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INDUSTRIAL HYGIENE SAMPLING DECISION-MAKING, MONITORING AND RECORDKEEPING. 555, ADMINISTERING A SAMPLING PROGRAM

SYSTEMS CONTROL, INC., (VT), PALO ALTO, CA

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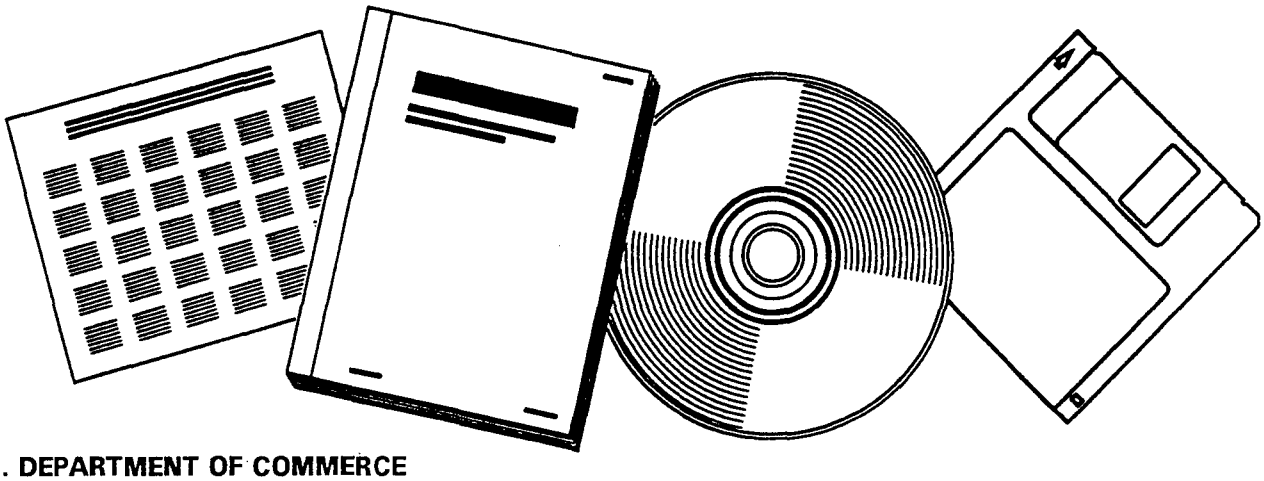

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

INDUSTRIAL HYGIENE SAMPLING

Decision-Making, Monitoring & Recordkeeping

555 ADMINISTERING A SAMPLING PROGRAM

U.S. Department of Health, Education & Welfare
Public Health Service
Center for Disease Control
National Institute for Occupational Safety & Health
Division of Training & Manpower Development

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Technical Report X
SCI Project 5147

INDUSTRIAL HYGIENE SAMPLING STRATEGY

AND

METHODOLOGY COURSE PACKAGE

PART III

TWO-DAY NON-TECHNICAL COURSE

Prepared for:

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Safety and Health
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16. Abstract (Limit: 200 words) This report presents the basic course guide for the 2 day nontechnical part of the Industrial Hygiene Sampling Strategy and Methodology Course package. Topics covered included legal aspects of sampling, recognition and determination, sampling methods and strategies, economic impact, technical assistance and future trends. The objectives included recognizing the organizations instituted by the OSH Act and record keeping responsibilities, recognizing legal implications of the OSH Act and the sampling aspects of the Act, recognizing implications of the six exposure monitoring regulations impact areas, identifing and classifing toxic air contaminants, completing a workplace raw material survey and identifying existing air contaminants in the workplace, calculating potential exposure concentrations and recognizing the contents of an Occupational Environmental Determination Report, mastering the Industrial Hygiene Background for the Manager Module of Instruction, correlating exposure standards to a systematic flow diagram of operational steps, answering questions about the OSH Act of 1970 and the Proposed Exposure Standards, recognizing the economic impact of the OSH Act of 1970, selecting sampling equipment as well as an industrial hygiene consultant, making use of NIOSH and OSHA Services and other organizations that can assist and advise, and providing feedback about the course.

17. Document Analysis a. Descriptors

b. Identifiers/Open-Ended Terms Industrial-hygiene, Air-sampling, Air-contamination, Training, Sampling-equipment, Workplace-studies, Regulations, Air-sampling-equipment

c. COSATI Field/Group

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OVERVIEW

This document contains the basic course guide for the two-day non-technical part of the Industrial Hygiene Sampling Strategy and Methodology Course Package.

The agenda for this part of the course is presented on the following page.

Some of the material for this part of the course is still in preparation and will be submitted within the next few weeks.

COURSE AGENDA

The agenda for Part III, the Two-Day Non-Technical Course, is detailed as follows:

Day 1 (Periods 1 - 8) Industrial Hygiene Background for the Manager

Lesson	IHM1)	Orientation
	IHM2)	Legal Aspects of Sampling I
	IHM3)	Legal Aspects of Sampling II
	IHM4)	Legal Aspects of Sampling III
	IHM5)	Recognition and Determination I
	IHM6)	Recognition and Determination II
	IHM7)	Recognition and Determination III
	IHM8)	Review

Day 2 (Periods 1 - 8) Federal Regulations and Employer Guidelines

Lesson	M1)	Legal Aspects of Sampling IV
	M2)	Legal Aspects of Sampling Workshop
	M3)*	Sampling Methods and Strategies
	M4)*	Sampling Methods and Strategies Workshop
	M5)	Economic Impacts
	M6)	Technical Assistance
	M7)*	Future Trends
	M8)	Review and Evaluation

* Still to be prepared

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Orientation IHM1

TIME: Industrial Hygiene Background for the Manager Module, Period 1 (50 minutes)

OBJECTIVES: Enable the trainee to use the course materials for maximum learning efficiency.

EXHIBITS: None

KEY TERMS: No new key terms introduced.

MATERIALS: Student Manual
Pencil and eraser

METHODS: Read Explanation/Lecture; listen to the instructor's lecture.
Take notes for later discussion

CONTENTS

The following is an outline of the contents of the Orientation lesson:

INTRODUCTION

Welcome to the 2-day Non-Technical Course. This Industrial Hygiene Sampling Course (Industrial Hygiene Sampling Course A) is offered by the NIOSH Division of Training and Manpower Development to help fulfill the responsibilities of the U.S. Department of Health, Education and Welfare under the Occupational Safety and Health Act of 1970. The 2-Day Course is part of a NIOSH program that trains industrial hygienists, employers, and others who are concerned with the recognition, evaluation, and control of occupational health and safety standards.

This lesson gives you a chance to get acquainted with various aspects of our course. The instructor will give you a briefing on how the course will be conducted. Now is the time to ask any questions you may have about the course materials, facilities, etc.

EXPLANATION/LECTURE

COURSE SCHEDULE

This course is designed for completion in two full days of classwork. Course content is organized into two units of modular instruction, and each day or module consists of eight 50-minute class sessions; four in the morning and four in the afternoon. This schedule allows a 10-minute break between each session and a lunch break between the morning and the afternoon sessions.

LESSONS

The lessons in each module feature either a lecture, or a workshop. All but the last day of instruction conclude with a review lesson to help reinforce the material learned in that module. The final class session of the entire course is devoted to a course evaluation, and an informal question and answer period.

Each of the lessons in the course begins with an "overview" page that tells you what to expect in that part of the instruction. The overview for each lesson gives you important information about:

- Lesson name and number
- Lesson objectives
- Exhibits or visuals found in the lesson
- Special words or "key terms" of importance in the lesson
- Materials needed
- Methods of instruction

The overview is followed by an outline of the contents of the lesson. The rest of the lesson usually contains explanation/lecture notes, exercises, or

other related instructional material. Most lessons close with a list of the references that had been noted in the text or that might provide further information to an interested student on a particular subject.

Workshops

Workshop lessons contain a number of exercises, usually multiple choice, followed by the solutions to the exercises. You are allowed to look back through the text, as needed, to answer these exercise questions.

Audio-Visual Aids

The instructor will show slides in many of the lessons. Copies of these slides are found in the text material and are referred to as Exhibits. All Exhibits/Slides are titled and numbered for easy reference.

STUDY TIPS

No specific homework assignments are included in this course. However, there is a great quantity of information for you to absorb during this two-day course. Therefore, you are urged to review nightly all lessons covered during that day and all lessons to be presented on the following day. The more familiar you are with the course material, the easier the course will be and the more completely you will learn.

While reviewing material previously covered, spend time on the areas that gave you some difficulties: Reread hard passages and study carefully the examples given to illustrate a difficult point until you have mastered the material. Then, read the module to be presented the following day, absorbing as much as you can. This way, you will be able to confidently and efficiently proceed throughout the course.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Legal Aspects I IHM2

TIME: Industrial Hygiene Background for the Manager Module, Period 2 (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Recognize the organizations instituted by the OSH Act
2) Delineate record keeping responsibilities

EXHIBITS: None

KEY TERMS: (In order of occurrence)

OSH Act
NIOSH
NACOSH
OSH Review Commission

MATERIALS: Student Manual
Handout of OSH Act

METHODS: Read Explanation/Lecture; listen to instructor's lecture. Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Legal Aspects I Lesson:

INTRODUCTION

The Occupational Safety and Health (OSH) ACT of 1970 (Public Law 91-596) is one of the most far reaching Federal laws ever enacted. The Act has as its purpose, "to assure so far as possible every working man and woman in the nation safe and healthful working conditions...," which basically means that every worker who is even remotely involved in interstate commerce and who is not covered by any other Federal Act superseding OSHA (e.g., the Coal Mine Safety and Health Act and the Metal and Non-Metal Safety Act) is protected. Even such workers as agricultural and domestics, usually excluded under worker-oriented laws, are covered under this one. Thus the law covers almost everyone working: approximately 57 million people in some 4.1 million workplaces. No other piece of worker legislation is so encompassing.

The Act has these means to accomplish its purpose:

- The development and promulgation of occupational safety and health standards;
- The Federal enforcement of occupational safety and health standards;
- Scientific, medical and technical research;
- Occupational safety and health training and education;
- The development of the corps of safety and health manpower; and
- A program through which the states can up-grade their occupational safety and health activities, thereby qualifying for the right to administer and enforce their own respective programs.

In addition to outlining how all of this is to be done, the Act spells out a basic set of workers' rights. It further provides for record-keeping requirements, statistics gathering and dissemination and establishment of advisory and study committees.

To implement, enforce and administer its provisions, the Act created two new agencies, one within the Department of Labor and another within the Department of Health, Education and Welfare. The Labor Department's Occupational

Safety and Health Administration (OSHA) is responsible for overall administration and enforcement. HEW's National Institute for Occupational Safety and Health (NIOSH) is responsible for primary research and manpower development; its relationship to OSHA is mainly advisory. In addition, the Act created the semi-judicial Occupational Safety and Health Review Commission which is independent of both the Labor Department and HEW. The Review Commission renders decisions on appeals from aggrieved parties, for the most part employers who feel they have been unjustly cited for an OSHA violation.

This lesson and the following lesson, Legal Aspects II discusses in detail, the OSH Act of 1970. This lesson focuses on the organizations instituted by the OSH Act, penalties and recordkeeping responsibilities, while Legal Aspects II is devoted to the legal aspects of the Act.

EXPLANATION/LECTURE

ORGANIZATIONS INSTITUTED BY THE OSH ACT

Occupational Safety and Health Administration (OSHA)

OSHA's primary functions are development, promulgation and enforcement of occupational safety and health standards, making OSHA the legal administrative unit for implementation and enforcement of the Act. The Assistant Secretary of Labor for Occupational Safety and Health is the chief administrative officer and, for all practical purposes, the chief occupational safety and health decisionmaker. His immediate boss is the Under Secretary of Labor. The Act, of course, places ultimate formal responsibility with the Secretary of Labor.

Organizationally, OSHA is divided into a national office, 10 regional offices and 54 area offices. Policies and programs, for the most part, are developed in the national office and implemented by the regional area offices.

OSHA is authorized to:

- Put into law mandatory occupational safety and health standards, or regulations.
- Modify and improve mandatory occupational safety and health standards.
- Enter factories for inspection purposes.
- Prescribe regulations for maintaining accurate records.
- Develop and maintain statistics on occupational safety and health.
- Establish and supervise programs to train and educate employees and employer personnel regarding this law.
- Make grants to states.

OSHA publishes the most current regulations in the Federal Register, the Federal publication providing daily (Monday through Friday) coverage of public regulations and legal-notices issued by the Federal agencies. The regulations are then annually codified in the Code of Federal Regulations (CFR), and can be found under section 1910.1000. The employer must be aware of the latest standards and regulations promulgated by OSHA so that he may remain in compliance with the law. Many public and university libraries carry the Federal Register and/or the Code of Federal Regulations. The employer should periodically check these documents for regulations that apply to his place of employment, or he may subscribe to the Federal Register.

The Federal Register is furnished by mail to subscribers for $5.00 per month or $50.00 per year*, payable in advance. The charge for individual copies is .75¢ per issue. To subscribe to the Federal Register or receive individual copies, send a check or money order payable to the Superintendent of Documents, U.S. Goverment Printing Office, Washington, D.C. 20402.

National Institute for Occupational Safety and Health (NIOSH)

The National Institute for Occupational Safety and Health (NIOSH) was established by the Department of Health, Education and Welfare to carry out research duties under the OSH Act. NIOSH's responsibilities include:

- Conducting, directly or by grants or contracts, research, experiments or demonstrations relevant to occupational safety and health;
- Developing criteria for dealing with toxic materials and harmful physical agents;
- Making toxicity determinations on request by employer or employee groups;
- Conducting directly, or by grants and contracts, educational programs aimed at providing an adequate supply of qualified personnel and;
- Publishing an annual listing of all known toxic substances.

*prices quoted as of December 1975

The Toxic Substances publication provides a list of potentially hazardous substances and serves as a guide for research needed in setting new occupational health standards. It is obtainable from:

Office of Public Information (Headquarters)
National Institute for Occupational
Safety and Health
Room 10-A-22
5600 Fishers Lane
Rockville, Maryland

or

Office of Public Information (Cincinnati Office)
National Institute for Occupational
Safety and Health
4676 Columbia Parkway
Cincinnati, Ohio 45226

GPO Order Number 171900006

National Advisory Committee on Occupational Safety and Health (NACOSH)

The OSH Act stipulates that a committee be established to advise and consult the Secretary of Labor and the Secretary of Health, Education and Welfare on matters related to the administration of the Act. This committee, the National Advisory Committee on Occupational Safety and Health (NACOSH), consists of 12 members appointed by the Secretary of Labor, 4 of whom are designated by the Secretary of Health, Education and Welfare. NACOSH is composed of representatives of management, labor, occupational safety and health professionals and the public. NACOSH members are selected upon the basis of their experience and competence in the field of occupational safety and health. All NACOSH meetings are open to the public and transcripts of the meetings are available for public inspection.

OSH Review Commission

Another commission, the Occupational Safety and Health (OSH) Review Commission, was establish by the Act to aid OSHA and NIOSH in making decisions on contested cases. The OSH Review Commission is composed of 3 members who are appointed by the President and the Senate. The 3 members

are qualified by way of training, education, or experience to carry out the functions of the Commission under this OSH Act. The Chairman, designated by the President, appoints any hearing examiners and other employees necessary in assisting the Commission. Every official act of the Commission is entered in record, and the records are open to the public.

The Commission may order testimony to be taken or witnesses to appear at the hearing or in court. They may also order documentary evidence to be produced at a hearing or in court.

PENALTIES

A person or employer violating the OSH Act is subject to penalties in the form of criminal and civil fines and/or criminal jail sentences. The Commission assesses the penalties taking into consideration the size of the business of the employer being charged, the employer's violation history, and the gravity of the violation. Types of violations and their respective penalties are presented below:

- Willful or Repeated Violations

  Any employer who willfully or repeatedly violates the Act or a standard, rule, order or regulation related to it is subject to a civil penalty of not more than $10,000.

- Serious Violations

  Any employer who receives a citation for serious violations* of the Act or a standard, rule, order or regulation related to it is subject to a civil penalty of up to $1,000 for each violation.

- Non Serious or Other Violations

  Any employer who receives a citation for a non-serious violation is subject to a civil penalty of up to $1,000 for each violation.

* A serious violation is said to exist if there is a substantial probability that death or serious physical harm could result from conditions, practices, means, methods, operations or processes in use in a place of employment.

- Daily Penalties for Failure to Abate

  Any employer who fails to correct a violation for which a citation has been issued is subject to a civil penalty of not more than $1,000 per day during which such failure or violation continued.

- Willful Violations Causing Death of an Employee

  Any employer who willfully violates any standard, rule or order and that violation caused death is subject to a penalty of no more than $10,000 or a 6 month maximum period of imprisonment or both. If this is a second violation for the employer, he is subject to a penalty of no more than $20,000 or a one year maximum period of imprisonment or both.

- Penalty for Leaking Information

  Any person who gives advance notice of any inspection to be conducted under the act without authority from the Secretary is subject to penalties of no more than $1,000 or a 6 month maximum period of imprisonment or both.

- Penalty for Giving False Information

  Any person knowingly making any false statement, representation or certification in any application record, report, plan or other document filed or maintained under the Act is subject, upon conviction, to a fine of $10,000 maximum, or to a 6 month period of imprisonment or both.

- Penalties for Killing Enforcement Personnel

  Anyone killing a person while engaged in or on account of an inspection, investigation or law enforcement function will be punished by imprisonment for a term of any number of years or for life.

