5 What to Audit

This chapter details what is included in an industrial hygiene audit. It also reviews the commitment needed for a good practice industrial hygiene audit. A sample checklist is provided after each section of this chapter.

THIS CHAPTER CONTAINS:

What Does an Audit Include?

An audit includes:

- Program management
- Needs assessment

Program Management

The effective management of a site's industrial hygiene program is the key to controlling its health risks. This means using proven methods to recognize, evaluate, and control the health risks. An audit should include assessments to show whether the management of the industrial hygiene program recognizes, evaluates, and controls site risks.

Following are important items to audit for effective program management:

- Site occupational health policy. How does the policy compare with good practice? Is the policy conveyed to employees in a meaningful way?
- Documentation to show that employees are accountable for good practice
- Evidence of top management's involvement in industrial hygiene
- Procedure for employees to have questions answered regarding industrial hygiene risk
- Industrial hygienist authority to do his or her job
- Industrial hygiene management employee job descriptions

- Clear responsibility for the industrial hygiene program
- A top management system to ensure awareness of the status of industrial hygiene management
- Appropriateness of control programs in place

Needs Assessment

The consequence of many industrial hygiene stresses often are slow to develop. Consequently, program emphasis should be tied closely to chemical, physical, ergonomic, and biologic exposures where effects might not be obvious to the affected individuals.

Some important questions are:

- How are industrial hygiene risks identified?
- What are the qualifications of the persons responsible for discovering exposures? Have they adequate experience and training?
- Has the site-monitoring program measured appropriate concerns?
- Has a comprehensive industrial hygiene hazard survey been conducted?
- Are there periodic work site inspections and appropriate response action(s)?
- Has a process hazard analysis been conducted?
- Has timely investigation for every illness occurred?
- Is there a complete history of exposure data and employee medical data?

Review Questions:

1. How does top management effectively give support for an industrial hygiene audit?
2. Name four audit items for program management.
3. List four items used to determine the industrial hygiene stresses at a work site.
4. What three departments/groups must be committed for the success of an industrial hygiene audit?

INDUSTRIAL HYGIENE AUDITING — A MANUAL FOR PRACTICE
Program Management Audit Questions

	Y	N
1. Is the industrial hygiene staffing appropriate?		
2. Has the industrial hygienist worked in formal problem solving?		
3. Is there a job description outlining industrial hygiene management responsibilities?		
4. Is there an industrial hygiene operating plan and budget?		
5. Are the business and industrial hygiene goals in writing?		
6. Do most management people know the scope of industrial hygiene work and how this work helped the success of the company?		
7. Is there a signed company industrial hygiene policy?		
8. Does a resource plan covering both industrial hygiene staffing and equipment exist?		
9. Are there corporate management guides for industrial hygiene?		

Hazards Present

- Chemical stresses
- Physical stresses
- Ergonomic stresses
- Biological stresses

Industrial hygiene is the science and art of recognition, evaluation, and control of environmental stresses. These stresses arise at work. They can cause sickness, poor health, or discomfort and poor work among workers and the surrounding community.

An industrial hygiene audit evaluates factual records. It seeks to identify deficiencies in facility programs to address chemical, physical, ergonomic, and biological stresses.

Chemical Stresses

The auditor must evaluate the processes and chemical agents on site. He must determine how they are used. How much is handled? How often and for how long? Is the proper protective equipment being worn? What is the background of any employee's illnesses? Is it related to workplace exposure?

The audit must also evaluate Material Safety Data Sheets (MSDSs) or other manufacturer warning information. The MSDS describes the physical and chemical traits of the chemicals, product name, warning information, emergency measures, and control methods. Facility practices should be audited to see whether they agree with the MSDS. Where differences exist, a clear, documented rationale must be available.

Physical Stresses

Noise, temperature, pressure, and radiation are examples of physical stresses that should be audited. These stresses can cause acute or chronic illness depending on the amount, length of time, and frequency of the exposure. A thorough audit should check sampling results. The effectiveness of medical programs, such as hearing evaluations, should also be audited.

The effects of heat stress range from simple discomfort to serious illness, or death. The auditor will need to check workplace control methods. Factors of interest include air temperature, humidity, radiant heat sources, and air velocity. Also, the type and amount of work with the potential for creating ergonomic concerns is an issue.

Sources of radiation, both ionizing and nonionizing, might be used in the facility. For example, "X" and gamma radiation are used in industrial radiography. Gamma and beta radiation are used in thickness tests. They also are used in density and level gauges. Nonionizing ultraviolet radiation is used as a bactericide. Microwaves are used for cooking and communications. Lasers are used for communications and for computer manufacturing. The auditor must check the exposure monitoring records and evaluate radiation protection programs in effect.

Ergonomic Stresses

Ergonomic audits should check materials handling procedures and any use of mechanical aids. Offices, control room, equipment, and work station layout should be checked for good ergonomic design. Tool use also requires ergonomic evaluation.