- Failure to Post Citations or Employee Rights

  Any employer who violates any posting requirements under the Act is subject to a penalty of up to $1,000 per violation.

RECORD KEEPING

An efficient employer maintains clear, complete, written records not only to meet legal requirements, but to encourage an orderly and controlled operation and to accumulate data for future purposes. Because these records can be requested by the Secretary, his authorized representative, or the

OSH Review Commission to be used as evidence at a hearing, it is important that they be uniformly filled out, well documented, and accurate. OSHA and NIOSH provide forms for most types of required records. The correct use of these forms helps insure a complete record of the necessary information.

Laws and Regulations

All employers, except for the small employer,* are required under the OSH Act and under the OSHA/NIOSH Standard Completions Program to keep written records of the following:

- Work related death, injuries and illnesses (excepting minor injuries requiring only first aid treatment and which do not involve medical treatment, loss of consciousness, restriction of work or motion or transfer to another job). This log of occupational injuries uses OSHA Form-100. Information must be entered no later than six working days after receiving notification that a recordable injury or illness has occurred.
- Initial employee exposure measurements.
- Measurements and determination of employee exposure. This record should contain:
  - Calculations, observation and information indicating employee exposure to contaminants.
  - Employee complaints of symptoms attributable to exposure to contaminant.
  - Date of determination, work being performed at the time, location within work site, name and Social Security number of each employee considered.

*The small employer, defined as having seven or fewer employees, is exempt from almost all record keeping and reporting requirements. The small employer must report any accident involving employee death or hospitalization of five or more employees. The only other requirement is that the small employer maintain a log of occupational injuries and illnesses if he is notified by the Bureau of Labor Standards that he has been selected to take part in a statistical survey of occupational injuries and illnesses.

- Tests of mechanical ventilation systems (where such systems constitute engineering controls).
- Annual training sessions.
- Records required by employee medical surveillance program. This record should contain:
  - Medical history of employees
  - Physician's findings and opinions

Employees, former employees or their representatives and employee-designated-physicians must be allowed access to these records. However, for the case of former employee records, it must be noted that the employer is only required to keep records for the duration of employment of the affected employee.

Laboratories testing the contaminant samples also have record keeping obligations. Records of observations must be made as each step in the examination of specimens is performed. Equipment lists, AIHA accreditation correspondence and receiving and shipping records are several items recorded by the accredited laboratory.

The compliance officer or person hired to carry out sampling procedures or laboratory duties is legally and professionally obligated to respect the confidential aspects of the information they obtain. Trade secrets, operations, apparatus, confidential statistical data, amount or source of any income, profits, losses, etc., must not be divulged. Disclosure of confidential information can result in fines up to $1,000 or one year imprisonment or both, and removal from office or employment.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON:	Legal Aspects II	IHM3
TIME:	Industrial Hygiene Background for the Manager Module, Period 3 (50 Minutes)	
OBJECTIVES:	Enable the trainee to: 1) Recognize the legal implications of the OSH Act 2) Recognize sampling aspects of the OSH Act	
EXHIBITS:	None	
KEY TERMS:	standards	

INTRODUCTION

This lesson is a continuation of the Legal Aspects I lesson. In Legal Aspects I, you learned about the organizations instituted by the OSH Act of 1970, penalties and recordkeeping requirements. Lesson IHM3 discusses the legal aspects of the OSH Act.

EXPLANATION/LECTURE

LEGAL ASPECTS OF THE OSH ACT

Employer and Employee Duties

It is important that both employer and employee comply with occupational safety and health standards in order to create a safe, danger-free and accident-free place of employment. Under this act, each employer has the legal duty to "furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employee." The employee has the legal duty to "comply with occupational safety and health standards and all rules, regulations, and orders pursuant to this act which are applicable to his own actions and conduct." Employers should make a point of keeping their employees informed of their protection and obligations under the Act.

Legal Authorization of Standards

The Act authorizes three types of standards. The three types in the Act are:

- National consensus and established Federal standards;
- Standards subject to the requirement of Section 6(b);
- Emergency standards.

Standards in the first category are usually referred to as "interim standards," while those in the second category are often called "permanent standards." Neither label is altogether correct since all occupational safety and health standards are subject to change and revision. The Act anticipates that new standards will be added, and that existing ones will be continuously reviewed, modified and, where applicable, revoked. In other words, Congress intended safety and health standards to be constantly refined to provide employees the maximum protection possible within the industrial environment and its changing technologies.

The primary differences between the first two categories of standards are their originating sponsors and the methods by which they are developed and put into action as a law.

National Consensus Standards. Under the Act, the Secretary of Labor had until April 1973 to issue national consensus or established Federal standards. In setting these standards, the Secretary is not required to follow the provision of the Administrative Procedures Act which mandates public hearings. Therefore, the Secretary has the authority to promulgate any standard which meets the national consensus or established Federal standards criteria.

A national consensus standard is defined as "any occupational safety and health standard or modification thereof which (1) has been adopted and promulgated by a nationally recognized standards-producing organization, (2) was formulated in a manner which afforded an opportunity for diverse views to be considered and (3) has been designated as such by the Secretary of Labor." The Congress specified national consensus standards as those produced by the American National Standards Institute (ANSI) and the National Fire Protection Association (NFPA).

An established Federal standard is "any operative occupational safety and health standard established by any agency of the United States and presently in effect, or contained in, any act of Congress in force on the date of enactment of this act." Established Federal standards are those contained in the Walsh-Healey Act, the McNamara-O'Hara Service Contract Act, the Construction Safety Act of 1969, the Longshoremen's and Harbor Worker's Compensation Act, and the National Foundation on Arts and Humanities Act.

According to the Occupational Safety and Health Act, any national consensus standard or any established Federal standard can be adopted by the Secretary unless he determines that such a standard would not improve safety or health.

Section 6 (b) Standards (Standards under the OSH Act). Section 6 (b) standards are those which result from the procedures detailed in Section 6 (b) of the Occupational Safety and Health Act. The legislative history of the law indicates that Congress intended the national consensus and Federal standards to be of an interim or temporary nature. It was expected that the consensus and Federal standards would be reviewed, modified and, where applicable, revoked in accordance with Section 6 (b). It was also expected that new standards would be added to the initial package through the 6 (b) process.

According to the Act, 6 (b) standards are to be based on research, demonstrations and experiments, taking into consideration the latest scientific information, feasibility and experience. Where applicable, these standards are required to contain provisions for the use of labels or other warning devices, treatment, preventive measures and engineering controls, limits of exposure and medical examinations. Employers are also required to maintain accurate records of worker exposure to those "potentially" toxic materials or harmful physical agents which must be monitored or measured, and to inform employees if they are being exposed to such hazards. Employers must inform workers about corrective actions being taken where exposure levels exceed the prescribed standard.

These special rules for harmful exposures are applicable to those 6 (b) standards which are usually referred to as occupational health standards (governing such substances and agents as chemicals, gases, fumes, dusts, heat and noise). Compared to safety standards, occupational health standards are considered seriously underdeveloped and in critical need of research.

The process for the development and promulgation of 6 (b) standards is as follows:

1. The Secretary of Labor may propose such standards on his own,
2. He may appoint an advisory committee to develop a 6 (b) standard and make recommendations,

3. The National Institute for Occupational Safety and Health (NIOSH), in the Department of Health, Education and Welfare, may make recommendations for new standards based upon its scientific and medical research,

4. Interested parties such as employers or employees may request the Secretary to develop, modify or revoke a standard.

The Act provides for public participation in the 6 (b) process through the submission of written comments, public hearings and representation on advisory committees. The decision as to which means of participation are allowed is almost entirely left to the discretion of the Secretary.

In the first place, the Secretary may determine that a new or revised standard is not needed and therefore reject a request to initiate 6 (b) proceedings. If such is the case, he is only required to publish his reasons. Should he decide that a new or revised standard is needed, he may simply promulgate it. In this event the Secretary is required to publish the new standard in the Federal Register and to allow 30 days for the submission of written comments by interested parties.

During this 30-day period interested parties may file objections to the standard and request a public hearing. Within 60 days after the expiration of the period provided for the submission of written comments, or within 60 days after the completion of a public hearing, the Secretary must either issue a new standard or make a determination that one is not needed.

Should the Secretary decide to appoint an advisory committee, the entire process could, under the Act, take as long as 540 days or 18 months.

The specific time requirements are:

1. Advisory committee recommendations, maximum 270 days,
2. Publication of standard in Federal Register, maximum 60 days,
3. Written comments and hearing requests, maximum 30 days,
4. Hearings set, maximum 30 days,
5. Promulgating standard after hearings, maximum 60 days,
6. Delay of the effective date of the standard, maximum 90 days,

Emergency Standards. The Secretary, at any time, can issue an emergency standard if he determines that it is necessary to protect workers from immediate danger. This action can be taken where existing standards are judged inadequate or where there are no existing standards. An emergency standard takes effect immediately upon publication in the Federal Register. From the date of publication, the Secretary has six months to promulgate a 6 (b) standard based on the emergency action.

Other Standard's Provisions. In addition to authorizing specific types of standards, the Act also provides for the judicial review of standards, variances from standards, standards advisory committees and the relationship of states to the development of standards.

Once the Occupational Safety and Health Administration (OSHA) in the U.S. Department of Labor promulgates an interim, emergency or permanent standard, the Act provides that any adversely affected party can challenge the validity of the standard by filing a petition with the U.S. Court of Appeals. The petition for the Court's review of the standards must be filed within 60 days from the promulgation of the standard. Unless otherwise ordered by the Court, such a petition "shall not operate as a stay of the standard."

The Assistant Secretary for OSHA can permit variances from a standard if:

- an employer can demonstrate his inability to comply in the time required due to shortages in trained personnel or equipment, or due to inadequate time for construction or alterations;
- an employer can demonstrate that he has, or will have, safety and health protections as effective as a Federal standard;
- an employer is participating in an approved occupational safety and health experiment.

The cited employer has an opportunity to contest the citation or proposed penalty. He may file a notice within 15 days after the issuance of the assessed penalty/citation stating that the punishment is unfair, or that the time period in which he must correct the violation is too short. The Commission, after receiving the complaint from the Secretary and reviewing it, gives the employer an opportunity for a hearing. After the hearing, the Commission issues an order based on findings of fact, affirming, modifying, or disregarding the initial citation.

Occasionally an employer is issued a citation for a violation that is extremely difficult or impossible to control. The employer may contest the citation and request a hearing. After the hearing the Secretary will issue an order affirming or modifying the correction requirement. However, if the employer fails to notify the Secretary within 15 days contesting the citation, the citation and assessed penalty become a final order.

Appeals

Any person taking issue with an order of the Commission may take the order to the United States Court of Appeals within their judicial district for review. A written petition asking that the order be modified or set aside must be filed in the court within 60 days of the issuance of the Commission's order. The court then has power to grant the petitioner temporary relief, a restraining order or a decision to modify, or affirm the Commission's order if they feel it just and proper. The judgement of the court is final, except that the court's order can be subject to review by the Supreme Court.

The Secretary may also obtain a review or enforcement of any final order of the Commission by filing a petition in the United States Court of Appeals. The procedures followed by the employer (above) apply to the Secretary.

No person may discharge or discriminate against employees who file complaints or testify in proceedings related to the OSH Act. Any employee who believes he has been discharged or discriminated against may file a complaint within 30 days with the Secretary. After investigating a valid complaint, the Secretary shall bring an action in court against the person who discharged or discriminated against the employee.

Right of Entry

The Secretary of Labor or a representative is authorized to enter any factory, plant, establishment, construction site or workplace after presenting the appropriate credentials. He is given the power to inspect and investigate any such place of employement and all pertinent equipment, structures and conditions within it. The plant owner, operator or manager must allow the Secretary entrance without delay. The employer, or his representative, and an employee may accompany the Secretary for the purpose of aiding his inspection.

Request for Inspection

Any employee(s) who believe their place of employment to be unsafe or dangerous to health may request an inspection. An inspection request is written and must indicate the grounds for the request. It should be signed by the employee(s) requesting it, unless they specifically ask that their names not be included in the request for inspection notice. After reading the request notice, if the Secretary determines a dangerous situation exists, he will make an inspection. The request notice will be provided to the employer or his agent no later than at the time of the inspection. If he determines that there are no reasonable grounds to believe any danger exists, he will offer a written notification stating so to the employee(s).

Citations

If the Secretary or his representative believes an employer has violated a section of the OSH Act, he will issue a written citation to the employer. The citation contains a description of the nature of the violation and the time period within which the employer must correct the violation. The Secretary also notifies the employer at this time or shortly after of any assessed penalties.

State Jurisdiction

A state agency or court may assert control under state law over any occupational safety and health standards not covered in the OSH Act. A state may also assume responsibility for the development and enforcement of occupational safety and health standards already promulgated under the OSH Act. The state development and enforcement of such standards requires that a state plan be submitted to the Secretary of Labor. The Secretary will approve the plan if the State provides the proper funding, supervising agencies, inspection programs, and other services to develop and enforce the law.

REFERENCES

1. Occupational Safety and Health Act of 1970, Public Law 91-596, 91st Congress - 5.2193, December 29, 1970.

2. Weidner, R.B., "Legal Aspects of the Occupational Safety and Health Act, NIOSH, 1975.

3. Rothman, F.B., "Legal Aspects and Recordkeeping: An Overview Part I: Legal Aspects," The Yale Law Journal, Vol. 29, pp. 163,

4. Mallins, D.L. and S.W. Werner, "Occupational Safety and Health, A Policy Analysis," Government Research Corporation, 1973.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Legal Aspects III IHM4

TIME: Industrial Hygiene Background for the Manager Module, Period 4, (50 minutes)

OBJECTIVES: Enable the trainee to recognize the implications of the six exposure monitoring regulations impact areas.

EXHIBITS: IHM4*1 - Employee Exposure Determination and Measurement Requirements Flow Diagram

KEY TERMS: See IHM2 and IHM3

MATERIALS:
Student manual
Pencils
Proposed Exposure Standards: Ketones
Handout

METHODS:
Read Explanation/Lecture; listen to instructor's lecture.
Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Legal Aspects of Sampling III lesson:

INTRODUCTION

The joint OSHA/NIOSH Standards Completion Project, begun in 1974, issues standards and regulations describing employee exposure limits to toxic occupational enviornmental contaminants. These proposed standards establish requirements for each chemical substance in six important areas:

- Measurement
- Methods of Compliance
- Safety Guidelines
- Employee Training
- Medical Surveillance
- Recordkeeping

The proposed standards are designed to enable employers to better understand and comply with existing OSHA safety and health standards.

confidence level of 95%. An employer is given much freedom in his choice of sampling method; he is not required to use a specific method, but rather can use any method meeting accuracy requirements. However, all exposures should be calculated on an 8-hour time weighted average basis. In our ketone example an appendix is included (Appendix B, page 20209) to further advise the employer in meeting the requirements of the proposed standard, including the accuracy requirements.

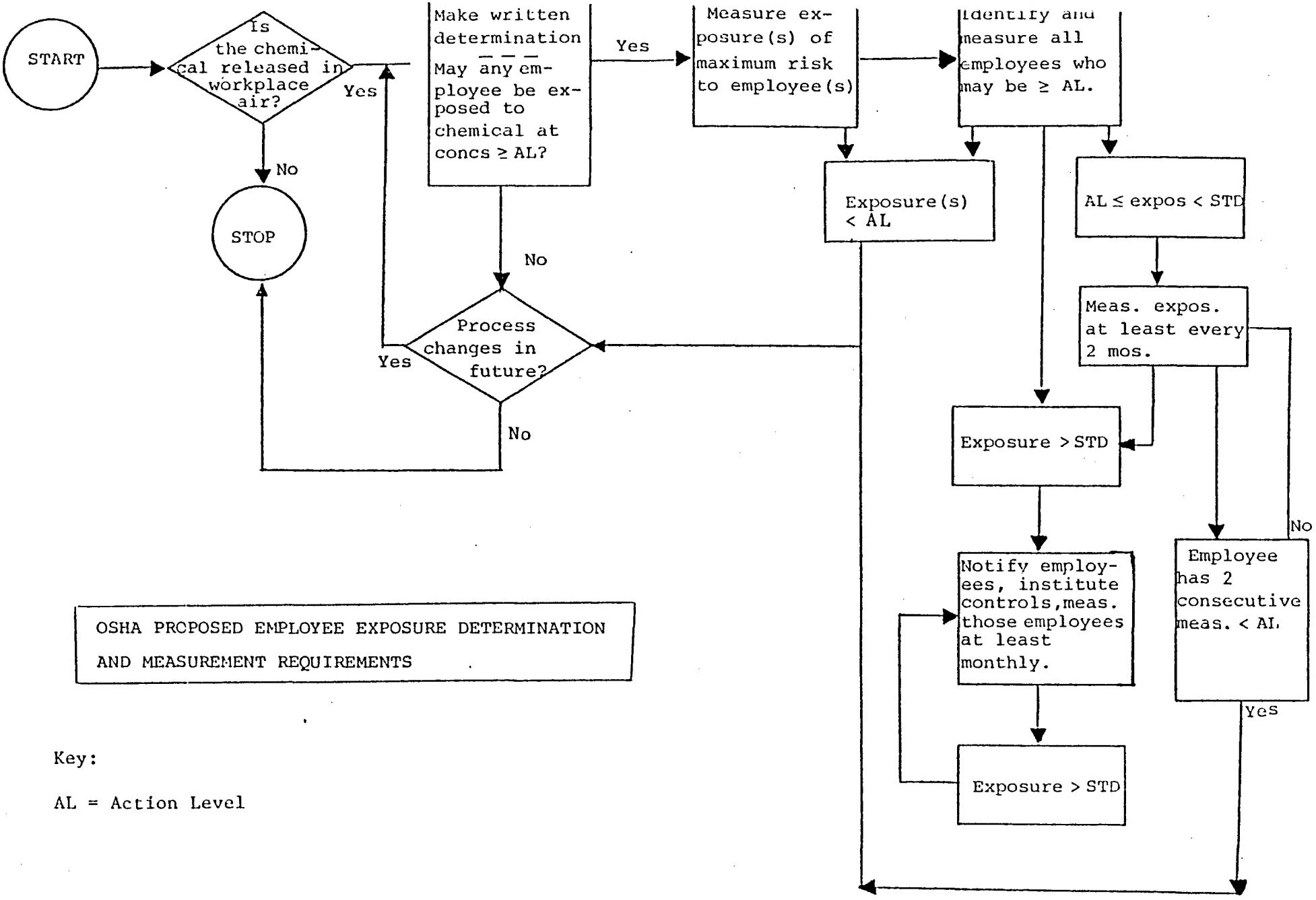
Methods of Compliance (Page 20204)

When an employee's exposure has been calculated, and he is above the Federal standard, certain steps must be taken to lower his exposure and consequently put his exposure at or below the Federal standard. These methods of lowering the overexposed employee's exposure come under the general label of "control procedures". There are three basic types of controls, or corrective procedures and devices that the proposed standards recognize as being effective:

- Engineering controls
- Work practice controls
- Respirators

Engineering controls are by far the preferred type of control method. They reduce airborne concentrations of a substance at its source of emission and they are not highly subject to human error. Work practice controls (careful work habits) are the second best method of exposure control. However, work practice controls are only as good as the supervision provided. Also, failures in work practice controls are not as easily detected as engineering control failures.

Respirators are the least preferred method of compliance, or control procedures. They are capable of providing good protection only when properly selected and fitted, worn, and when replaced at the appropriate time. Despite the difficulties and disadvantages surrounding respirators, they remain the only viable form of protection when engineering or work practice controls are not feasible. Occasionally all three types of controls will be used together;



Key:

AL = Action Level

Exhibit IHM4*1 Employee Exposure Determination and Measurement Requirements Flow Diagram

If any of the employees for whom an initial determination has been made appears to be exposed to concentrations of a contaminant above the action level, the employer must measure the exposure of the employee most likely to have the highest exposure (often called the maximum risk employee). If he is exposed above the action level, the employer must measure the exposure of all employees similarily affected.

If such measurements show that an employee is exposed to the contaminant above the action level but below the permissible standard, the employer must measure the employee's exposure every two months. If the employee is exposed to the contaminant at concentrations above the permissible exposure level, the employer must measure the employee's exposure at least monthly, inform the employee of his overexposure and institute control measures.

If the results of 2 consecutive measurements taken at least one week apart reveal that an employee is not exposed above the action level, then the measurement program for that employee can be stopped.

These measurement provisions are designed in a step-by-step fashion to simplify and clarify exposure measurement procedures and to minimize the financial and administrative burden on employers. Exhibit IHM*4, Employee Exposure Determination and Measurement Requirements Flow Diagram, is a graphic representation of the step-by-step exposure measurement procedures.

Again, this information found on pages 20203 and 20204 details the broad and general considerations of exposure determinations. Specific information for each chemical is included later in the proposed Standard in the section describing a particular chemical. This holds true for all of the areas discussed.

Methods of Measurement (page 20204)

This provision of the proposed standards is designed to insure that employee exposures are measured using methods that will produce accurate results. "Accuracy" refers to the difference between a measured value and the true concentration. The accuracy of the sampling method must have a

EXPLANATION/LECTURE

An example of this type of Exposure Standard describing ketones has been handed out in order for you to better understand the exposure regulations and requirements specified by them. We will discuss all aspects covered by these standards, concentrating particularly on the six most important areas.

EXPOSURE MONITORING REGULATIONS

The proposed standard begins by listing and defining all toxic substances within the chemical family to be discussed. For example, look at page 20202 in your handout. Under the heading *Toxic Materials* (middle column) six different toxic substances in the ketone family are described. Next the standard defines specific terms such as "action level" and the manner in which they should be used. On page 20203 under the heading *Definitions* you will find this discussion. You should carefully read this section whenever using these proposed Exposure Standards in a workplace.

This *Definitions* section provides broad and general information about the proposed Standard's requirements. More specific information is presented for each chemical later in the handout. For example, turn to page 20206, section 1910.935 2-Butanone. Under this heading you again see the subheading *Definitions* listing, this time, quite specific information applicable to to 2-Butanone.

Measurement

Exposure Determination and Measurement - In workplaces where any of the regulated substance is released into the air, the employer must make a written "initial determination". The initial determination is a simple calculation of exposure based on the factors you will learn about in Lessons IHM6 and IHM7. The employer must take care that the initial determination accurately reflects employee exposure conditions during a working day. The precise requirements of the initial determination as specified by OSHA are spelled out in the ketone example on pages 20203 - 20204.

if none of them are singly adequate, using three together can often provide sufficient protection. Further and more specific information on compliance methods can be found under the chemical name, (for example, for 2-Butanone look on page 20206, column 3).

Safety Guidelines

Personal Protection Equipment (page 20204). Direct skin contact with ketones is also dangerous. The proposed standard provides for the use of protective clothing to prevent employees from being subjected to repeated or prolonged skin contact with the hazardous substance. This protection is not mandatory for workers not in contact with ketones or in occasional contact with ketones. The information under the same heading for specific chemicals reveals the precise type of protective clothing required.

Fire and Safety (page 20204). Appendix B (See page 20209) offers very distinct guidelines for fire and explosion hazards inherent in the regulated substance. The *Fire and Safety* section under each specific chemical provides detailed information on this subject.

Spills (page 20204). The proposed standard requires that ketone spills be cleaned up immediately after eliminating possible sources of ignition and providing all available ventilation. Ketones are prohibited from entering places such as sewers or drainage systems.

Employee Training (page 20205)

Under the exposure standards, the employer is required to provide an annual training session for:

- Employees exposed to airborne concentrations of the regulated substance in excess of the action level;
- Employees having skin contact with the liquid form of the substance; and
- Employees working where the substance might create a fire or explosion hazard.

The following information must be presented in this training program:

- Appendix A - Substance Safety Date Sheet;
- A review of the signs, symptoms, and medical conditions of exposure;
- Emergency procedures; and,
- Correct use of protective equipment

Proposed toxic substance standards for all toxic substances used in a workplace should always be posted in a place accessible to the employees.

Medical Surveillance

The Standards require that certain medical information be obtained from all employees who are or who will be exposed to a toxic substance at concentrations at or above the action level. The purpose of this medical history is to reveal medical conditions which could be affected or aggravated by exposure to the toxic substance. If an employee's medical history reveals a condition that may put him at an increased risk in the workplace, a medical examination is required. Medical examinations must be made available to any employee who reports any signs or symptoms of over exposure to the contaminant. When a medical examination is required, the employer must provide the physician with certain information so that the physician can offer an opinion based on relevant facts.

Some appendices are included in the proposed Standards to aid both the employer and the physician in this area. Appendix A, Substance Safety Data Sheet (for 2-Butanone look at page 20208, column 3) lists symptoms of an overexposure to this chemical as well as emergency first-aid procedures.

Appendix C, Medical Surveillance Guidelines, is provided to aid the physician in evaluating any health hazards endangering the employee. The employer must then obtain a written opinion from the physician containing certain information as specified in the *Medical Surveillance* section of the Standard.

Recordkeeping

The employer, under the proposed standards, is required to keep up-to-date written records of the following information:

- Written initial exposure determinations,
- Measurements of employee exposures,
- Tests of mechanical ventilation systems,
- Annual training sessions, and
- Records required by employee medical surveillance programs.

These records must be accessible by employees, former employees or their representatives, and employee's physicians. The *Recordkeeping* section found under the particular chemical (for example, page 20208 column 2) details the specific information to be recorded for each of the categories mentioned above.

COMPLIANCE VS. NONCOMPLIANCE MONITORING

The compliance point of view is held by the employer or the industrial hygiene consultant to a company. Because their responsibility is the protection of employees, the employer assumes a worker is in noncompliance with the Federal standard and then tries to prove with data that the worker is actually in compliance. Samples are taken and calculations are performed resulting in data that is used to prove or disprove the hypothesis that the worker is in noncompliance with the Federal standard.

The noncompliance point of view is held by the governmental compliance officer. The officer's duty is to find those employees who might be over-exposed to an industrial air contaminant and prove that they are indeed in noncompliance with a Federal standard. Thus, the compliance officer assumes compliance and tries to prove with data that the worker is actually in non-compliance with a Federal standard.

REFERENCES

1. Department of Labor, Occupational Safety and Health Administration, Toxic Substances; Ketones - Proposed Exposure Standards, Federal Register, Vol. 40, No. 90, May 8, 1975.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Recognition and Determination I — IHM5

TIME: Industrial Hygiene Background for the Manager Module, Period 5 (50 minutes)

OBJECTIVES: Enable the trainee to identify and classify toxic air contaminants.

EXHIBITS: IHM5*1 - The Size of Air-Borne Contaminants

KEY TERMS:

- gas
- chemical carcinogen
- particulate
- fume
- aerosol
- mist
- irritant
- asphyxiant
- anesthetic
- systemic poison
- vapors
- lung scarring agent
- blood damaging agent
- hepatonic agent
- nephrotoxic agent
- neurotoxic agent
- acute exposure
- chronic exposure

MATERIALS: Student manual
Pencils with erasers

METHODS: Read Explanation/Lecture; listen to instructor's lecture.
Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Recognition and Determination I Lesson:

INTRODUCTION

The workplace is a hazardous environment. The continuing introduction of newly invented substances into the workplace makes this problem one which is never completely solvable. Consequently, in order to insure a safe and healthy environment for all workers, it is necessary to be able to classify contaminants by physical type and affect on the human system. This kind of basic knowledge will enable you to judge the toxicity of substances currently found in a workplace, as well as substances that might be introduced into the workplace in the future.

In order to determine if it is possible to have exposed employees, you first must understand some of the basic factors or stresses that may cause sickness, impaired health, or significant discomfort to employees. By introducing you to this type of information, this lesson will help you assess a work environment and determine if any over-exposed employees might exist.

EXPLANATION/LECTURE

PHYSICAL STATES OF OCCUPATIONAL ENVIRONMENTAL CONTAMINANTS

Airborne contaminants can be present in the air in a variety of forms. The 4 major categories for the physical classification of toxic materials are:

- gases and vapors
- particulate matter
- liquids
- solids

Gases and vapors, and particulates pose greater and more serious health problems than solids and liquids. Consequently, knowledge of these classifications is necessary for proper evaluation of the work environment, not only from the standpoint of how they affect the worker, but also so that correct exposure sampling methods can be employed. The following is a list and brief description of the physical states of contaminants:

- Vapors:

  Vapors are the gaseous form of substances which are solids or liquids at normal temperatures and pressures. Their size range is at the molecular level. Mercury vapors and carbon tetrachloride are examples of vapors.

- Particulates:

  Particulates (or dust) is a term used in industry to describe airborne solid particles that range in size from 0.1 to 25 micrometers (0.000004 to 0.001 inches) in diameter. Dusts are generated by physical processes such as handling, crushing and grinding of organic solid materials. Examples of particulates include silica, asbestos, and lead dusts.

- Fumes:

  Fumes are solid particles that are generated by condensation of materials from the gaseous state. Fumes are usually found as the result of volatilization of molten metals. The formation of fumes is often accompanied by a chemical reaction, such as oxidation.

Some examples of fumes are lead oxide fume, iron oxide fume, and copper fume. Gases and vapors are not fumes, although they are often incorrectly called that, such as gasoline fumes, and carbon monoxide fumes. Fumes typically occur in the size range 0.01 to 5 micrometers (0.0000004 to 0.0002) inches.

- Aerosols:

  Aerosols are liquid droplets or solid particles dispersed in the air that are fine enough to remain dispersed for a period of time. Some examples of aerosols are smoke and fog.

- Mists:

  Mists are suspended liquid droplets. They are generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Oil mists produced during cutting and grinding operations, acid mists from electroplating and pesticide mists from spraying operations are examples of mists.

PHYSIOLOGICAL EFFECTS OF TOXIC AGENTS

Different toxic substances produce different effects on the human system. The following section presents a system for classifying toxic substances in terms of the physiological response obtained.

Irritants

Irritant materials are corrosive in action. They inflame the moist mucous surfaces of the body. The airborne concentration of irritants is of far greater importance than the length of time of exposure in regards to their harmful effects. Some examples of irritant materials that exert their effects primarily on the upper respiratory tract are aldehydes, alkaline dusts and mists, and ammonia. Some materials that effect both the upper respiratory tract and lung tissues are chlorine, bromine and ozone. Irritants that affect primarily the terminal respiratory passages are nitrogen dioxide and phosgene.

Asphyxiants

Asphyxiants exert their effects on the body by depriving the cells of their oxygen supply. They are generally divided into two classes: simple asphyxiants and chemical asphyxiants.

- The simple asphyxiants are physiologically inert gases that dilute the available atmospheric oxygen below the level required to support life. Some examples of simple asphyxiants are methane, nitrous oxide and hydrogen.

- The chemical asphyxiants take action in the body by limiting the use or availability of an adequate oxygen supply. They either prevent oxygen transport in the blood or prevent normal oxygenation of the tissues. Some examples of chemical asphyxiants are carbon monoxide, hydrogen cyanide and nitrobenzene.

Anesthetics and Narcotics

Anesthetics and narcotics exert their action on the body by depressing the central nervous system. The most common example of an anesthetic is ethyl alcohol. Other examples include acetylene, ethylene and ethyl ether.

Systemic Poisons

Systemic poisons are materials that cause injury to particular organs of the body's system. The halogenated hydrocarbons (such as carbon tetrachloride) for example, can cause injury to the internal organs, while benzene and phenol may cause damage to the blood system. Materials that are classified as nerve poisons are carbon disulfide, methyl alcohol, tetraethyl lead, and organic phosphorus insecticides. Lead, mercury, cadmium, and maganese are examples of metallic systemic poisons. Toxic nonmetallic inorganics in the same class are arsenic compounds, selenium and the fluorides.

Chemical Carcinogens

Chemical carcinogens are chemicals that have been demonstrated to cause tumors in mammalian species. The induction of a tumor type not usually observed, the induction of an increased incidence of a tumor type normally seen, or the appearance of such tumors at an earlier time than would otherwise be expected, are ways in which the chemical carcinogens exert their influence on the human body. Often the worker's exposure to the carcinogen and the tumor appearance are separated by a latency period of 20 to 30 years.

Lung Scarring Agents

Another class of materials are those that slowly produce damage to the lung. The damage occurs by lung scarring rather than immediate irritant action. These are particulate matter other than systemic poisons.

Lung damaging fibrosis-producing dusts include silica and asbestos. Other dusts, such as coal dust, can produce pneumoconiosis, which has long been a concern in the mining industry.

Blood Damaging Agents

Blood damaging agents break down the red blood cells or chemically affect the hemoglobin in the blood. Examples of blood damaging agents include benzine, arsine and aniline.

Hepatotoxic Agents

Hepatotoxic agents damage the normal functioning of the liver. Examples of hepatotoxic agents are carbon tetrachloride, tetrachloroethane, nitosamines, and compounds of plant origin.

Nephrotoxic Agents

Nephrotoxic agents result in damage to the functioning of the kidney. Examples of nephrotoxic agents include some halogenated hydrocarbons and uranium.

Neurotoxic Agents

Neurotoxic agents produce damage to the nervous system. Examples of neurotoxic agents include organo-metallic compounds such as methyl mercury and tetraethyl lead and carbon disulfide.

ROUTE OF ENTRY

The methods in which the hazardous material enters the body may have some relationship to the reaction of the body to the material. Contaminants enter the body principally in three ways:

- Skin absorption (through the skin)
- Ingestion (through the digestive tract)
- Inhalation (through the respiratory tract)

The respiratory tract is the most common route of entry for airborne contaminants into the body. The continuous need to oxgenate the tissue cells and the respiratory tract's intimate association with the body's circulatory system make these organs particularly accessible.

The physiological effect of inhaled airborne material depends strongly on the particle size. As can be seen in Exhibit IH3*1, typical airborne contaminant particle sizes range from less than 0.01 micrometer to over 25 micrometers (0.0000004 to 0.001 inches). The size of particles of concern as a health hazard is generally considered to be below 10 micrometers in diameter. This is because the larger airborne particles, particularly those greater than 10 micrometers in diameter, have a much greater probability of being captured in the upper passages of the respiratory system. Particles down to about one-half micrometer (0.00002 inches) in size, such as smoke or fumes, penetrate deeper but are usually collected on the mucous lining of the airway ducts. Extremely small particles such as some aerosols can reach the membrane of the alveolar walls. It is here that the lung is most vulnerable to damage.