Systems for work station and task review should be audited. These systems should reduce ergonomic stresses. The industrial hygiene audit of an ergonomics program also should check improvement plans for identified concerns.

An ergonomic audit can identify changes required reducing physical injuries and illnesses. These changes might also increase performance, improve maintenance, raise output and improve quality of products.

Biological Stresses

Biological stresses from plants, animals, microbiologic agents, or their products can present a health hazard to humans. Audit programs will vary in scope depending on the type of biological agent. The audit should evaluate procedures to identify and control biological agents of concerns. Again, this area will be of greater concern in some industries than others.

Review Questions

1. What hazard evaluations should be included in an industrial hygiene audit?

2. What record might give the auditor a baseline for comparison for determining variation in chemical exposures from accepted standards?

3. What five physical stresses could be audited?

INDUSTRIAL HYGIENE AUDITING — A MANUAL FOR PRACTICE Hazards Present Audit Questions		
	Y	N
1. Are MSDSs kept for all chemical agents on site?		
2. Are the MSDS guides followed by the site?		
3. Does the site have a system in place to track new chemical/physical agents?		
4. Are procedures in place to ensure that an accurate lists of chemical agents is kept?		
5. Are changes in the processes evaluated?		
6. Is the evaluation done prior to the process change?		
7. Is the evaluation process documented?		

Exposure Monitoring

- Exposure Monitoring Program
- Sampling Techniques
- Quality Control
- Sampling Results

An industrial hygiene audit checks the site's procedures for evaluating the potential risks to its employees. The full audit also determines whether all written procedures are being followed. The audit must determine whether the proper equipment and methods are used. Is equipment calibrated properly? Are the correct analytical methods being followed? Are samples being taken according to the schedule?

Exposure Monitoring Program

The audit should assess the facility's program to track and evaluate exposures. This program should be reviewed to ensure that an appropriate risk assessment program is in place. Does the program establish a monitoring schedule? Is the schedule followed?

As with all aspects of the audit a principle focus in this section should be on the availability of written documentation of the exposure monitoring program. If the program depends on knowledge held by a few individuals, and not documented, serious deficiency should be noted.

Sampling Techniques

To audit sampling the industrial hygiene auditor must have a good working knowledge of exposure monitoring methods and analysis. Personnel sampling should establish the level of employee exposures to the chemicals in the workplace. The audit should review monitoring records to determine employee exposure status.

For all types of sampling, the goal of the audit is to evaluate the facility's program to address potential employee risk.

Quality Control

Several questions arise when auditing exposure monitoring. For example: Was the equipment in use appropriate for the chemical or physical stress in question? Was the instrument calibrated? How were calibration records kept? What was the right air flow rate for the type of air monitoring pumps in use? What was the minimum sampling volume needed to provide enough chemical that could be found by the analytical method? How was area sampling linked with the personnel testing? Was the sampling interval (long-term, short-term peak) appropriate for the type of exposure? Part of the audit is to determine whether these questions were answered by the field industrial hygienist performing the exposure monitoring.

The industrial hygiene audit must ensure that accurate data about the site was given to the analytical laboratory. All data about the sample (i.e., flow rate, sampling volume, chemical to be analyzed, interferences, and time of sampling) must be given to the laboratory. Ideally, the laboratory should be certified by the American Industrial Hygiene Association. This certification is given to laboratories that meet strict quality control rules for analysis.

Sampling Results

Monitoring strategies, communication procedures for management and employees and the rationale for follow-up monitoring should be audited. It should be determined whether proper sample sizes and distribution were used. A review of exposure results should be conducted and retesting frequency should be part of the audit. Periodic exposure monitoring is an important part of any industrial hygiene program. The audit should decide whether enough samples were taken to check employee exposure. Actual exposure may be compared with recognized standards during the audit.

Exposure monitoring reports detail the industrial hygienist's evaluation of site monitoring. They include recommendations. Acronyms such as TLV or PEL should be defined. Their use should be kept to a minimum. As part of the audit process, industrial hygienists should audit the reports to ensure that technical data is clear and concise. Also, the audit should check for variations of the technical practices from both external and internal standards.

Review Questions

1. Name two elements of exposure monitoring?

2. How can the auditor be assured that the laboratory results are accurate?

3. What certification should a laboratory have to indicate that the lab maintains strict quality control?

4. What should be checked in industrial hygiene technical reports?

INDUSTRIAL HYGIENE AUDITING — A MANUAL FOR PRACTICE Exposure Monitoring Audit Questions		
	Y	N
1. Does the site's procedure respond to potential exposures?		
2. Does the monitoring program encompass all concerns?		
3. Are there sufficient tests to show true exposure level?		
4. Are basic processes always understood before testing?		
5. Do only AIHA-approved laboratories provide analysis?		