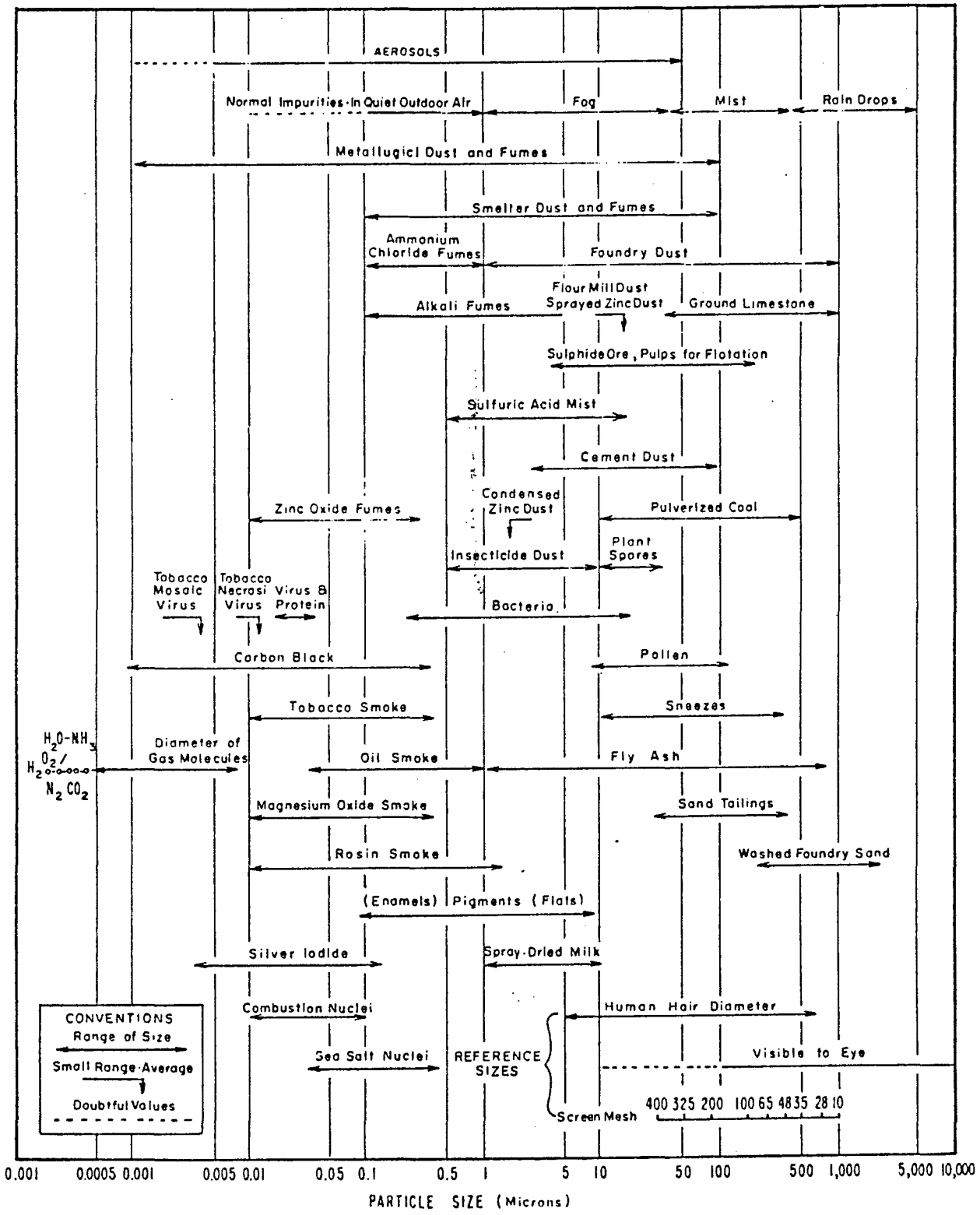
RATE OF EXPOSURE

The rate of exposure to toxic agents is also an important consideration in determing the hazardous effect of the agent. Generally, the more toxic the material the less exposure the human system can tolerate. Rate of exposure

to hazardous substances is usually categorized as being acute or chronic:

- Acute exposure is characterized by rapid absorption of a hazardous substance resulting in a immediate reaction of the human body. The exposure occurs quickly and can instantly cause damage to the body. For example, inhaling high concentrations of carbon monoxide gas or carbon tetrachloride vapors will produce acute poisoning.

- Chronic exposure occurs when there is continuous absorption of small amounts of contaminants over a long period of time. Each dose, taken independently, would barely effect the human body, but the quantity accumulated over a long period, (months to years), can result in serious damage. The toxicants can remain in the tissues causing steady damage. Chronic poisoning can also be produced by exposure to small amounts of a harmful material which produces irreversible damage to tissues and organs so that the injury accumulates rather than the poison. An example of such a chronic effect of a toxicant is the disease known as silicosis. It is produced by the inhalation of high contrations of silica dust over a period of years and results in breathing difficulties and ultimately death due to lung failure.



(Chart reproduced by courtesy of Mine Safety Appliances Company.)

EXHIBIT IHM5*1 The Size of Air-Borne Contaminants

REFERENCES

1. Leidel, N.A. and K.A. Busch, "Statistical Methods for the Determination of Noncompliance with Occupational Health Standards," NIOSH Technical Information, NIOSH #75-159, April 1975.

2. Budenaers, D. and Y. Bar-Shalom, "Handbook for Sequential Sampling Plans and Decision Theory for Employer Monitoring of Employee Exposure to Industrial Atmospheres," Systems Control, Inc., 1975.

3. National Institute for Occupational Safety and Health, "Recognition of Occupational Health Hazards," NIOSH, December 1974-76.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Recognition and Determination II IHM6

TIME: Industrial Hygiene Background for the Manager Module, Period 6, (50 minutes)

OBJECTIVES: Enable the trainee to :

(1) complete a workplace raw materials survey

(2) identify existing air contaminants in a workplace

EXHIBITS:

IH4 *1 Materials Safety Data Sheet

IH4 *2 Potentially Hazardous Operations and Air Contaminants

IH4 *3 Solvent Application Rates in Certain Typical Individual Operations

KEY WORDS: See Lesson IHM5

MATERIALS: Student Manual
Pencils and erasers

METHODS: Read Explanation/Lecture; listen to instructor's lecture.
Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Recognition and Determination II lesson:

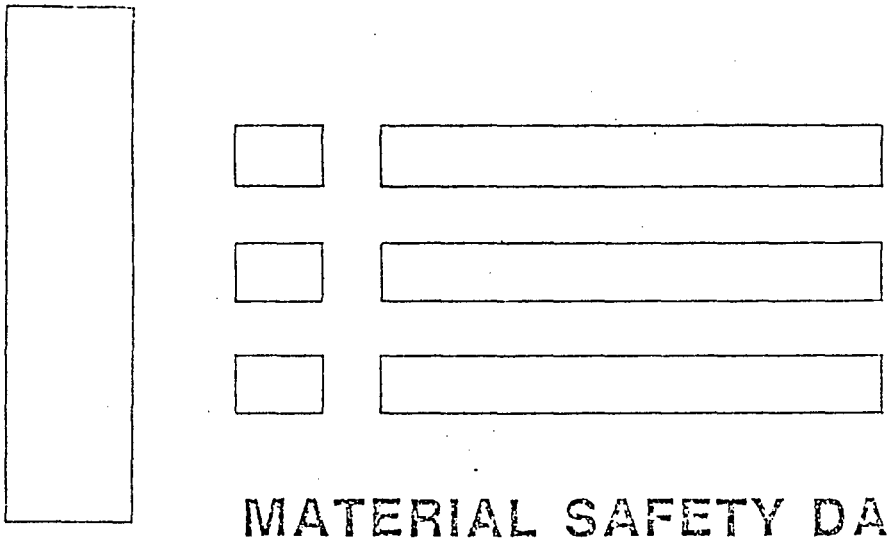
EXPLANATION/LECTURE

WORKPLACE RAW MATERIAL SURVEY

The main purpose of the Workplace Raw Material Survey is to find out if any harmful contaminants are being used in a workplace. The procedures to follow in carrying out this survey are quite simple. First, list all raw materials used in work operations and manufacturing processes that might be released into the workplace air. In many instances, this information may be obtained from purchasing records. Many raw materials used in industrial operations are identified by "trade names" rather than by chemical composition. Because the chemical composition of each raw material must be known, the employer should contact the manufacturer and obtain proper identification of the raw material.

This information can be conveniently recorded on a "Material Safety Data Sheet." NIOSH supplies a convenient 4-page form (Exhibit IH4*1) and OSHA supplies a 2-page form required only in the maritime industry. When using these forms be sure to check if any component is Federally regulated under 29 CFR 1910. If so, there may be specific use regulations for some components as well as informative appendices. The appendices are a convenient source of data for specific substance properties.

The next step in the Workplace Raw Material Survey is to compare your list with the tables of substances published in the Occupational Safety and Health Standards, 29 CFR 1910. This procedure will determine if the employer is subject to the provisions of Federal regulations by the use of, or having in his establishment, the substances listed in the published standards. Even if the toxic substances are not Federally regulated, the same exposure monitoring, control procedures, etc., as similar substances with Federal regulations should be instituted. Professional industrial hygiene consulation should be employed.



MATERIAL SAFETY DATA SHEET

I PRODUCT IDENTIFICATION	
MANUFACTURER'S NAME	REGULAR TELEPHONE NO. EMERGENCY TELEPHONE NO.
ADDRESS	
TRADE NAME	
SYNONYMS	

II HAZARDOUS INGREDIENTS		
MATERIAL OR COMPONENT	%	HAZARD DATA

III PHYSICAL DATA			
BOILING POINT, 760 MM HG		MELTING POINT	
SPECIFIC GRAVITY (H_2O = 1)		VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H_2O, % BY WT	
% VOLATILES BY VOL.		EVAPORATION RATE (BUTYL ACETATE = 1)	
APPEARANCE AND ODOR			

EXHIBIT IHM6*1 Material Safety Data Sheet

VI REACTIVITY DATA
CONDITIONS CONTRIBUTING TO INSTABILITY
INCOMPATIBILITY
HAZARDOUS DECOMPOSITION PRODUCTS
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION
VII SPILL OR LEAK PROCEDURES
STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED NEUTRALIZING CHEMICALS
WASTE DISPOSAL METHOD
VIII SPECIAL PROTECTION INFORMATION
VENTILATION REQUIREMENTS
SPECIFIC PERSONAL PROTECTIVE EQUIPMENT RESPIRATORY (SPECIFY IN DETAIL)
EYE
GLOVES
OTHER CLOTHING AND EQUIPMENT

EXHIBIT IHM6*1 (cont.)

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)		AUTOIGNITION TEMPERATURE	
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER		UPPER
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARD			

V HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA

ROUTES OF EXPOSURE

INHALATION

SKIN CONTACT

SKIN ABSORPTION

EYE CONTACT

INGESTION

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE

CHRONIC OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES

EYES:

SKIN:

INHALATION:

INGESTION:

NOTES TO PHYSICIAN

EXHIBIT IHM6*1 (cont.)

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

OTHER HANDLING AND STORAGE REQUIREMENTS

PREPARED BY: _____

ADDRESS: _____

DATE: _____

EXHIBIT IHM6*1 (cont.)

PROCESS OPERATIONS AS A SOURCE OF CONTAMINANTS

The mere presence of a potentially toxic material in an establishment does not necessarily imply that a hazardous condition exists. In addition to the Material Safety Data Sheets which serve as a list of the potentially toxic substances, the processes and work operations in which these materials are used must be known and investigated. In this regards, there are many processes and work operations that should be suspect with respect to their potential of releasing toxic materials into the work environment. The following are a few examples:

- Any process or operation that involves grinding, sanding, sawing, cutting, crushing, screening, sieving, or any manipulation of dry material that generates dust.
- Any process involving melting of toxic metals that would give rise to metal fumes and oxides.
- Any liquid or spray process involving the use of toxic solvents or products that contain solvents, and that generate solvent vapors such as: mixing wet materials, degreasing operations, spray painting, and drying-oven operations.
- Processes that involve treatment of metal surfaces: pickling, etching, acid dripping, and cleaning operations that may release acid, alkaline mists or various gases and vapors as a result of chemical reactions into the work environment.

The above processes and operations should serve as examples and should not imply that they are the only ones that may be encountered in the wide variety of industries in our society. Also, it should be recognized that industrial processes change frequently and rapidly, with new and different materials continually being introduced. Each time a process is changed the employer should reasses the workplace in order to determine if a new health hazard exists.

Some additional examples of potentially hazardous operations and air contaminant examples are given in Exhibit IHM6*2.

PROCESS TYPES	CONTAMINANT TYPE	CONTAMINANT EXAMPLES
HOT OPERATIONS		
Welding Chemical Reactions Soldering Melting Molding Combusting	Fumes (f) Gases (g) Particulates (p)	Chrome Iron Manganese Metal Oxides (f) Carbon Monoxide (g) Ozone (g) Nitrous Oxides (g) Cadmium (f) Fluorides (p) Lead (f) Carbon monoxide (f)
LIQUID OPERATIONS		
Painting Degreasing Dipping Spraying Brushing Coating Etching Cleaning Dry cleaning Pickling Plating Mixing Galvanizing Chemical reactions	Vapors (v) Gases (g) Mists (m) Particulate (p)	Trichloroethylene (v) Methylene chloride (v) 1,1,1-trichloroethylene (v) Hydrochloric acid (m) Sulfuric acid (m) Hydrogen chloride (g) Cyanide (m) Chromic acid (m) Hydrogen cyanide (g) TDI, MDI (v,p) Hydrogen sulfide (g) Sulfur dioxide (g)
SOLID OPERATIONS		
Pouring Mixing Separations Extraction Crushing Conveying Loading Bagging	Dusts	Cement Quartz (free silica) Fibrous glass

Exhibit IHM6*2 Potentially Hazardous Operations and Air Contaminants

PRESSURIZED SPRAYING		
Cleaning parts Applying pesticides Degreasing Sand blasting Painting	Vapors (v) Dusts (d) Mists (m)	Organic solvents (v) Chlorodane (m) Parathion (m) Trichloroethylene (y) 1,1,1 trichloro-ethane (y) Methylene chloride (y) Quartz(free silica,d)
SHAPING OPERATIONS		
Cutting Grinding Filing Milling Molding Sawing Drilling	Dusts	Asbestos Beryllium Uranium Zinc Lead

Exhibit IHM6*2 (cont.)

WORKPLACE OBSERVATIONS

Lesson IH3 (Recognition and Determination I) and the previous sections of this lesson have given you a rough indication of the potential hazards that may be present in a workplace. Knowledge of the physical states of contaminants, their effects on the human body, the chemical composition of the raw materials and the processes and operations involved allows you to be able to recognize the existence of potentially exposed employees.

The next step in the workplace survey is to directly observe the work operations. It is here that a potential health hazard is identified and a determination may be made of employee exposure to airborne concentrations of hazardous materials released into the work environment.

Visual Identification of Contaminants

Some potentially hazardous conditions and sources of air contaminants can be visually identified, such as dusty operations. However, the existence of visual dust does not necessarily mean a hazardous condition is present. The dust particles that cannot be seen pose the greatest hazard to workers because they are in the size range that is most readily respirable. This visual identification can be used as a rough indicator of contaminants but should not be considered absolute as, for example, the fact that a visible dust cloud is absent does not mean that a nonhazardous atmosphere exists.

Operations that generate fumes may be visually identified, since the melting of metals, such as in welding, results in visible smoke emissions. In electroplating operations, where metallic surfaces are subjected to a variety of treatments by immersion in heated tanks of acids, alkalies, and degreasing agents, visible mists in the form of steam are often generated.

Identification by Sense of Smell

Some sources of air contaminants in work operations can be determined by the sense of smell. Gases and vapors may often be detected by their distinct odors, tastes or irritating effects, such as burning sensations

in the nose, throat, and lungs. However, the ability to identify and detect their presence will vary widely with individuals. Caution is advised in this method of detection, due to olfactory fatigue. Also, many gases and vapors have odor thresholds higher than the permissible exposure levels, so it would be possible for an overexposure to occur before the offending material could be detected by smell. Tables of odor thresholds are very hard to find in the literature and often contain conflicting data. However, one can check each Federal Health Standard (29 CFR 1910) and examine the permitted Respiratory Protection Table for the substance. If OSHA specifically allows either a chemical cartridge or gas mask respirator for an organic vapor (without requiring an end-of-life indicator) it can be assumed that the organic vapor has some warning property (generally odor or irritation) at levels below the permissible exposure. One should then refer to Appendix A (Substance Safety Data) and Appendix B (Substance Technical Guidelines) of the particular substance standard for futher information on what these warning properties may be.

Distance Between Employee and Contaminant Source

Employee location in relation to a contaminant source is also an important factor in determing if an employee may be exposed to a hazardous substance. In most instances, the closer the worker is to the source of an air contaminant, the higher the probability is that a significant exposure will occur. In some instances it will be necessary to investigate air flow patterns within a work establishment since many contaminants can be dispersed long distances from the source of evolution. Thus, it would be possible to expose workers who are not in close proximity to the contaminant source.

Job Performance Procedures

The procedures or methods the worker uses to perform his job should also be analyzed. Exhaust ventilation equipment for degreasing tanks that is designed to prevent release of toxic materials into the worker's environment may not perform its intended function if the worker must bend directly over the tank to perform his job. In this same respect, improper worker

habits of not using or improperly using control equipment may cause exposure to hazardous materials. Also, careless handling of toxic materials, whether intentional or unintentional, could cause situations in which exposures could occur.

Equipment

Improper design, installation, or maintenance of control equipment can many times cause exposure situations. Far too often employers (or their contractors), ignorant of the principles of local exhaust ventilation will design and install ineffective control systems. The principles of design and measurements to determine system effectiveness contained in Reference 6 should be followed.

The properties of the workplace itself should be considered in relation to how contaminant concentrations can be effected. Certainly high temperature locations would give rise to higher evaporation rates of toxic solvents. The location of open doors and windows provides some natural ventilation that tends to disperse or dilute toxic materials released in the workroom. Attention should also be directed towards induced general ventilation that might provide some measure of control.

REFERENCES

1. Leidel, N.A. and K.A. Busch, "Statistical Methods for the Determination of Noncompliance with Occupational Health Standards," NIOSH Technical Information, NIOSH #75-159, April 1975.

2. Budenaers, D. and Y. Bar-Shalom, "Handbook for Sequential Sampling Plans and Decision Theory for Employer Monitoring of Employee Exposure to Industrial Atmospheres," Systems Control, Inc., 1975.

3. National Institute for Occupational Safety and Health, "Recognition of Occupational Health Hazards," NIOSH, December 1974-76.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Recognition and Determination III IHM7

TIME: Industrial Hygiene Background for the Manager Module
Period 7 (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Calculate potential exposure concentrations.
2) Recognize the contents of an Occupational Environmental Determination Report

EXHIBITS: IHM7*1 - Solvent Application Rates in Certain Typical Individual Operations

KEY TERMS: No new key terms introduced in this lesson.

MATERIALS: Student Manual
Pencils with erasers and/or calculators

METHODS: Read the Explanation/Lecture; listen to the Instructor's lecture. Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Recognition and Determination III lesson:

EXPLANTATION/LECTURE

CALCULATION OF POTENTIAL EXPOSURE CONCENTRATIONS

Calculations can often be made to determine if standards might be exceeded by knowing the ventilation rate in a workplace and the quantity of material generated. For example, suppose four gallons of methyl ethyl ketone are used (evaporated) in eight hours and the ventilation rate in the workplace is 600,000 cubic feet per hour dilution air. Then the formula would be:

Steady state exposure concentration estimate (in ppm) =

$$\frac{(403) \times (\text{specific gravity of solvents}) \times (10^6) \times (\text{pints solvent/hr.}) \times (K)}{(\text{molecular weight of solvent}) \times (\text{ventilation rate in cubic ft./hr.})}$$

K is a safety factor constant that must be included to take into account relative toxicity of material, location of fans in the workroom, proximity of employees to the work operation, etc. K values can vary from 3 to 10 and are often chosen at 6. Thus for example:

$$\frac{403 \times 0.81 \times 10^6 \times 4 \times 6}{72 \times 600{,}000} = 181 \text{ parts/million}$$

For the conditions in this example, it is obvious that the standard for methyl ethly ketone (200 parts per million) is close enough to the calculated estimate (even with K equal to 6) that some workers might be exposed at some times. A maximum risk worker (typically the one closest to the source of MEK such as a tank or solvent tray) should be chosen and an exposure should be obtained as detailed in the next chapter. One should be very conservative with judgements based on the previous equation since a value of K=1 assumes (unattainable) perfect mixing in the room and concentrations 10 to 20 times the average room concentration can easily occur near the solvent source.

If the room is "closed" or if the ventilation rate is unknown (or very low) a conservative assumption of one effective room change per hour can be made. Since the room air would probably be poorly mixed, it is best to assume K=10. The previous equation becomes:

Steady-state exposure concentration estimate (in ppm) =

$$\frac{(4.03) \times (10^9) \times (\text{specific gravity of solvent}) \times (\text{pints solvent/hr.})}{(\text{molecular weight of solvent}) \times (\text{room volume in cubic ft.})}$$

Suppose that methyl ethyl ketone is used in a nonventilated room at the rate of one pint per eight-hour shift. The room is 20 feet long by 10 feet wide by 10 feet high, or 2000 cubic feet:

$$\frac{4.03 \times 10^9 \times 0.81 \times 0.125}{72 \times 2000} = 2830 \text{ parts/million}$$

Definitely in this case we should proceed with maximum risk employee exposure measurements as detailed in the next chapter.

Reference 5 provides more sophisticated equations for conventional dilution at sources such as point, area, and strip sources. These equations are very useful for estimating concentrations that prevail in the breathing zone of workers if they are engaged in tasks that involve evaporation only a short distance (a few feet) from their face. In this case the local breathing zone concentrations may be high while the average concentration in the room is low.

Exhibit IHM7*1 provides estimates of typical solvent application rates where the solvent rate information is lacking.

OPERATION	PINTS/MINUTES/WORKER
Manual, small-brush cementing: "fussy" work (raincoat, balloon making, etc.)	0.02 - 0.03
Manual, large-brush applications ("daubing" patent leather)	0.02
Manual, gross application, maximum use rate by hand (unusual)	3/4 - 1 1/2
Mechanical coating operations	1/3 - 2
Spray painting machinery	1/4 - 1/2

Exhibit IHM7*1 Solvent Application Rates in Certain Typical Individual Operations

EMPLOYEE COMPLAINTS OR SYMPTOMS

Employee complaints or symptoms which may be attributable to exposure to a chemical substance must always be considered in determining the need for exposure measurements. An employer can obtain information on the common symptoms of exposure to a substance from the Health Hazard Data section in Appendix A of a substance standard and the Signs and Symptoms section in Appendix C of the standard.

OCCUPATIONAL ENVIRONMENTAL DETERMINATION REPORT

The end goal of the previous lessons is a written report stating whether any employee may be exposed to airborne concentrations of a hazardous chemical substance at or above the action level. Refer to appropriate Federal regulations to determine minimum required information for this report. The following guidelines are recommendations concerning what a comprehensive report should contain. The report can be organized for convenience by either employee or work operation. It is compatible with proposed Federal health standard requirements.

- Date of report.
- Name and Social Security number of employee.
- Work operations performed by the employee at the time of the report.
- Location of work operations within the work site.
- Chemical substances to which the employee may be exposed at each work operation.
- Any information, observations, and estimates which may indicate exposure to a chemical substance. List any exposure measurement data and calculations.
- Federal permissible exposure limits and/or ACGIH TLV for each chemical.
- Complaints or symptoms which may be attributable to chemical
- Typical and effectiveness of any control measures used. For mechanical ventilation controls list measurements taken to demonstrate system effectiveness.
- Operating condition ranges for production, process, and control measures for which the determination applies.
- Determination summary including any further action required.

REFERENCES

1. Material Safety Data Sheet (booklet), U.S. Department of Labor, Available from OSHA Area and Regional Offices.

2. "A Recommendated Standard. . .An Identification System for Occupationally Hazardous Materials", NIOSH Publication #(NIOSH) 75-126, (1974).

3. "Guide for Respirable Mass Sampling", AIHAJ, 3, 133, (1970).

4. "Industrial Ventilation - A Manual of Recommended Practice," American Conference of Governmental Industrial Hygienist, 13th, ed., (1974). (This manual is revised about every two years. The current edition can be purchased from the ACGIH Committee on Industrial Ventilation, P.O. Box 453, Lansing, MI, 48902.)

5. Hemeon, W.C.L., Plant and Process Ventilation, Industrial Press, Second edition, (1963).

6. Leidel, N.A., K.A. Busch, and J.R. Lynch, "Occupational Exposure Sampling Strategy Manual," NIOSH Draft (March 1976).

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

INDUSTRIAL HYGIENE BACKGROUND FOR THE MANAGER

LESSON: Review IHM8

TIME: Industrial Hygiene Background for the Manager Module, Period 8 (50 minutes)

OBJECTIVES: Enable the trainee to improve his or her mastery of the Industrial Hygiene Background for the Manager Module of Instruction

EXHIBITS: None

KEY TERMS: No new key terms introduced in this lesson.

MATERIALS: Student Manual
Pencils with erasers

METHODS: Independent Study and group discussions.

CONTENTS

The following is an outline of the contents of the Industrial Hygiene Background for the Manager Module Review Lesson:

INTRODUCTION

This last lesson of the Industrial Hygiene Background for the Manager Module of Instruction provides brief summaries of the important concepts examined in each of the lessons. Sixteen excercises are included to test and improve your mastery of the material in this module.

LESSON SUMMARIES

SYNOPSIS OF LESSON IHM1: ORIENTATION

The Orientation Lesson introduced you to the Non-Technical 2-Day course format. You learned the general course layout, the "best" way to use the various course materials, and study tips to enable you to more fully comprehend the course material.

SYNOPSIS OF LESSON IHM2: LEGAL ASPECTS I

The Ocupational Safety and Health Act of 1970 has as its purpose "to assure so far as possible every working man and woman in the nation safe and healthful working conditions". NIOSH and OSHA were created under the Act to see to it that safe conditions exist. Specifics on types of penalties under this law are discussed in this lesson. Clear, complete record-keeping is required by the Act; a list of the required record data is presented.

SYNOPSIS OF LESSON IHM3: LEGAL ASPECTS II

Legal Aspects II is a continuation of Lesson IHM2. The legal aspects of the OSH Act of 1970 is stressed in this lesson. The different types of standards--National Consensus Standards, Section 6b Standards, and Emergency Standards--are examined and discussed. The employer's and employee's rights under the OSH Act, such as inspection requests and appeals are described. Other topics covered include Right of Entry, State Jurisdiction and citations.

SYNOPSIS OF LESSON IHM4: LEGAL ASPECTS III

The joint NIOSH/OSHA Standards Completion Program was initiated to protect employees from industrial air contaminants, and to aid employers in monitoring the exposure of employees in their workplaces. The proposed

standards list toxic chemicals and establish requirements for each chemical substance in six important areas:

Exposure Measurement
Methods of Compliance
Safety Guidelines
Employer Training
Medical Surveillance
Record Keeping

SYNOPSIS OF LESSON IHM5: RECOGNITION AND DETERMINATION I

Recognition and Determination I described the physical and physiological characteristics of industrial contaminants. Knowledge of these characteristics aids in surveying a workplace and detecting whether any danger to workers might exist.

The four major categories (gases and vapors, particulate matter, liquids, solids) for the physical classification of toxic air contaminants were listed and defined. Another system for classifying toxic substances in terms of their physiological response on the human body was described. Acute exposure, the short-term human system response to contaminants, chronic exposure and long-term human system response to exposure were discussed.

SYNOPSIS OF LESSON IHM6: RECOGNITION AND DETERMINATION II

Recognition and Determination II described the workplace Raw Material Survey, and the types of operations that can produce contaminants. Other information such as contaminant identification by sight and smell were discussed to allow you to survey a workplace and make decisions about whom and where to investigate for an overexposure.

SYNOPOSIS OF LESSON IHM7: RECOGNITION AND DETERMINATION III

Recognition and Determination III describes how to implement a calculation used to determine overexposure when the ventilation rate and quantity

of material generated is known. Guidelines were listed for filling out the Occupational Environmental Determination Report.

EXERCISES

Check the letter of the answer(s) to each of the following questions. More than one answer can be correct.

1. What is the most common way in which contaminants enter the body?

   a. through the skin
   b. through the ears
   c. through the respiratory tract
   d. through the digestive tract

2. Which of the following characterize the effects of chronic exposure?

   a. long-term human system response to exposure
   b. bodily absorption of small amounts of contaminants over a short time period
   c. bodily absorption of small amounts of contaminants over a long time period
   d. accumulation of poisons

3. Which of the following characterize the effects of acute exposure?

   a. short-term human system response to long-term exposure of contaminant
   b. immediate human system response to exposure
   c. short-term exposure resulting in immediate bodily damage
   d. body vulnerability to contaminant

4. Harry Wardley has worked in an asbestos mill for 21 years. In his latest physical examination, Harry's physician discovered that Harry had 3 asbestos-related tumors. In this case, the asbestos acted as:

   a. a systemic poison.
   b. a neurotoxic agent.
   c. an example of acute exposure.
   d. an example of chronic exposure.
   e. a chemical carcinogen

5. Bess Hickson works as a border inspector. While checking the rear license plate of a suspicious looking truck, the driver started the truck and quickly sped away. The prodigious quantity of carbon monoxide that Bess inhaled caused her to pass out as the CO limited her oxygen supply. In this case, the carbon monoxide acted as:

   a. a simple asphyxiant.
   b. a chemical asphyxiant.
   c. an anesthetic.
   d. a blood damaging agent.

6. Bess's malady is an example of:

   a. acute exposure.
   b. chronic exposure.

7. George Calvert was stopped by the police and cited for drunk driving one night. He claimed that he was not drunk but had been exposed to high dosages of ethyl ether causing him to appear drunk because of the ethyl ether's effect on his central

nervous system. Even if George's claim was true, he was still a hazard on the highway as both alcohol and ethyl ether act as:

a. an anesthetic and narcotic agent
b. a stimulant on the central nervous system.
c. a depressant on the central nervous system.
d. anti-inhibiting agents.

8. Brown lung, or byssinosis is a disease common to cotton mill workers. The disease develops slowly; early symptoms are restricted breathing, later, emphysema develops ultimately ending in death due to heart failure.

   1. How do you think the cotton particles enter the body?

      a. through the digestive tract
      b. through the respiratory tract
      c. through the skin

   2. What is the physiological effect of the cotton particles on the body?

      a. lung scarring agent
      b. asphyxiant
      c. irritant
      d. blood damaging agent

9. Glenn Rudolph owns and manages a new photographic laboratory. After opening the plant, he began a work place survey and listed all of the raw materials present in his plant by their brand names. He completed the Material Safety Data Sheets and then began to compare the raw materials listed with the tables of substances published in the OSH Standards 29 CFR 1910. He became perplexed when some substances he felt sure were highly toxic did not appear in the tables of substances. Why do you think he could not find them?

   a. Because he did not know the work operations that generated the substances

b. Because the new presence of a harmful substance does not imply that a hazardous condition exists
c. Because he listed the substance by its brand name instead of its chemical composition
d. Because he did not know the physical state of the substance.

10. Which of the following operations might generate air contaminants?

a. dry cleaning
b. welding
c. writing
d. crushing rock
e. cutting meat
f. sand blasting
g. neon light bulb replacing
h grinding

11. Each time a process or operation is changed in the work place, the employer should:

a. increase the number of workers and decrease their work hours in the area where the change took place.
b. check to be sure that the exhaust fans work properly.
c. reassess the work place in order to determine if a new health hazard exists.
d. inform all employees of the process changes.

12. The visual identification of potentially hazardous contaminants is not always accurate because:

a. the fact that a contaminant is not visible does not necessarily mean that a hazardous condition is absent.
b. the fact that a contaminant is visible does not necessarily mean that a hazardous condition exists.

c. some contaminants are darker than others.
d. eye tests are not given to industrial hygienists to insure that their sight is accurate.

13. In most instances, the closer a worker is to the source of an air contaminant:

a. the higher the probability of over exertion.
b. the higher the probability is that he will be able to detect the contaminant by odor.
c. the greater the need for heavy clothing.
d. the higher the probability of a significant exposure.

14. Workers have different habits while performing tasks. These habits should be analyzed because:

a. some workers may not be cost effective.
b. the improper work habits of one worker may cause other workers to become antagonistic towards him.
c. improper work habits may cause exposure to hazardous materials.
d. this would enable the employer to have concrete evidence in order to start an award for the "Best Worker" and "Best Supporting Worker", and thus improve worker performance.

15. A factory with revolutionary and secretive production techniques does not want to allow an industrial hygienist to come in and take samples for fear that their secrets will be divulged. Is the factory's fear justified?

    a. No, the industrial hygienist must respect all confidential information or he will be liable for stiff fines, loss of employment, and/or one year imprisonment.

    b. Yes, if the factory is producing slip-on latex fingerprints.

    c. Yes, but the factory can always sue the industrial hygienist.

    d. Yes, the industrial hygienist is legally and professionally obligated to allow the public access to any information he discovers.

16. The main purpose of the OSH Act is to:

    a. Protect children from harsh working conditions.

    b. Avoid industrial hazards and accidents in order to preserve human resources.

    c. Provide equal worker protection under the law, regardless of profession.

    d. To assure workers safe and healthy working conditions.

ANSWER KEY TO EXERCISES

The correct answers (where appropriate) are underlined. Other answers are indicated.

1. What is the most common way in which contaminants enter the body?

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NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

FEDERAL REGULATIONS AND EMPLOYER GUIDELINES

LESSON: Legal Aspects IV M1

TIME: Federal Regulations and Employer Guidelines Module, Period 1 (50 minutes)

OBJECTIVES: Enable the trainee to correlate the proposed exposure standards to a systematic flow diagram of operational steps.

EXHIBITS: M1*1 - OSHA Proposed Employee Exposure Determination and Measurement Strategy Flow Diagram

KEY TERMS: No new key terms.

MATERIALS: Student Manual
Pencils with erasers
Ketone Proposed Exposure Standards Handout

METHODS: Read Explanation/Lecture; listen to instructor's lecture.
Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Legal Aspects IV lesson:

INTRODUCTION

In lesson IHSM4, Legal Aspects of Sampling III, you learned about the important points covered by a Proposed Exposure Standard. A flow diagram was exhibited in that lesson as a format of operational steps to follow when checking a workplace for possible air contamination.

This lesson uses both the Proposed Exposure Standards for Ketones, and the Flow Diagram. Using the Flow Diagram as a guide, we will run through the steps an employer or plant manager would follow in determing employee overexposures.

EXPLANATION/LECTURE

OSHA PROPOSED EMPLOYEE EXPOSURE DETERMINATION AND MEASUREMENT STRATEGY

Block 1 Presence of Chemical in Workplace Air

The first step in determing employee exposure uses some of the information you learned in the Recognition and Control lesson. Turn back to lesson IHM6, Recognition and Determination II, page Workplace Raw Material Survey section,and review it briefly. Remember that the purpose of this Survey is to determine if any harmful contaminants are being used in a workplace.