Exposure Control

- Hazards audit
- Engineering, work practice, or administrative controls
- Personal protective equipment

Auditing worker exposure controls, engineering controls, work practice controls, or personal protective equipment is the purpose of an industrial hygiene program. It requires a knowledge of the hazards at the site and the level of the exposure risk. Using this knowledge, the auditor can decide what types of controls should be in place. He also decides what level of control is needed and what supporting programs are necessary. Examples of closely related programs are training, preventive maintenance, and medical test programs.

Hazard Audit

When checking the effectiveness of controls, the auditor must review the hazards at the site. The auditor also must study employee exposure monitoring records, and there should be a review of medical complaints at the site. The auditor should find controls in place or a control plan for each hazard. The walk-through and the review of sampling data gives a snapshot in time about the controls. Checking historical data provides a way to evaluate long-term exposure control.

If the audit includes personal or area exposure monitoring, the auditor should look at the controls in place to address any concerns raised by the results of this monitoring. The auditor should also check their effectiveness. The audit might include checks of ventilation systems, equipment to reduce physical stresses (such as isolation of noise, shielding of radio-frequency energy), or lasers. Discussion with affected employees might also be included to determine whether the workers' perceptions match the program's intent.

Engineering, Work Practice, or Administrative Controls

Engineering controls require constant attention. The auditor should check the facility's preventive maintenance program to learn if exposure controls are included. Preventive maintenance should include timely checks of control systems. For example, preventive maintenance for ventilation systems should include checks of airflow at capture points. Fans and belts should also be inspected. The auditor must determine whether such checks are being made. Written logs should be maintained documenting preventive maintenance activities.

Work practice or administrative controls need training support and supervision to be effective. The auditor should check the way

new employees are trained and refresher training procedures for existing employees. The auditor should evaluate whether there are procedures to review work practices and administrative controls on a regular basis.

Personal Protective Equipment

Checks of personal protective equipment (PPE) should include all aspects of the administrative program. The need for PPE depends on the control systems present. Do they control for chemical, physical, ergonomic, and biological stresses?

The PPE administrative program should include records of the following:

- The process to select PPE
- Training on the proper use of PPE
- Upkeep, cleaning, and storage of PPE
- Evaluating physical ability to use PPE
- Supervisory methods to ensure PPE is used properly

The audit should include review of the written program. It should review records to make sure training and medical checks are performed as needed. Observations on actual PPE use and compliance with programs should be documented during the physical review of the facility.

Administrative Programs

The audit of an exposure control program should also include the administrative activities needed to carry it out. The following procedures should be checked in the audit:

- Methods used to train employees in the purpose of controls and their responsibilities
- Methods used to check control effectiveness
- Follow-up methods to repair or upgrade inadequate controls
- Engineering or process change review method to evaluate any need for controls before start-up

Review Questions:

1. What three systems dictate the need for PPE?

2. Name five administrative tasks for audit to be sure about proper PPE.

3. Name four stresses that might require PPE.

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE
Exposure Controls—Personal Protective Equipment Audit Questions

	Y	N
1. Have the hazards in the facility been identified?		
2. Have identified hazards been evaluated for exposure to employees?		
3. Are controls in place for hazardous exposures?		
4. Are control plans being developed where controls have not been put in place?		
5. Do preventive maintenance programs include evaluating performance, in addition to mechanical maintenance?		
6. Are ways in place to be sure new equipment is checked for any needed controls?		
7. Are training programs in place to be sure of proper use of work practice or administrative controls?		

Continued

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE Exposure Controls—Personal Protective Equipment Audit Questions—*Continued*		
	Y	N
8. Is there a way to be sure that proper work practice and administrative controls are followed?		
9. Are written methods in place for PPE use?		
10. Do written methods include:		
Selection needs		
Training needs		
Maintenance, cleaning, and storage needs		
Medical examination needs		
Oversight methods		

Equipment Maintenance/Selection

- Industrial Hygiene Monitoring Equipment
- Direct-Reading Gas and Vapor Monitors
- Respiratory Protection

Auditing for the right sampling equipment that fits the use, needs, and cost limitations is no easy task. Understanding the site's sampling needs must precede the audit of the equipment. Today there is a wide range of choices in equipment. This gives the industrial hygienist many options about how to proceed. For example, there are more than 20 combustible gas meters on the market. The choice will rest partly on whether a direct readout is needed. Is electrical fire safety a need? Are there differences in shelf-life of the sensors? Checking for the right selection and maintenance of equipment is key for auditing employee exposure monitoring data.

Industrial Hygiene Monitoring Equipment

Selecting monitoring devices depends on the following:

- Sampling goal
- Nature of the stresses
- Accuracy and sensitivity of the equipment
- Possible interferences
- Cost and reliability of the method
- Duration of sampling period
- Ease/complexity of equipment operation
- Regulatory requirements

These elements should be audited as appropriate. The audit should include review of equipment used to collect samples for laboratory analysis, such as air pumps. Calibration and maintenance records should be audited. Records should show that the equipment was calibrated before sampling began, and then rechecked during and after the sampling period. If equipment is being used in potentially flammable or explosive atmospheres, the equipment selected should be intrinsically safe. Is radio-frequency (RF) shielding necessary? The auditor should examine the sampling applications to determine whether this was considered. The auditor should make sure that the equipment has been selected appropriately and fits with the exposure monitoring strategy of the site.

Flow-rate adjustment is critical when using an air-sampling pump. The basic instrument that is used to determine flow rate is a bub-

ble meter. Other devices include a rotameter, a critical orifice, a stroke meter, and a constant-flow sampler.

The auditor must determine whether these flow-rate meters are calibrated properly. This will verify that the pump was operating at the desired flow rate, according to sample collection protocol.

The physical form and makeup of a chemical stress determines the type of collection media used for the sample. Media varies for gases and vapors vs. sampling for dusts. Media selection for gases and vapors includes the use of liquid-media samplers. These types of samplers include gas-wash bottles, glass-bead columns, fitted bubblers, and spiral absorbers. Also, the use of solid-sorbent tubes is common for sampling nonreactive or insoluble gases and vapors. Media selection for dusts includes the use of filters, cascade impactors, impingers, precipitators, elutriators, and cyclones. Based on the types of samplers that are used, monitoring data should be audited to be sure the correct media was used for the application.

Direct-Reading Gas and Vapor Monitors

Field industrial hygiene relies heavily on being able to make quick safety decisions based on actual conditions. The interest in obtaining real-time field data has vaulted equipment makers into the direct-reading instrument market.

The auditor must pay special attention when checking the selection and maintenance of direct-reading instrumentation. Since the field industrial hygienist relies heavily on real-time readings for decision-making purposes, calibration must be performed often. The audit should check that calibrations follow the manufacturer's specifications. There is potential of chemical cross sensitivity with many direct-reading instruments, so the auditor must pay special attention to the limitations of the equipment. Complete records of all calibration procedures, actual data, and results should be maintained in logbooks, and always be kept with the instruments. Additional job-specific record keeping should be audited. This includes calibration data for the instrument used. Additional information for audit includes temperature, employee's name, job title, and social security number. Documentation of any field conditions that could have affected the accuracy of the instrument should be considered during the audit.

When auditing the maintenance of this equipment, the auditor must review for documentation to show what happened. Information about the frequency of factory calibrations, cleanliness, decontamination (especially for use at hazardous waste sites) and storage should be present for audit. Special attention should be paid to the cleanliness of photoionization detectors. Because the lamps used in this equipment can become dirty quickly, inaccuracy could result. Radio-frequency shielding is also of value with direct-reading instrumentation. RF interference can adversely affect both digital and analog readouts.

Respiratory Protection

The following items affect respiratory protective equipment:

- Need for multiple sizes of masks
- Manufacturer
- Current exposure data
- Data on cartridge, canister, or filter goodness
- Throw-away or reusable respirators
- User comfort
- Cost
- Simplicity of operation/upkeep/repair
- Approval from NIOSH or MSHA
- Odor threshold data
- Physical state of stress

The auditor should check records of how respirators are provided to users. Audit how

often worker exposures are examined and how often fit tests are performed.

When breathing air is supplied, the auditor should also check the type and installation of air compressors. This is to be sure that Grade "D" breathing air is provided. The auditor should also check maintenance, inspection records, and general record keeping for testing supply air.

Respirator maintenance is key to a respiratory protection program.

- Methods for cleaning and disinfecting of respirators
- Methods for respirator storage
- Maintenance, inspection, and repair methods/logs
- Hydrostatic testing of breathing air cylinders

Review Questions

1. Should the auditor check monitoring equipment and be sure it was appropriately selected?
2. The field industrial hygienist relies on real-time readings for decision-making purposes. What essential step should be performed often, and documented in the logbook for audit?
3. Should sample data have been analyzed by an AIHA-accredited laboratory?
4. Should the calibration logbook be stored with the piece of equipment?
5. What are two main factors the auditor should check for decision logic with respect to selecting pumps for an exposure assessment?

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE
Equipment—Maintenance, Selection Audit Questions

	Y	N
1. Are written methods in place for PPE use?		
2. Do written methods include:		
Selection needs		
Training needs		
Maintenance, cleaning, and storage needs		
Medical examination needs		
Oversight methods		

Regulatory Compliance

- Regulatory organization
- OSHA regulations

Evaluating a facility's industrial hygiene program for compliance with federal, state, and local regulations is often a principle goal of an audit.

Note that though references to OSHA regulations are used in this section, the basic principles of auditing regulatory compliance apply anywhere. Auditing for regulatory compliance can be difficult when using just a fixed general checklist. Over time, changes in regulations can be expected. New regulations are issued and might be updated, changed, or even eliminated. Also, depending on the

location of the site, different regulations might apply. State or local regulations, for example, might exist with no comparable national standards.

The type of operations at a site will determine which regulations apply. Health and safety needs for a foundry will differ from those in food processing or in a refinery. Even within an industry, differences will be found in the chemicals and processes used. The geographic location, and the size of the site might make a special audit necessary.