For the remainder of this lesson, you will play the part of the person in charge of determing employee overexposure. You are trying to determine whether hazardous concentrations of chemicals are being released into the air at the Chemville Chemical Company's plant. You notice that several chemicals worthy of investigation are being released. The first chemical you decide to investigate is Hexone. Since Hexone is a member of the Ketone family, you would obtain a copy of the Proposed Ketone Exposure Standards. (You should already have a copy for this lesson.) You would next carefully read the introductory pages and general comments in the Standards, and prepare to move to Block 2 and make a written determination. If you had found no chemicals released into the workplace air, you would stop the workplace evaluation.

Block 2 The Written Determination

The written determination is an estimate of whether any employer may be exposed to concentrations in excess of the action level. (Remember that the action level is equal to 1/2 of the Federal standard). A written determination must be made even if the employer determines that no employee is exposed above the action level. Turn to the Hexone section in the Ketone Standard, page 20218. To make a written determination for Hexone, the following factors must be taken into consideration: the amount of hexone present in the workplace; the size of the workplace; the type of operation being performed; the amount and type of ventilation; and an employee's distance from the hexone emission source.

The written determination must contain these observations, as well as any measurements of hexone, employee complaints or symptoms attributable to hexone, date, name and Social Security number of each employee considered. A list of required contents for the written determination is always included under the chemical name. For hexone, look on page 20218 sections B1 and B2.

If it has been determined that some employees are being exposed to concentrations of hexone at or above the action level, you must move on to Block 4 of the flow diagram in order to measure the exposure(s) of the maximum risk employee(s). If no employees are suspected of being exposed to hexone at or above the action level, then proceed to Block 3 and stop your sampling determination until a change in process or control methods occur.

Block 4 Measure Exposure(s) of Maximum Risk Employee(s)

The maximum risk employee is that employee believed to have the greatest exposure to a chemical, in this case hexone. This employee's exposure is measured and the measurement should be representative of the maximum hexone exposure of that employee.

Exposure Decisions

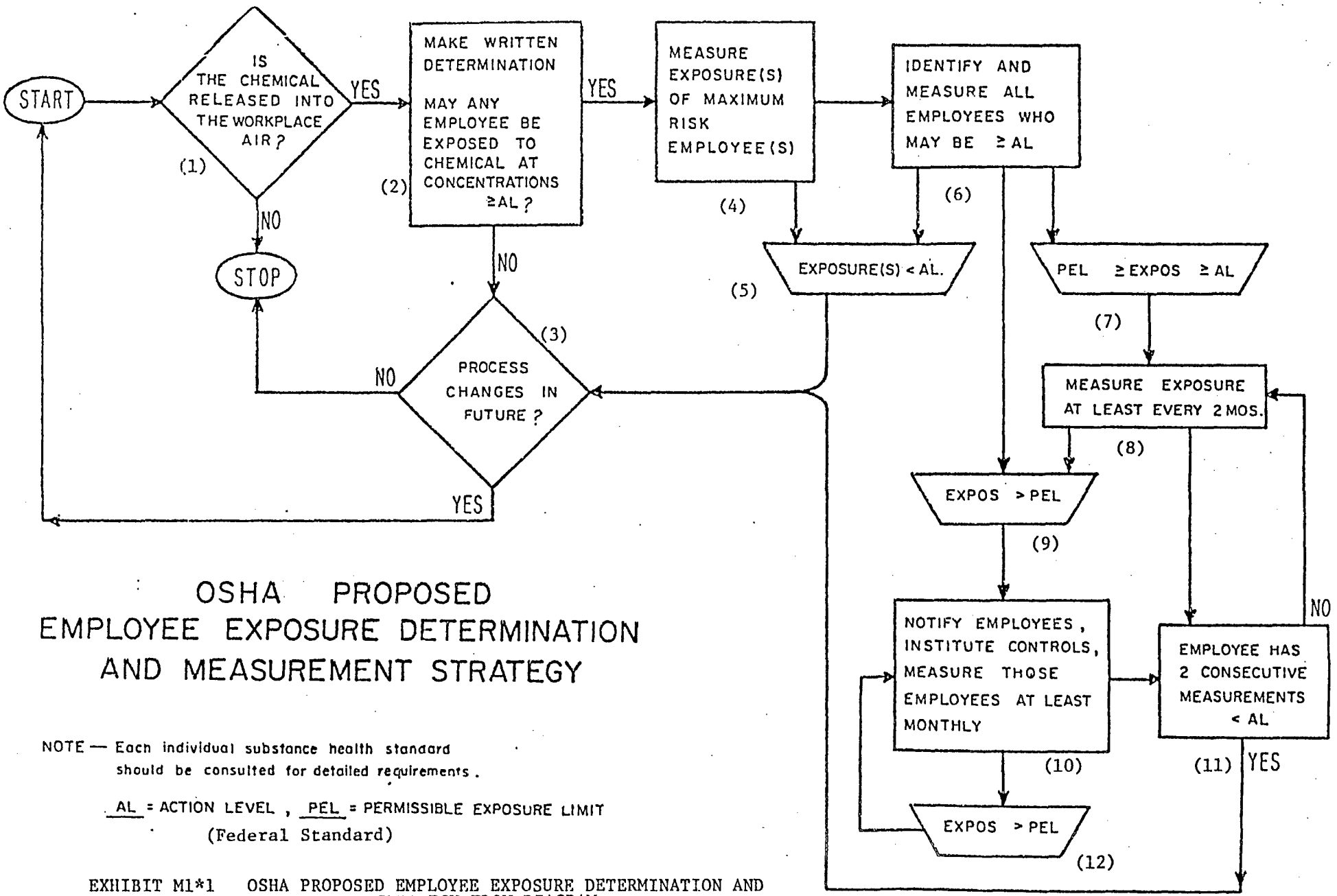
There are three possible outcomes and corresponding actions for the maximum risk employee(s) exposure measurements.

- If the maximum risk employee's exposure measurement is at or above the action level, the employer must identify and measure the exposures of all other employees who might have been exposed to hexone at or above the action level (Block 6).
- If the maximum risk employee's measurement is at or above the action level but below the Federal standard (permissable exposure) (Block 7), the employee exposure must be monitored at least every 2 months (Block 8).
- If the maximum risk employee's exposure measurement is above the Federal standard (Block 9) the employer must identify and measure all employees who may have the same exposure measurement and institute control measures. Control measures for hexone are

described on page 20219 under the section heading *Compliance*. The employer must also notify in writing each overexposed employee and measure their exposure levels monthly.

If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to hexone below the action level, the employer may stop the monthly measurements for that employee (Block 11).

Any changes in process, procedures or controls necessitates resampling affected workers; i.e., going through the flow diagram operational steps again.



OSHA PROPOSED EMPLOYEE EXPOSURE DETERMINATION AND MEASUREMENT STRATEGY

NOTE — Each individual substance health standard should be consulted for detailed requirements.

AL = ACTION LEVEL, PEL = PERMISSIBLE EXPOSURE LIMIT (Federal Standard)

EXHIBIT M1*1 OSHA PROPOSED EMPLOYEE EXPOSURE DETERMINATION AND MEASUREMENT STRATEGY FLOW DIAGRAM

REFERENCES

1. Department of Labor, Occupational Safety and Health Administration, Toxic Substances; Ketones - Proposed Exposure Standards, Federal Register, Vol. 40, No. 90, May 8, 1975.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

FEDERAL REGULATIONS AND EMPLOYER GUIDELINES

LESSON: Legal Aspects Workshop M2

TIME: Federal Regulations and Employer Guidelines Module, Period 2, (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Answer questions about the OSH Act of 1970
2) Answer questions about the Proposed Exposure Standards

EXHIBITS: None

REFERENCES: Lessons IHM2, IHM3, IHM4, M1

KEY TERMS: No new key terms introduced.

MATERIALS: Work surface
Course manual
Pencils with erasers

METHODS: Independent study and group discussion.

CONTENTS

This lesson provides practice in using the concepts introduced in Lessons IHM2, IHM3, IHM4 and M1. The following is an outline of the workshop session:

INTRODUCTION

Lessons IHM2 and IHM3 covered various aspects of the OSH Act of 1970. You learned about the organizations created by this Act, it's legal aspects and recordkeeping requirements instituted by the OSH Act and the Standards Completion Program. Lessons IHM4 and M1 discussed the joint NIOSH/OSHA Proposed Exposure Standards, focusing on the 6 most important impact areas. Lesson M2 gives you an opportunity to test your knowledge in these areas.

The exercises in this lesson consist of 20 multiple choice, self-check questions to answer:

1. Work by yourself, unless the instructor gives other directions.
2. Read and follow the material as presented in the text. Refer back to Lessons IH 5 and 6 or the Ketone Proposed Exposure Standard handout as often as you wish.
3. Ask the instructor for help when you need it, but save your "big" questions for discussion with the rest of the group.

EXERCISES

Check the letter of the answer(s) to each of the following questions or complete the question as directed.

NOTE: More than one answer can be correct.

1. The OSH Act of 1970 created two new government agencies and two commissions. Match each with their particular duties.

OSHA	Renders decisions on appeals
NIOSH	Advises Secretary of Labor
NACOSH	Enforces Act and Standards
OSH Review Commission	Conducts research

2. Under the OSH Act, the employer has the legal duty to:

   a. Fine employees if they don't follow safety standards.

   b. Furnish employees with a place of employment free from recognized hazards.

   c. Furnish employees with pure mountain drinking water.

   d. Keep records of work related injuries.

3. The OSH Act provides for public participation in the promulgation of standards: What are the avenue(s) open to the public when they wish to state their opinion?

   a. They may submit written comments to the Secretary of Labor.

   b. They may submit written comments to the Labor Relations Board.

   c. They may request a public hearing.

   d. They may request that a non-partisan group such as the American Medical Association, review a standard.

4. An emergency standard can be issued when some substance already in industrial use is discovered to present grave and immediate dangers to workers. When does the emergency standard take effect?

   a. Whenever NACOSH recommends that it be activated

   b. At midnight on any January 1st

   c. 30 days after the hearing date has been set

   d. Immediately upon publication in the Federal Register

5. Which of the following need not be included by an employee in a request for an inspection?

   a. Name of the employee requesting the inspection

   b. The grounds for the request

   c. The nature of the health hazard

   d. The address of the place of employment

6. Any person taking issue with an order of the Commission may take the order to a U.S. Court of Appeals. What procedure must be followed to accomplish this?

   a. A recommendation must be obtained from the U.S. Supreme Court stating that the order is controversial enough to warrant a Court of Appeals hearing.

   b. A written petition signed by 250 people asking that the order be modified must be filed in the U.S. Court of Appeals.

   c. A written petition asking that the order be modified must be filed in the U.S. Court of Appeals within 60 days of the issuance of the Commission's order.

   d. This person must call the U.S. Court of Appeals' secretary and make an appointment for a hearing.

7. Which of the following is not a violation requiring a penalty under the OSH Act?

   a. Failure to post employee rights in a workplace

   b. Failure to correct a violation for which a citation was issued

   c. Failure to vaccinate employees

   d. Falsifying records

8. Clear, complete records should be kept by an employer in order to:

   a. Meet legal requirements.

   b. Provide, if called upon, admissable evidence at a hearing.

   c. Accumulate data for future purposes.

   d. Supplement taped or memorized records.

9. Who is exempt from almost all recordkeeping requirements?

   a. The small employer (ten or fewer employees)

   b. The small employer (seven or fewer employees)

   c. Government employees

   d. Employers of agricultural workers

10. The assistant Secretary for OSHA can permit variances from a Standard if:

   a. An employer has seven or fewer employees.

   b. An employer did not know about the standard.

   c. An employer can demonstrate that he has safety and health protections as effective as Federal standards.

   d. An employer can demonstrate that he is unable to comply for very good reasons, such as personnel or equipment shortages or inadequate time for alterations.

11. Employers should keep up-to-date on regulations and standards put into law by OSHA. The best source for getting the latest information is:

    a. The National Occupational Hazard Survey

    b. The Code of Federal Regulations

    c. The Toxic Substances publication

    d. The Federal Register

12. A representative of the Secretary of Labor has just entered a factory. He has shown the employer his credentials, and is beginning an inspection. What may the employer do?

    a. Call the police and request that they remove the inspector

    b. Demand to see the inspection notice before allowing the inspector to proceed further

    c. Accompany the inspector on the inspection

    d. Request that the inspector come another day, if the inspection is an inconvenience to the employer

13. Employers who discriminate against or discharge employees who file complaints or testify in proceedings related to the OSH Act are subject to:

    a. Court action.

    b. Loss of plant or factory.

    c. A long walk down a short pier.

    d. State penalties.

14. Which is the best control procedure to use?

    a. Engineering controls

    b. Work practice controls

    c. Respirators

15. Under the proposed NIOSH/OSHA Exposure Standards, the employer is required to provide an annual training session for certain employees. Who are the employees?

    a. All employees in a workplace.

    b. All employees exposed to a toxic substance above the action level.

    c. All new employees.

    d. All employees having skin contact with liquid forms of a toxic substance.

16. Proposed Toxic Substance Exposure Standards should be posted:

    a. In the men's bathroom.

    b. In the women's bathroom.

    c. In a place accessible to all employees.

    d. By the coke machine.

17. Under the proposed Exposure Standards, medical examinations must be made available to:

    a. All employees

    b. All employees reporting any symptoms of overexposure to a contaminant.

    c. All employees reporting any symptoms of overexposure to a contaminant, and their offspring.

    d. All employees between the ages of 50 and 65.

18. In the proposed Exposure Standards, the definition of action level is:

    a. One-half of the permissable exposure limit.

    b. Any value above the permissible exposure limit.

    c. The permissible exposure limit.

    d. The point at which a contaminant becomes volatile in the air.

19. If an employee is exposed to a contaminant at concentrations above the permissible exposure level, the employer must:

    a. Measure the employee's exposure at least weekly.

    b. Measure the employees exposure at least monthly.

    c. Inform the employee of his overexposure.

    d. Institute control measures.

20. In the proposed Exposure Standards, employee's exposures must be measured using methods that will produce "accurate" results. In this case, what does accuracy refer to?

    a. Correct calculations.

    b. The difference between a suspected concentration value and the true concentration.

    c. The difference between a measured value and the true concentration.

    d. The right sampling method for the right job.

ANSWER KEY TO EXERCISES

The correct answers (where appropriate) are underlined. Other answers are indicated.

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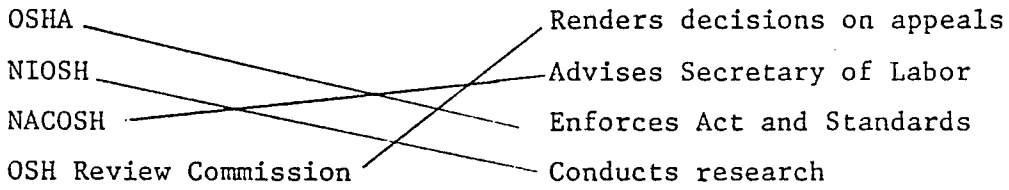

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NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

FEDERAL REGULATIONS AND EMPLOYER GUIDELINES

LESSON: Economic Impacts M5

TIME: Federal Regulations and Employer Guidelines Module, Period 5 (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Recognize the economic impact of the OSH Act of 1970
2) Select sampling equipment
3) Select an industrial hygiene consultant

EXHIBITS:

KEY TERMS:

MATERIALS: Student Manual

Pencils with erasers

METHODS: Read the Explanation/Lecture; listen to the instructor's lecture. Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Economic Impacts lesson:

INTRODUCTION

ECONOMIC IMPACTS

One subject of great concern to the employer or plant manager is the economic impact of the OSH Act of 1970. The major concern is not with government fines resulting from violations, but rather those costs encountered in redesign, modification and replacement of equipment and facilities to meet the Act's requirements. While no one really knows how much it will cost to comply with Federal standards resulting from the OSH Act, some figures have been compiled. McGraw Hill in their fourth annual Investment in Employee Safety and Health found that:

> "American business plans to spend $3.18 billion for plants and equipment devoted to employee safety and health this year, 17% more than in 1975, compared with last year's actual decline of 12%. This means that after allowance for inflation, investment in safety and health will be up about 8% this year. The 17% increase is four percentage points higher than the planned percentage rise in this year's total capital investment and six percentage points lower than the expected percentage increase in spending for pollution.
>
> The rise in job health and safety investment is concentrated most heavily in the nondudable goods segment of manufacturing. But there is spending strength indicated all across-the-board. Manufactures currently plan to spend $1.79 billion in 1976, a 21% increase above last year, with nondurable goods manufacturers increasing spending 26%. Durable goods manufacturers are planning a 15% increase. A 13% boost to $1.39 billion is scheduled for this year by nonmanufacturing industries.
>
> . . .Planning ahead to 1979, American business now expects to increase its safety and health expenditures by 14% to $3.60 billion, about 4.5% per year. By 1979, the manufacturing sector expects to be responsible for 54% of safety and health investment compared with 56% this year. The nonmanufacturing sector plans to increase its spending 19% while manufacturing will increase its spending by only 9%, reversing the pattern of greater growth in manufacturers' expenditures in 1976.
>
> . . .We are likely to see some real growth in employee safety and health spending this year and it is expected to rise further in the future. . . .Investment in job health and safety is related, in part, to the present enforcement of the 1970 Occupational Safety and Health Act (OSHA). This is still a relatively new area of large-scale capital expenditures. It does not result in increased or more modern productive capacity, but it may be responsible for improved labor productivity."

Although compliance with the standards does result in increased costs, these costs are at least partly offset by the resulting benefits of safer and healthier workplaces, and as a consequence, lower workman's compensation costs and less production time lost. The total cost of occupation hazards-lost wages, medical expenses, insurance claims, production delays, lost time of co-workers and equipment damage was estimated at $15 billion during 1974.

Economic impact statements have been issued on certain specific toxic substances. Some of them are available now from OSHA, and other are currently in process of development.

SELECTING EQUIPMENT

Sampling instruments used to evaluate the environment for occupational health hazards are generally classified according to type as follows:

- Direct reading
- Those which remove the contaminant from a measured quantity of air. and
- Those which collect a known volume of air for subsequent laboratory analysis.

Most of the equipment used by industrial hygienists is found under the first two types. The third group includes various types of evacuated flasks, plastic bags, or other suitable containers for collecting known volumes of contaminated air to be returned to the laboratory for analysis.

The choice of a particular sampling instrument depends upon a number of factors. Among these are:

- Portability and ease of use;
- Efficiency of the equipment or device;

- Reliability of the equipment under various conditions of field use;
- Type of analysis or information required;
- Availability; and
- Personal choice based on past experience and other factors.

No single, universal sampling instrument is available and it is doubtful if such an instrument will ever be developed. In fact, the present trend is the development of a greater number of specialized instruments such as the direct reading gas and vapor detectors. Personal monitors should be used for exposure measurement purposes. Direct-Reading Portable instruments are quite useful for survey purposes but are cumbersome for exposure measurements. For area monitoring, portability is not a factor, but the equipment should have specifity.

The person in charge of buying equipment should lood for instrumentst that sample a wide variety of substances, yet should not be subject to interference of other substances that are not being sampled. A wide range of adaptability is another quality to look for when selecting instruments.

In evaluating a worker's exposure or the environment in the workplace, an instrument must be used that will provide the necessary sensitivity, accuracy, reproducibility, and, preferably, rapid results. "Air Sampling Instruments for Evaluation of Atmospheric Contaminants" published by the American Conference of Government Industrial Hygienists gives detailed discussions of instruments used for sampling particular types of contaminants. One of the older, but still valid, discussions on this subject is "Sampling and Analyzing Air for Contaminants" by Silverman. Those whose responsibilities include the collection and analysis of samples will find this publication a worthwhile reference.

The use of continuous monitoring devices to evaluate the working environment has increased tremendously in recent years. While these devices

are normally not designed for field use, many are available in sizes that are convenient for this purpose. In general, however, many industries install these devices in areas were exposures to certain gases or vapors may vary considerably. Examples include the use of continuous monitors for carbon monoxide in tunnels or plant areas where this gas is produced or used, monitors for chlorinated hydrocarbons such as in the production of carbon tetrachloride or trichloroethylene, and monitors for certain alcohols. Many of these continuous detecting and recording instruments can be equipped to sample at several remote locations in a plant and record the general air concentrations to which workers may be exposed during a shift. Many large plants have added computerized equipment to the recorders so that the data may be readily available and summarized for instant review. However, as is the case with other instruments, continuous monitors must be calibrated periodically and the interferences known.

Another consideration in selecting sampling equipment is "evidence of accuracy". Recall that the proposed OSHA health regulations require a written record of all measurements taken that must include evidence of the accuracy of the sampling and analytical methods used. The following are examples of ways to meet this requirement and should be considered when selecting sampling equipment:

- Establish field calibration procedures for sampling equipment.
- Have samples analyzed at a laboratory participating in an industrial hygiene quality control program such as the one conducted by the American Industrial Hygiene Association (AIHA).
- Use NIOSH certified detector tubes (certified under 42 CFR Part 84) if available.
- Refer to manufacturer's literature statements of accuracy.
- Refer to analytical laboratories' statements that their analyses will meet the accuracy requirements of the regulations.

After selecting the instrument, the plant manager, industrial hygienist, compliance officer, or other person collecting samples must become familiar with the device and its limitations. He must know, for example, whether or not the particular instrument is specific for the contaminant to be determined, what other substances interfere with the test, and the accuracy and sensitivity of the device. He must also be familiar with the response time, which is the time interval from the instant samples are taken to the time the instrument shows a reading or the chemical reaction takes place in a detector tube. Futhermore, in the case of detector tubes, the readings must be made under good lighting conditions, preferably in daylight.

GUIDELINES FOR SELECTING AND USING AN INDUSTRIAL HYGIENE CONSULTANT

Knowing When a Consultant is Needed

Having read the previous chapters, you should have a feeling for the situations that you can deal with on your own. If you are still unsure of the solution or if preliminary control measures have proved unsatisfactory, it may be time to consider the use of a consultant. Industrial hygiene consultants are primarily used to accomplish two major objectives. The first is to recognize and evaluate potential health and safety hazards to workers in the occupational environment. The second objective is to design and evaluate the effectiveness of controls to protect the workers in the workplace. The material and guidelines of this appendix are based on material presented in Chapter 6 of the NIOSH Industrial Noise Control Manual (NIOSH #75-183). This manual should be referred to for guidelines for selecting a noise control engineering consultant.

Even though you may be familiar with the chemicals and processes used in your plant or shop, you may not feel you have the background or training to evaluate their health effects and recognize potentially hazardous exposure situations. Competent industrial hygiene consultants are able to accomplish these tasks because of their training and experience. Additionally, consultants can efficiently and economically evaluate the magnitude of

employee exposures, if this is necessary, because of their knowledge of the proper sampling equipment and analytical procedures required.

Consultants can also provide important recommendations regarding whether or not control measures are required and the alternatives available. They can design, supervise the proper installation of, and evaluate the effectiveness of proper control measures. These can include the substitution of alternate less toxic materials, change of process, engineering controls, administrative controls, and personal controls such as respirators. Also if you have installed control measures that don't work, you may have to use a consultant to retrieve the situation. Although this may be a painful decision, it hopefully will occur only once. You should document the situation thoroughly and use the consultant to supply information on what went wrong, either through improper design, improper installation, or both.

Consultants can be used to keep you aware of the requirements of current Federal and state regulations in the area of occupational safety and health. They can inform you when medical examinations of your employees may be appropriate or required by regulation. They should be able to recommend to you appropriate physicians or clinics in your area that specialize in occupational medicine. The consultant can play a valuable role in providing the examining physician with information on the occupational exposures of each employee examined and alert the physician to particular medical tests either recommended or required by regulations. Additionally, consultants can design and provide the information for employee training programs. Lastly, you may be approaching a lawsuit situation, where data must be obtained, interpreted, and presented (as an expert witness) by a disinterested third party. Many consultants can provide this complete service.

Now that you have decided to obtain a consultant, how do you proceed? You should first be warned that there is no legal bar to anyone offering services as an industrial hygiene consultant. Consequently, it is up to

you to avoid those who are unsuitable because of lack of training or experience, incompetence or simple venality or greed.

Selection of a Consultant

Individuals or firms billing themselves as industrial hygiene consultants can be broadly classified according to whether or not they have a special interest in recommending a particular exposure monitoring procedure or system, medical exam service, or control process. Both types, properly used, have their special advantages and disadvantages.

In the first group of "special interest consultants", individuals or firms vary in their backgrounds from product salesperson to industrial hygiene professionals who are quite competent. This group, which is most commonly identified by the degree of their association with manufacturing or retail sales of occupational health and safety products, should be used only if, by the use of the techniques described in the previous chapters, you have satisfied yourself that you know what sampling strategy or control procedure is applicable to your situation. In this case, you have progressed to the point where the "consulting" aspect consists mainly in recommending the appropriate exposure monitoring equipment and analytical facilities, if required. Or it may consist of assistance in soliciting proposals for the design and installation of control equipment such as ventilation control systems or respirators. The main problem remaining is to write your contract in such a way that you are guaranteed (to the extent possible) of acutally solving your problem in a cost effective manner. The advantage of using this group directly is that you avoid consultant costs and pay only for the product or service. In effect, you are acting as your own consultant.

The disadvantage in dealing with a product-oriented consultant is that a costly mistake, out of proportion to the independent consultant's fees, is rendered more likely since these consultants may not consider all options available. Examples abound of cases where thousands of dollars were spent in purchasing a particular type of monitoring equipment or in implementing

a particular control system, only to discover that the desired results were not obtained. If there are any doubts in your mind as to the proper method for solving your problem, then an "independent consultant" (one free from ties to a particular service or line of products) should be called in. Since this "independent consultant" is what is usually meant by the word "consultant", it is this type of industrial hygiene consultant that will be discussed for the remainder of this lesson. The word independent will be dropped.

There are several sources one can go to for information and names of consultants available locally. The first consists of the two Federal agencies involved in occupational safety and health: the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA). NIOSH has ten regional offices across the country located in large cities. Their phone numbers are listed under "United States Government, Department of Health, Education, and Welfare". NIOSH regional offices usually have lists of consultants in their region (consisting of several states). NIOSH offices can provide technical and informational materials on a wide range of occupational safety and health topics. OSHA has both regional offices and several area offices in each region. OSHA office phone numbers are listed under "United States Government, Department of Labor". OSHA offices can also provide technical and informational materials, particularly regarding Federal occupational safety and health standards. OSHA offices are particularly valuable in assisting in the determination of what standards may be applicable to your firm and their proper interpretation. The best thing about these two government agencies is that their information is free and you are sure that it is current.

Another source of information consists of the professional associations and public service organizations related to occupational safety and health. Three national groups are the American Industrial Hygiene Association (AIHA), American Society of Safety Engineers (ASSE), and the National Safety Council (NSC). These three have local chapters, sections, or offices in major cities which are a source of information and assistance. The AIHA publication, American Industrial Hygiene Association Journal, contains a list of industrial hygiene consultants in several issues each year.

The other sources are a little more difficult to pursue, but useful information may be found. The Yellow Pages of your phone book are a good place to look. The headings to look under are generally along the lines of: Safety Consultants, Safety Equipment and Clothing Suppliers, and Air Pollution Control. Many insurance companies now have loss prevention programs that employ industrial hygienists. Make inquiries of your present insurer and perhaps compare the services they offer to those of other insurance companies. Finally, there may be a university or college in your area that has an environmental health program. Generally their staff professionals are available for consultation.

Guideline Questions to Ask Prospective Consultants

The best protection against an incompetent consultant is to question the prospective consultant yourself. A series of questions is given below. They should not be given equal weight since some are minor in importance. However, the list is generally organized in descending order or importance.

Experience

- For how many years have you been professionally active in industrial hygiene?
- Please supply a list of recent clients that you have served, preferably in my geographical area, and on problems similar to those in which I am interested. Are you retained by any clients on a continuing basis? (Be sure to call a few of these references to obtain their opinion on the consultant's services.)
- What teaching or training have you done in industrial hygiene? What groups were involved: university, industry, trade associations, civic groups, engineers, symposia?

Consultation Status

- Are you now an independent consultant? For how many years? Full-time or part-time?

- If part-time:
  - Who is your chief employer or in what other business ventures are you involved?
  - Is your employer aware and does he approve of your part-time activity as an industrial hygiene consultant?
  - May we contact your employer concerning you?
  - What restrictions does your employer place on you as a part-time consultant?
- Are you associated with the manufacture or sale of a product that could create a conflict of interest in your activities as a consultant?

Education

- What schools did you attend and what courses did you take related to industrial hygiene?
- What degrees did you receive and when?
- What special conferences, seminars, symposia, or short courses have you attended (especially recently) to stay current with industrial hygiene technical information and governmental regulations?
- What other sources of information do you use to stay current with the field of industrial hygiene?

Professional Affiliations

- What professional associations do you belong to? (Representative ones are the American Industrial Hygiene Association, American Conference of Governmental Industrial Hygienists, American Society of Safety Engineers.) What is your present grade of membership and length of time in that grade, for each association?
- Are you certified by any of the following:
  - American Board of Industrial Hygiene (in the comprehensive practice of industrial hygiene)
  - Board of Certified Safety Professionals

  - Environmental Engineering Intersociety Board (as an industrial hygiene engineer)

- Are you a registered professional engineer? In what states and disciplines?

- Of what professional engineer associations are you or your firm a member?

- Of what trade associations, chambers of commerce, or similar business groups are you or your firm a member?

Special Capabilities

- In what areas of industrial hygiene do you specialize?

  - Comprehensive plant studies and/or analyses
  - Ventilation
  - Noise control
  - Audiometry
  - Biological monitoring
  - Heat stress
  - Ergonomics
  - Occupational medicine
  - Safety
  - Product safety and labelling
  - Radiological control
  - Training instruction
  - Air pollution
  - Meteorology
  - Waste disposal
  - Water pollution

- What equipment do you have for conducting industrial hygiene evaluations in my plant or shop?

- What laboratories do you use for the analysis of your exposure measurements samples? Are they accredited by the American Industrial Hygiene Association? Do they participate in the NIOSH Proficiency Analytical Testing Program (PAT) and for what materials? (The AIHA Journal periodically publishes a list of accredited laboratories.)

- What equipment do you have for the calibration of test apparatus such as pumps and direct-reading instruments? Do you have a calibration program for your equipment?

- Can you refer me to a physician or clinic capable of doing preplacement examinations, periodic examinations, or diagnostic examinations on my employees if these may be required? Do you have any business connection with these individuals or firms?

- Can you refer me to engineering firms capable of installing controls such as local exhaust ventilation systems if these may be necessary? Do you have any business connection with these firms?

- Can you refer me to appropriate safety equipment supplies if personal protective equipment is necessary for any of my employees? Do you have any business connection with these firms?

- Can you serve an expert witness, either for your client or as a friend of the court? What experience have you had as an expert witness?

Business Practices

- Please indicate your fee structure. Do you handle this by hourly charges, estimates for the total job, retainer charges, or all of these?

- In your charges, how do you treat such expenses as travel, subsistence, shipping, report reproduction, and computer time?

- Can you supply a list of typical laboratory analytical fees?

- If you use a contract form, please supply an example.

- What insurance and bonding do you have?

- What statements do you have in your contracts covering commercial secruity, liability, patent rights?

- What restrictions are there on the use of your name in our reports, in litigation, or in advertisements?

- What is the character and extent of reports that you prepare? Can you supply an example?

- What facilities do you have for producing design drawings for control systems that may be necessary?

- What is the size of your staff? What are their qualifications? Who will be working on this project?

- Do you have branch offices? Where?

- Are you operating as an individual, partnership, or corporation?

The Proposal

Once you have selected a consultant, you can arrange to obtain his services in several ways. With most professional people, a verbal commitment is sometimes all that is necessary. However, you may wish to request a written proposal that spells out the steps to be taken in the solution of your problem.

Often, in a larger job, proposals from several points of view are evaluated and used as one of the bases for the final selection of the consultant. In this case answers to pertinent questions in the preceding section may be sought in the proposal rather than in the interview. If so, evaluation of the proposal from this point of view is self-evident from the above discussion. If the questions you are interested in are not answered to your satisfaction, don't hesitate to ask for further clarification. In the discussion below, we are concerned with the section of the proposal that outlines the consultant's approach to your problem.

Aside from background qualifications of the consultant, the proposal should answer the questions:

- How much is the service going to cost? Smaller jobs are often bid on an hourly basis, with a minimum commonly specified of one-half day's work, plus direct expenses. Larger jobs are usually bid at a fixed amount, based on the work steps described.
- What is the consultant going to do? The answer to this question may range all the way from a simple agreement to study the problem to a comprehensive step-by-step plan to solve it.
- What will be the end result? The answer to this question is all too often not clearly understood; the result is usually a report that specifies the consultant's recommendation. If you do not want to pay for the preparation of a written report, and a verbal one will do, specify this in advance. Since recommendations often call for construction to be carried out by others, whose work is not subject to the consultant's control, results can usually not be guaranteed. Rather, an estimate of the exposure control to be attained is all that can be expected. If the consultant is to provide drawings from which the contractor

will work, one must specify sketches or finished drawings. Generally, sketches are sufficient. If special materials are required, the consultant should agree to specify alternative selections if possible. If you want a guaranteed result, experimental work will usually be necessary.

Other Services

If you wish, the consultant can also, as additional services, provide monitoring of construction to determine compliance with specifications. The consultant can also make post-installation measurements to confirm predications and supply oral briefings as needed.

If the consultant is to serve as a expert witness for you, you will find that he is not automatically on your side. Rather, he is more likely a friend of the court, devoted to bringing out the facts he has developed, with careful separation of fact from expert opinion. Complete frankness is needed if you want to avoid unpleasant surprises. For example, the consultant may be asked by the opposing attorney for a copy of his report to you. Thus, this report should be prepared with this eventuality in mind.

If the consultant is retained to develop a specific control device for you, there should be a meeting of minds on handling of patent rights. Ordinarily the patent is assigned to the client, with perhaps a royalty arrangement for the inventor.

For many situations the consultant will need photographs and plans of machines and shop layout to facilitate his evaluation. Permission to obtain these data can be handled in manner consistent with your industrial security system. A qualified consultant will not have to be told to regard this material as private, not to be divulged to other without your prior consent. If you regard him as the professional person he is, your association can be fruitful to all concerned.

REFERENCES

1. The Industrial Environment--Its Evaluation and Control, U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, NIOSH, 1973.

2. Mallino, David, Occupational Safety and Health--A Policy Analysis, Government Research Corporation, 1973

3. 4th Annual McGraw-Hill Survey Investment in Employee Safety and Health, Economics Department, McGraw-Hill Publishing Company, New York, New York, 1976.

4. Ashford, Nicholas A, "Worker Health and Safety: An Area of Conflicts", Monthly Labor Review, U.S. Department of Labor, Bureau of Statistics, Vol. 98, No. 9, September, 1975.