In addition to occupational safety and health agencies, other groups might have regulations that apply to a particular site. The U.S. Nuclear Regulatory Commission (NRC) has basic control over the buying, storage, use, sale, and disposal of radioactive materials for both man-made and naturally occurring isotopes. Radioactive materials can be present in many forms and products. They range from powders for coatings to sealed sources for checking welds. Government regulations outline basic needs for employee protection and general handling methods such as posting of areas and storage.

The U.S. Environmental Protection Agency (EPA) sets guides for polychlorinated biphenyl (PCB) surface contamination. It also is involved in asbestos regulations and controls use of some chemicals in the Toxic Substance Control Act (TSCA). The future probably will bring more regulations from the EPA in areas such as indoor air quality.

Auditing for compliance must begin with establishing which regulations apply to the site. The methods, processes, and chemicals used will determine which are applicable. The industrial hygiene audit should be limited to regulations having an impact on occupational health programs. The audit should also check the site's method to establish which regulations apply to facility operations.

In addition to checking the regulations that might apply to a facility, the audit team should inquire to determine what resources and mechanisms available to facility personnel for staying abreast of current regulations and regulatory interpretations. Besides on-site access to current regulations, some form of update service also should be available. Ideally this service also provides information on proposed regulations as well as those presently in effect.

The desired level detail of the compliance audit should also be established. An all-encompassing level of detail can be unacceptably time-consuming. A brief review, however, might not be sufficient to reveal all deficiencies. Since regulatory compliance audits focus on paperwork, a specific amount of time should be set aside for review of records.

Overlap between audit topics can be expected. Regulatory issues will be examined in many of the other audit areas.

OSHA Regulations

Many OSHA regulations might impact the audited site. Following are some specific regulations that should be checked:

- **Hazard Communication**
  - — Written program
  - — Labels
  - — Training
  - — Material Safety Data Sheets

- **Hearing Conservation**
  - — Surveys completed
  - — Audiograms completed
  - — Training

- **Respiratory Protection**
  - — Written program
  - — Training
  - — Physicals
  - — Fit testing and records

- **Hazardous Waste Operations and Emergency Response**
  - — Training
  - — Emergency response
  - — Medical surveillance
  - — PPE
- **Eye and Face Protection**
- **Toxic and Hazardous Substances** (e.g., lead, arsenic, asbestos)

Privacy of employee exposure and medical records is important. Procedures to ensure protection of records should be checked. Limited access, locked storage files, and proper employee records release forms should also be audited. Regulations require specific records, and these records should be audited. Finally, notices of violations about health and safety should be checked. The items of noncompliance, the type of violation (such as serious or willful) and corrective actions taken should be noted. The current status for past violations also should be audited. Prompt attention to citations is important to any industrial hygiene program.

Review Questions

1. List three variables that affect which regulations apply to a specific site.
2. Indicate other types of agencies that might issue health and safety-related regulations.
3. Name five general health and safety regulatory issues that should be audited.

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE
Regulatory Compliance Audit Questions

	Y	N
1. Is an employee named for regulatory compliance?		
2. Do they have up-to-date resources on new regulations?		
3. Are records kept in one location?		
4. Are private records kept private?		
5. Is the site covered by an OSHA-approved state program?		
6. Have state regulations been sought?		
7. Has local government issued regulations that apply to the site?		
8. Does the site use or handle asbestos or PCBs in a manner covered by TSCA?		
9. Are written programs on file and open where required by specific regulations? (See examples in text)		
10. Are programs in place to meet specific operations or chemical health and safety regulations (e.g., lead, arsenic, PCBs)?		
11. Is radioactive material used?		
12. Is an NRC license in place?		
13. If so, are the needs of 10 CFR Parts 19 and 20 being followed?		
14. Has the site been checked by an OSHA compliance officer?		
15. Have notices of violation, if any, been followed up and recorded?		

Training

- Purpose
- Training elements
- Outside services and contractors

Audits should be performed to evaluate the effectiveness of training programs. Training programs should convey health and safety information to employees. They should address safety and health hazards and explain how safety procedures and controls can prevent work injuries and illnesses.

Elements of a Training Audit

A training audit should include review of:

- Employee population selected for training
- Goals for training stated
- Content of the training
- Schedule
- Ways to measure success
- Profiles of trainer(s)
- Means to follow up and correct any weakness found

Selected Population

Employees should be selected for training based on their exposure to potential hazards. At a minimum, it should also include those from government regulations. There should be a system to track new hires and employees who are sent into targeted work groups. Training should be given to employees prior to exposure to hazards.

Goals for Training Clearly Stated

Course goals should be used in planning training. They should be clearly set out as part of the course. The training and experience of participants should be considered in the developing of course material.

Content of the Training

Course content should be consistent with the potential hazards of a process and should agree with government regulations. Some training requirements provide detailed lists of the materials that must be covered in employee training.

Mechanism for Measuring Success in Meeting Goals in Place

The way a company determines whether employees understand process risks should be audited. The challenge for the trainer is not only to share information, but to be sure employees understand it. Feedback methods include course evaluations and employee post-tests. These tools test real learning.

Credentials of Trainer(s)

The person(s) giving the training should be appropriately knowledgeable in the issues of concern to present the material. They should also be able to answer questions. The training program should be overseen by a knowledgeable safety and health professional. This information should be recorded and audited.

Follow-up of Correction for any Deficiencies

Course feedback should be used by the trainer(s) to improve training courses. Follow-up should contain methods to account for who did not receive required training. The training schedule should also specify what training is needed by employees and when it needs to be conducted both initially and as a refresher.

Outside Services and Contractors

Training of contractor employees often is the duty of the contractor employer. The host firm must supply the contractor with information on site hazards. On the other hand, con

tractors must inform the company about chemicals or hazardous processes brought on site. They must also provide Material Safety Data Sheets. This might be most important when the employing firm does not have the knowledge to train the exposed workers.

Contract or temporary employees (who are given work and supervised by the company) should be in training programs just like a regular employee. Employees contracted to do the company's work off site are often the employees of another firm. Safety and health information about the work should be given to their employer. Responsibility for training should be dealt with in the contract. Audit to ensure that contractors are given sufficient training to ensure the safety of their workers and nearby facility employees.

Review Questions

1. What is the purpose of an industrial hygiene training audit?
2. Name seven elements of a training audit.
3. Who is responsible for contractor training?

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE
Training Audit Questions

	Y	N
1. Are all training programs to be clearly documented?		
2. Are training manuals written for the target user, not the trainer?		

Emergency Planning

Emergency planning and response includes industrial hygiene activities in many areas. In the United States, emergency response programs often are driven by OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standard. The standard has regulations tied to emergency planning and response at hazardous waste sites. The regulations also relate to RCRA sites and non-waste site conditions such as a spill or release at a manufacturing site. The regulations include health-related items such as medical checks, training, and PPE use.

In the same way OSHA standard 1910.38 (Employee Emergency Plans) details regulations for site emergency action plans and fire protection plans. Parts of the regulations look at training, rescue, and medical duties. All of these should have input from industrial hygienists.

The audit should begin by evaluating the facility's emergency plan and the planning process. The effectiveness of an emergency response relies on proper planning and assignment of responsibilities. The core of this element should be a written emergency plan. The plan should document all aspects of the emergency response process, including evaluation of potential hazards, assignment of responsibilities, coordination with outside agencies, reporting or alarm procedures, escape routes and procedures for accounting for all evacuees, emergency equipment available, and location and training of response personnel. How the response plan was developed and who was involved in the process should be reviewed. A coordinated effort with input from the health and safety department, production or operations management, maintenance, and any other critical group is necessary. The facility plan should identify all potential emergencies such as buyer chemical releases or natural disasters. The response

action detailed in the plan should be specific to the type of emergency.

Emergency planning also calls for site response teamwork with outside services (e.g., fire department, hazardous material units, police, hospitals). Material Safety Data Sheets and site plans will also need to be shared. This may be required by regulations or a voluntary effort of the site to cooperate with the local services.

The industrial hygiene audit should evaluate training, medical check-ups, and PPE elements of emergency planning. Training should be a primary concern of the audit. Several aspects should be checked. First, have the exact training needs of the regulations been met? Many of the regulations set the number of hours of classroom-type training. For example, under HAZWOPER, training may range from 8 to 40 hours or more. Experience under a trained supervisor may also be mandated and include a specific time limit. Additional training and experience that makes an employee competent as an emergency provider also should be documented.

Training time does not always reflect the quality or adequacy of the training. The provider of the training should be noted, as should the instructor's background. Also, check the fit of the training content to the needs of the site. Finally, all training must be documented. Daily class sign-in sheets, course work, and certificates of completion should be checked.

Employees involved in emergency services should be in a medical surveillance program. The content, frequency, and adequacy of examination tests should be audited. Records should show the data from the physical, its content, and the physician's written opinion (including respirators), and limitations of the employees. Confidentiality of records must be maintained, of course.

Personal protective devices for the emergency responders must be appropriate for the hazards that might be encountered. Equipment for emergency responders should be in the audit of protective gear set out earlier in Section D. Standby equipment for emergency response must be inspected regularly to ensure proper condition and readiness. This ensures that the right equipment is available and fit for use. The storage area should be checked for its proximity to high risk areas. The equipment should be protected from potentially harmful exposure to dirt, sun, and chemicals.

Medical and first aid issues have separate emergency planning needs. Emergency medical response and first aid needs will vary with the type and size of the site. The proximity of outside medical services also affects site response needs. As a general rule, a site should have trained and certified first aid provider if emergency services are more than 10 minutes away. First aid supplies must be in a suitable location. There must be enough supplies and any specialty first aid items (e.g., for treatment of cyanide poisoning or hydrofluoric acid burns).