5. Leidel, Nelson, "Guidelines for Selecting and Using an Industrial Hygienist", Harvard Univ., Boston, Massachusetts, 1976.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

FEDERAL REGULATIONS AND EMPLOYER GUIDELINES

LESSON: Technical Assistance M6

TIME: Federal Regulations and Employer Guidelines Module, Period 6, (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Make use of NIOSH and OSHA Services

2) Make use of other organizations that can assist and advise an employer or manager.

EXHIBITS: M6*1 - Request for Health Hazard Evaluation Program

KEY TERMS: laboratory accreditation
NIOSHTIC
ANSI
PAT Program
ACGIH

MATERIALS: Student Manual
Pencils with erasers

METHODS: Read Explanation/Lecture; listen to instructor's lecture.
Take notes for later discussion.

CONTENTS

The following is an outline of the contents of the Technical Assistance lesson:

NIOSH SERVICES

NIOSH Regional Offices

NIOSH has offices in different regions of the United States. You can contact the office nearest you for information; following is a list of the locations of the various NIOSH regional offices.

REGION I

(Conn., Maine, Mass., N.H., R.I., and Vermont)
Paul Alvarado
Regional Consultant, NIOSH
Government Center (JFK Federal Bldg.)
Boston, Massachusetts, 02203
617/223-6668

REGION II

(N.Y., N.J., Puerto Rico and Virgin Islands)
Mary Louise Brown
Regional Consultant, NIOSH
26 Federal Plaza
New York, New York 10007
212/264-2485

REGION III

(Del., D.C., Md., W.Va., and Pa.)
William E. Shoemaker
Regional Consultant, NIOSH
3526 Market Street
Philadelphis, Pennsylvania 19104
215/597-6716

REGION IV

(Ala., Fla., Ga., Ky., N.C., S.C.,Tenn.)
Dr. Gordon Nifong
Regional Consultant, NIOSH
50 Seventh Street, NE
Atlanta, Georgia 30320
404/526-5474

REGION V

(Ill., Ind., Mich., Minn., Ohio, Wisc.)
Richard Kramkowski
Regional Consultant, NIOSH
300 South Wacker Drive
Chicago, Illinois 60607
312/353-1710

REGION VI

(Ark., La., N.M., Okla, and Texas)
George L. Pettigrew
Regional Consultant, NIOSH
1100 Commerce Street
Dallas, Texas 75202
214/794-2261

REGION VII

(Iowa, Kans., Mo., and Neb.)
Ralph J. Bicknell
Regional Consultant, NIOSH
601 East 12th Street
Kansas City, Missouri 64106
816/374-5332

REGION VIII

(Colo., Mont., N.D., S.D., Utah and Wyo.)
Stanley J. Reno
Regional Consultant, NIOSH
19th and Stout Streets
Denver, Colorado 80202
303/837-3979

REGION IX

(Arz., Calif., Hawaii, and Nev.)
Douglas L. Johnson
Regional Consultant, NIOSH
50 Fulton Street
San Francisco, California 94102
415/556-3781

REGION X

(Alaska, Ida., Ore., Wash.)
Dr. Walter E. Ruch
Regional Consultant, NIOSH
1321 Second Avenue, Arcade Bldg.
Seattle, Washington 98101
206/442-0530

Health Hazard Evaluation Program

If an employer or an employee suspects hazardous concentrations of airborne contaminants present in their plant or factory, they may request that NIOSH perform a health hazard evaluation. The hazard evaluation service is provided at no cost to the requestors.

To request a hazard evaluation, fill out the Request For Health Hazard Evaluation form, Exhibit M6*1. This request form is available in quantity from any NIOSH location.

The completed form is sent to the address on the form, the central NIOSH branch in Cincinnati. Having received the completed request, NIOSH Records validates and researches the toxic substance identified on the request.

The request, along with the packet of technical information, is sent to a NIOSH regional industrial hygienist who then contacts plant management and employee representatives to schedule an initial field visit. Employee representatives requesting such evaluations may have their names held confidential if they so desire. An observational survey of the workplace is conducted with these representatives to elucidate the extent of the problem and to determine the number and type of environmental samples to be collected. Employee interviews are conducted to identify adverse symptomatology experienced by the workers. Findings from the survey are reported to headquarters and a strategy developed for the environmental-medical evaluation. Sampling, analytical, and medical tests are derived and conducted by NIOSH to determine the concentration of substances found and the potentially toxic effects to affected employees. Study results are assessed, and a final determination made.

Affected employees are notified of the determination. A full report of the study including recommendations for controlling observed hazards, if appropriate, is sent to the employer; representative of employees; and the U.S. Department of Labor.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

REQUEST FOR HEALTH HAZARD EVALUATION

This form is provided to assist in registering a request for a health hazard evaluation with the U.S. Department of Health, Education, and Welfare as provided in Section 20(a)(6) of the Occupational Safety and Health Act of 1970 and 42 CFR Part 85. (See Statement of Authority on Reverse Side).

Name of Establishment Where Alleged Hazard(s) Exist _____

Company Address { Street _____ Telephone _____
City _____ State _____ Zip Code _____

1. Principal Company Activity _____
(manufacturing, construction, transportation, services, etc.)

2. Specify the particular building or worksite where the alleged hazard is located, including address _____

3. Specify the name and phone number of employer's agent(s) in charge.

4. Describe briefly the hazard(s) which exists by completing the following information:
Identification of Hazard or Toxic Substance(s) _____
Trade Name (If Applicable) _____ Chemical Name _____
Manufacturer _____ Does the material have a warning label? _____ Yes _____ No
If Yes, attach copy of label or a copy of the information contained on the label.
Physical Form: Dust ☐ Gas ☐ Liquid ☐ Mist ☐ Other ☐
Type of Exposure? Breathing ☐ Swallowing ☐ Skin Contact ☐
Number of People Exposed _____ Length of Exposure (Hours/Day) _____
Occupations of Exposed Employees _____

5. Using the space below describe further the nature of the conditions or circumstances which prompted this request and other relevant aspects which you may consider important, such as the nature of the illness or symptoms of exposure, the concern for the potentially toxic effects of a new chemical substance introduced into the workplace, etc.

EXHIBIT M6*1 REQUEST FOR HEALTH HAZARD EVALUATION FORM

6. (a) To your knowledge has this hazard been considered previously by any Government agency? _____
(b) If so, give the name and address of each.

_____

_____

(c) and, the approximate date it was so considered. _____

7. (a) Is this request, or a request alleging a similar hazard, being filed with any other Government agency? _____ (b) If so, give the name and address of each.

_____

_____

The undersigned (check one)

☐ Employer
☐ Authorized Representative of employees*

i ii iii (circle one)

believes that a substance (or substances) normally found at the following place of employment may have potentially toxic effects in the concentration used or found.

Signature _____ Date _____

Typed or Printed Name _____ Telephone: Home - _____

Address { Street _____ Business - _____
City _____ State _____ Zip Code _____

If you are a representative of employees, state the name and address of your organization.

_____

_____

Please indicate your desire:

☐ I do not want my name revealed to the employer.
☐ My name may be revealed to the employer.

Authority:

Section 20(a)(6) of the Occupational Safety and Health Act, (29 U. S. C. 669(a)(6)) provides as follows: The Secretary of Health, Education, and Welfare shall. . .determine following a written request by any employer or authorized representative of employees, specifying with reasonable particularity the grounds on which the request is made, whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found; and shall submit such determination both to employers and affected employees as soon as possible. If the Secretary of Health, Education, and Welfare determines that any substance is potentially toxic at the concentrations in which it is used or found in a place of employment, and such substance is not covered by an occupational safety or health standard promulgated under section 6, the Secretary of Health, Education, and Welfare shall immediately submit such determination to the Secretary of Labor, together with all pertinent criteria.

"Authorized representative of employees" means any person or organization meeting the conditions specified in 42 CFR Part 85.3 (b) (4) (i), (ii) or (iii):

(i) – that he is an authorized representative of, or an officer of the organization representing, the employees for purposes of collective bargaining; or

(ii) – that he is an employee of the employer and is authorized by two or more employees employed in the workplace where the substance is normally found, to represent them for purposes of the Act. Each such authorization shall be in writing and included in the request; or

(iii) - that he is one of three or less employees employed in the workplace where the substance is normally found.

Send the completed form to:

National Institute for Occupational Safety and Health
Hazard Evaluation Services Branch
U.S. Department of Health, Education, and Welfare
Cincinnati, Ohio 45202

EXHIBIT M6*1 (continued)

Health Hazard Evaluation Reports will be utilized in developing new standards where toxic substances are found but for which no standards exist. Information derived from health hazard evaluations will be used in assessment of the validity of existing standards.

NIOSH Technical Services

NIOSH Publications. NIOSH publishes a wide variety of health and safety-related pamphlets, studies, handbooks, and reports. For the most part they are not technical, are free upon request, and contain timely, important and useful information for employers, managers and employees. A monthly publications list carries the titles of all new material. This monthly publications list is mailed to anyone wishing to keep up-to-date on NIOSH publications. You may request the list from:

Robert A. Taft Laboratories
NIOSH
DTS COSHI
Information Resources and Dissemination Section
4676 Columbia Parkway
Cincinnati, Ohio 45226

NIOSHTIC. NIOSH offers the public a problem-solving, question-answering service. You can write to:

Information Retrieval Analysis Section
NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226

with an information request, question or problem, and a NIOSH staff member will attempt to answer your question free of charge with the help of NIOSHTIC, a computerized information retrieval system. NIOSHTIC covers many occupational safety and health disciplines such as toxicology, analytical methods, physiology, safety, etc. NIOSHTIC's data base contains many sources; among them are textbooks, special research papers, all NIOSH publications, NIOSH criteria document references, and relevant articles from 400 journals.

If an employee in your workplace had, for example, strange symptoms you believe could be occupationally created, you could write the above address, describing the symptoms and workplace situation. NIOSHTIC would then attempt to uncover the occupational environment creating these symptoms so that you could correct the problem. Or, if you wanted some specific information on a particular chemical or hazardous substance, you would write to the address listed above. The information you requested would then be retrieved from NIOSHTIC, and you would be sent a printed copy of it.

Industrial Hygiene Services

Technical assistance in the areas of engineering and industrial hygiene are also available to employers and employees. These services include the evaluation of special health-related problems in the workplace and recommendations for control measures. Write to:

Industrial Hygiene Services
Division of Technical Services
NIOSH, Post Office Building
Cincinnati, Ohio 45202 (513) 684-2737

Medical Services

Assistance in solving occupational medical and nursing problems in the workplace are available at the address below. These services include the assessment of existing medically related needs and the development of recommended means for meeting those needs. Write to:

Medical Services Branch
Division of Technical Services
NIOSH, Post Office Building
Cinannati, Ohio 45202 (513) 684-2732

Accident Prevention Services

Direct technical assistance is available to employers and employees for controlling on-the-job injuries resulting from accidents. Consultation in accident prevention is available and includes the evaluation of special problems and recommendations for corrective action. Write to:

Accident Prevention Services
Division of Technical Services
NIOSH, Post Office Building
Cincinnati, Ohio 45202 (513) 684-2876

ANSI

The American National Standards Institute (ANSI) is one of two American standards producing organizations supported by Congress as the source of "national consensus standards." ANSI is a non-profit organization made up of scientific, technical, trade, professional, consumer and labor organizations. The main function of ANSI is to act as "a clearing house to coordinate the work of standards development in the private sector which is currently carried on by nearly 400 organizations." Regarding this, ANSI's main duties are:

- Developing national consensus standards,
- Developing non-government international standards
- Certifing national and international performance standards.

INSURANCE

Most of the major insurance companies in the U.S. provide an industrial hygiene consulting service for companies they insure in a safety and health capacity. The amount of service they provide is dependent upon a company's size of account. Most of these insurance firms provide recognition and evaluation, and control services, but do not get involved in exposure monitoring. Some of these insurance companies also offer industrial hygiene consulting services independent of the insurance business.

LAB ACCREDITATION PROGRAMS

The AIHA lab accreditation program was started in 1973 with the aid of a grant from NIOSH. This service aims to assist laboratories in achieving and maintaining the highest possible level of professional performance.

New companies and plants initiating their industrial health and safety programs, and workplaces in need of laboratory assistance should enlist the services of AIHA accredited laboratories. A laboratory with AIHA accreditation demonstrates that it is able to measure up to the strictest possible standards. For a list of accredited laboratories, application or more information write to:

Coordinator of Laboratory Accreditation
American Industrial Hygiene Association
66 South Miller Road
Akron, Ohio 44313

PAT PROGRAM

The Proficiency Analytical Testing (PAT) Program was initiated by NIOSH in 1972. This proficiency testing program is aimed at providing guidelines to laboratories for determining acceptable substance analytical methods.

Laboratories participating in the PAT Program are provided with standard samples every two months. The labs analyze the samples in their normal fashion and then return the results to PAT people. Their results are evaluated and lab proficiency is determined on the basis of performance compared to the entire group of laboratories. By testing lab proficiency every two months, the PAT Program is able to insure a high level of quality and accuracy. All labs are notified of their performance and status so they can make any necessary corrections or modifications in the lab methods. Those labs with questionable performances are screened.

ACGIH

The American Conference of Governmental Industrial Hygienists (ACGIH) was organized in 1938 by a group of governmental industrial hygienists who desired a medium for the free exchange of ideas, experiences and the promotion of standards and techniques in industrial health.

It is an organization devoted to the development of administrative and technical aspects of worker health protection. The association has contributed substantially to the development and improvement of official industrial health services to industry and labor. The committees on Industrial Ventilation and Threshold Limit Values are recognized throughout the world for their expertise and contributions to industrial hygiene.

Membership is limited to professional personnel in governmental agencies or educational institutions engaged in occupational safety and health programs. The more than 1600 members from across the United States and around the world give the organization an international scope.

Objectives

The objectives and goals of the Conference are to:

- Promote sound industrial hygiene practices
- Coordinate industrial hygiene activities through offical Federal, state, local and territorial industrial hygiene agencies
- Encourage the free exchange of experiences and ideas among industrial hygiene personnel in such official agencies and educational institutions
- Collect and make available to all governmental industrial hygienists information and data which may be of assistance to them in the fulfillment of their duties.
- Hold annual and other such meetings as may be necessary to effectuate the purpose of the organization.

For more information, or applications write to:

Secretary-Treasurer, ACGIH
P.O. Box 1937
Cincinnati, Ohio 45201

REFERENCES

1. "American Conference of Governmental Industrial Hygienists", Brochure, American Conference of Governmental Industiral Hygienists, Cincinnati, Ohio, 1976.

2. Cavender, James H., "Proficiency Analytical Testing (PAT) Program", Technical Report, NIOSH, Cincinnati, Ohio, June 1976.

3. "The Health Hazard Evaluation Program of the National Institute for Occupational Safety and Health", Pamphlet, Division of Technical Services, NIOSH, Department of Health, Education, and Welfare, 1976.

4. "Accreditation", Brochure, American Industrail Hygiene Association, Akron, Ohio, May 1975.

NIOSH TRAINING COURSE

INDUSTRIAL HYGIENE SAMPLING, DECISION MAKING, MONITORING AND RECORD KEEPING

FEDERAL REGULATIONS AND EMPLOYER GUIDELINES

LESSON: Review and Evaluation M8

TIME: Federal Regulations and Employer Guidelines Module, Period 8, (50 minutes)

OBJECTIVES: Enable the trainee to:

1) Provide feedback about the course
2) Emphasize topics of special importance or interest

EXHIBITS: None

KEY TERMS: No new key terms are introduced in this lesson

MATERIALS: Student Manual
Pencils, paper
Course Evaluation Form

METHODS: Discussion and Evaluation

CONTENTS

The following is an outline of the contents of the Review and Evaluation Lesson:

INTRODUCTION

This is the final lesson of our course. There are two major tasks to accomplish, so we must move along quickly.

- Course Evaluation

  Here is your chance to say what you want on the Course Evaluation form included in this lesson. You do not have to identify yourself unless you wish. These forms will be collected and sent to NIOSH in a sealed envelope. Neither your Instructor nor your colleagues will see them.

- Topics Emphasis

  During the course, we may have missed or given little attention to a topic that is important to you. Be prepared to ask questions, share experiences, point out problems, or whatever. We will work in small groups in order to cover as much territory as possible.

Take 10 to 15 minutes to complete the Course Evaluation form.

Separate into groups of 3 to 5 and select a topic for emphasis. Allow about 35 minutes for class discussion.

COURSE EVALUATION

Please answer the questions below. Continue on the other side of the page if necessary.

1. What do you believe are the weaknesses of this course?

2. What do you believe are the strengths of this course?

3. Please comment on the instructors' presentations, describing what you liked and disliked about them.

4. What would you like to have added or expanded in the course?

5. What would you like to have eliminated or reduced in the course?

6. Did the course meet your expectations?

7. Please comment on the audio-visual aids describing what you liked and disliked about them.

8. Were the course arrangements (classroom facilities, lunchroom, accomodations, etc.) satisfactory?

9. Was the lesson time allotment (50 minutes) suitable for the amount and difficulty of text material presented?

10. Any other comments, criticisms or suggestions?

TOPIC EMPHASIS

This portion of the Review and Evaluation Lesson is devoted to an informal discussion session. If you haven't written down questions or noted problems during the course, take a few minutes now and jot some down. Next,break into groups according to the instructor's directions for the final discussion.

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Technology Administration
National Technical Information Service
Springfield, VA 22161 (703) 487-4650