Finally, the effectiveness of the emergency response program should be tested through drills and mock emergencies. The audit team should inquire about drills to determine the frequency, types, and means of evaluating response action.

In summary, the audit team must see that emergency response programs are documented, address all potential hazards and incidents, provide for properly trained equipped response personnel, and include provisions for drills and follow-up.

The appendixes in this manual contain checklists that should be useful in evaluating emergency response plans.

Review Questions

1. List three key elements of a site emergency plan.
2. What groups in an organization should participate in emergency planning?
3. What type of records related to emergency planning should be checked during an industrial hygiene audit?

INDUSTRIAL HYGIENE AUDITING—A MANUAL FOR PRACTICE Emergency Planning Audit Questions		
	Y	N
1. Does the site have a written emergency plan?		
1a Does the plan meet the needs of OSHA regulations (i.e., 1910.38 and/or 1910.120)?		
2. Are lines of authority and names of responsible people shown?		
3. Are enough people trained as emergency responders?		
4. Is training recorded?		
5. Has a site-wide hazard check been done?		
6. Have response plans been reviewed and worked out with community emergency service givers (i.e., fire department, HAZMAT teams)?		
7. Is there enough emergency response equipment, including PPE?		
8. Are responders part of a medical check-up program?		
9. Is the site set to respond to medical emergencies with trained aid providers and supplies?		

4 Conducting the Audit

When the planning and preparation for the audit has been completed, the site visit is conducted. The audit team may work together or separately with their facility counterparts according to individual task assignments, facility customs/culture, and audit parameters and scope.

THIS CHAPTER CONTAINS:

Introductory Meeting

The first responsibility of the audit team after arriving at the facility is to have an introductory meeting with top management and key personnel. The purpose of the meeting is to introduce the audit team, discuss the purpose, scope and objectives of the audit, review the audit schedule or agenda, and answer any questions the facility management might have. The audit team should also use this time to clarify the preliminary information provided by the facility or to remedy any omissions. The meeting presents an opportunity to establish open lines of communication and set the tone of the audit.

Preliminary Tour

A person knowledgeable of all facility operations should lead the audit team on a preliminary tour of the facility. The preliminary tour helps refine the scope of the audit. The tour is an opportunity for the audit team

members to make themselves familiar with the facility layout and discover any potential problem areas not identified during the pre-audit preparation phase. Previously determined audit priorities and agendas may be revised as a result of this preliminary tour.

Records Review

A thorough review of the facility's records can help audit team members formulate accurate impressions of the past and current state of the industrial hygiene program and the facility's general compliance status. Depending on the audit's parameters and scope, some or all of the records may be reviewed. Audit team members might wish to make photocopies of certain records for later reference during report preparation. Care must be taken to ensure preservation of the confidentiality of company or personal records. Records should always be kept in a secure location, preferably under lock and key. A written log detailing who has what records should be maintained for all documents to be returned to facility personnel at the end of the audit.

Detailed Facility Assessment

Using the revised agenda, the audit team should conduct an in-depth assessment of the facility's industrial hygiene program, within the communicated audit parameters. The assessment typically will include a detailed comparison of the information obtained from past audits, the preliminary tour, a thorough records review and discussions with management regarding the current observed status of the facility's program.

Notes taken during the detailed assessment can be accompanied by photographs, and copies of the facility's sampling results and control programs. The audit team should schedule end-of-day team debriefings and allow time for note taking, schedule and agenda revisions, and team discussions.

Closing Meeting

Information gathered during the facility site visit can be organized and reviewed prior to the closing meeting, when an overview of the audit findings should be presented to facility management. The formulation of some specific recommendations might require additional time, but the general intent of all recommendations to be submitted in the final report should be clearly communicated to facility personnel during the closing meeting. It is important that the audit team conduct the closing presentation as a team to ensure that all participants receive the same overview of the expected audit report.

All general findings and anticipated recommendations must be shared with key facility personnel. Particular attention should be given to problems requiring immediate attention to ensure that corrective action can be initiated without delay. Situations involving current danger to employees or facilities should be communicated immediately to management throughout the audit process and reiterated during the closing meeting.

Both the facility personnel and the audit team members should use the closing meeting as an opportunity to discuss any unresolved questions or concerns. A timetable for the final report should be established. The overall tone of the closing meeting should be as positive as possible, and positive findings and identified deficiencies should be presented. The meeting should be to the point and brief. Details of each issue should be discussed between appropriate facility personnel and audit team members outside of the closing meeting, or at least be delayed until after the established priorities for corrective action are discussed and summarized. The closing meeting is a time to briefly inform facility management of all anticipated recommendations to be included in the final report, and focus on high priority issues. Attempts to cover all issues in detail might serve only to

distract facility attention from the items needing immediate action.

Audit Documentation and Reports

Documentation

Proper documentation is critical to the industrial hygiene auditing process. Documentation provides a consistent means to inform others of the audit scope and findings, and it serves as a historical record of the audit. Documentation resulting from a completed audit should consist of:

- Preliminary information originally received from the facility
- Detailed inspection notes, photographs, and other information collected during the site visit
- Final report and any follow-up reports or correspondence

All data collection procedures used during the audit process should be documented and, to the extent possible, standardized. Documentation of the audit procedures is important for historical purposes. Audit records could become important for epidemiological or legal purposes many years in the future.

Audit documentation can and has been used as evidence both to support and criticize a company's specific occupational disease prevention program. Regardless, documentation is a necessary part of industrial hygiene management, and records should be retained at least until all issues are properly addressed and then archived or destroyed in accordance with a written records maintenance and destruction schedule. Many regulations include specific document retention requirements. Take care to ensure these requirements are met.

The last and perhaps most important aspect of documentation, is to document the corrective action taken as a result of the audit recommendations and archive this documentation with the audit report. Without sufficient follow-up and resolution of recommendations, the file is incomplete and can serve only to discredit the program at some point in the future.

Report Preparation

The audit report document should address the audit scope and procedures, observations, conclusions, and recommendations. It should be clear, concise and factual, and not contain subjective or accusatory language or conclusions. A typical standard report format includes the following sections:

- Executive summary
- Introduction
- Statement of findings/observations
- Conclusion
- Recommendations
- Appendixes

Executive Summary

The Executive Summary consists of a concise, brief overview of the audit purpose, conclusions, and recommendations, and might be the only part of the report that is read by senior management. It usually is best to write this section after the rest of the report has been written. The Executive Summary should be no more than two pages, preferably one.

Introduction

The Introduction section contains the who, what, when, where, and why of the audit. This includes the parameters and the scope of the audit, and the names of audit team members and facility management personnel.

Statement of Findings/Observations

The Statement of Findings/Observations should detail the discoveries made during the

records review and the detailed facility assessment phase. Industrial hygiene auditors should strive to present only statements of facts in this section of the report. Findings should include both positive and negative comments regarding the facility's programs.

Conclusion

The Conclusion section contains statements of deductive reasoning based on the factual information in the Findings/Observations section. Although the use of subjective comments and opinions based only on professional judgment are unavoidable in some instances, industrial hygiene auditors should strive to base conclusions firmly on objective statements of fact detailed in the Findings/Observations Section.

Recommendations

The "Recommendations" section contains the auditors' suggestions for corrective action to correct deficiencies noted in the "Conclusion" and "Findings/Observations" sections of the report. Recommendations should be as specific and helpful as possible, and may include more than one option to offer a facility a variety of possible solutions to a specific problem. Details of a recommendation (e.g., ventilation schematics) should be placed in an appendix and not in the recommendations section of the report. Make it clear that there is more than one way to solve most concerns.

Recommendations should be quantitative in some manner to allow persons responsible for the corrective action to determine when a recommendation has been fully or partially completed. A priority code (A,B,C, etc.) may also be assigned to each recommendation to assist the facility in completing the most important items first. Priorities can be placed in the Recommendations section with the definition and explanation of the priority setting system contained as an appendix.

Appendixes

It frequently is desirable to include additional information to supplement and clarify statements in the main body of the report. Information contained in appendixes may include photographs, maps, drawings, copies of previous reports, analytical results, process descriptions and flows, and other reference materials pertinent to the report.

Report Distribution and Follow-up

A draft of the report should be circulated among the audit team for individual comments and then sent to the audited facility for its comments. If the report contains suggested corrective actions, the facility's attention should be directed specifically to that section (the Recommendations section) to ensure that the time for abatement is understood and possible. The facility may also be asked to identify the specific personnel that will be responsible for completing action on each recommendation. A deadline should be set for completion of the review of the draft report. Facility comments should be considered carefully by the audit team, but modifications that substantially change the final report content should not be included without full agreement of the audit team.

After the final report is transmitted, periodic progress reports might be required from the facility on its status for completing the recommendations. Recommendations may be tracked until completed, and all recommendations should generally be completed by the next regular audit. Follow-up activities depend on the auditing process and requirements requested by the facility or other customer.

Confidentiality of Audit Reports

Industrial hygiene program audits may or may not be treated as "attorney/client privileged information" based on advice from

legal counsel. At the direction of legal counsel, distribution of audit reports may be restricted to only those facility personnel who "need-to-know" the details of the report in order for the recommendations to be completed adequately. Industrial hygiene auditors should resolve this legal question with legal counsel as early as possible in the audit process and well before the distribution of the industrial hygiene audit report. Legal confidentiality can usually be claimed only when the audit is based on attorney request.

More detail on report preparation can be found in Chapter 6 (Post-Audit Activities).

Questions

1. List the five phases of an audit site visit.
2. What is the purpose of the introductory meeting phase of the site visit?
3. What should be discussed in the closing meeting phase of the site visit?
4. List the six sections of a standard industrial hygiene audit report format.
5. Why should recommendations be "quantifiable"? When should the tracking of a recommendation cease?