

The methodology used in this analysis, unlike cost-effectiveness analyses for previous effluent guidelines, incorporates into the computations consideration of air emissions of volatile organic chemicals from process wastewaters. Removal of these pollutants is counted towards the cost-effectiveness of the regulation since the treatment technologies remove the substances from wastewaters. Furthermore, the toxic weighting factors (which are generally based solely on aquatic life criteria) also include proxy criteria for toxicity and carcinogenicity effects to humans through inhalation of volatile organic chemicals.

The cost-effectiveness analysis is included in the record of this rulemaking. The Agency invites comments on the analysis, particularly the inclusion of inhalation effects associated with the volatile organic chemicals.

#### IV. Executive Order 12291

Executive Order 12291 requires EPA and other agencies to perform regulatory impact analyses of major regulations. Major rules impose an annual cost to the economy of \$100 million or more or meet other criteria. Implementation of the proposed regulation for the Organic Chemicals, Plastics and Synthetic Fibers Industry has been projected to cost over \$100 million annually and thus is a major rule.

Water quality impacts have been analyzed (using treatment levels in this notice) for 81 direct discharge OCPSF facilities. EPA's published water quality criteria for priority pollutants are used to assess water quality impacts. The analyses project that under existing conditions, over 60 percent of the 81 OCPSF facilities exceed water quality criteria (depending on the criteria used). However, the projected exceedances of water quality criteria will be reduced by as much as 50 percent (depending on criteria used) by implementing the BAT levels in this notice.

In addition to the water-quality impact analyses at 81 OCPSF facilities, three site-specific assessments of the specific health and environmental benefits that may result from the

proposed regulations are currently in progress. The results reported in the March 21, 1983 *Federal Register* for the Kanawha River (West Virginia) and Houston Ship Channel (Texas) case studies will be reexamined to incorporate the new 308 data, the new BPT and BAT options, and ozone reduction benefits from controlling the volatilization of volatile organic chemicals (VOCs) that photochemically react in the troposphere to form ozone (smog). Currently, a third case study on the Delaware River is being conducted. This case study will include recreational and other non-health benefits, health benefits, and potential ozone reduction benefits.

An analysis of the national magnitude and nature of the VOC intermedia transfer problem (removal of VOCs from the receiving water body through biological treatment may result in volatilization into the air from treatment ponds) will be conducted prior to promulgation.

#### VII. Solicitation of Comments

This notice announces the availability of a substantial body of new data gathered by EPA. EPA has expended considerable resources to collect this data to respond to comments that the data base used at proposal was not adequate to support the proposed regulations. EPA believes that its expanded data set provides an adequate basis for the regulations described in this notice. However, EPA continues to solicit data relevant to all aspects of this rulemaking. Such data, if submitted, should be accompanied by sufficiently detailed information to indicate its nature, origin, and quality.

This notice also presents many new analyses and regulatory options. EPA solicits comments on all of these analyses and options. Commenters should be aware that EPA may promulgate regulations that incorporate any of these options, variations on the options, or combinations of the options. Comments should be made with these possibilities in mind.

In addition to the solicitation of comments on technical data and regulatory options discussed throughout

this notice, EPA solicits comments on the following economic issues.

(1) The economic impact analysis for this notice does not include baseline effects of CERCLA requirements in evaluating the economic achievability of these rules. EPA invites comments on the effect of the CERCLA taxes on the ability of this industry to afford the effluent guideline rules.

(2) The Agency requests comments on the economic impact analysis methodology. In particular, EPA requests comments on the plant closure analysis.

(3) EPA solicits comments on the financial data used to model the industry. Where the questionnaire data were unavailable, EPA used industry averages to estimate economic impacts. The Agency invites comments, supported by appropriate data.

(4) The Agency also requests comments on the plan to define small businesses as facilities with less than \$5 million in annual shipments of OCPSF products—i.e., whether alternative levels or criteria more appropriately define small business in this industry.

(5) EPA asks for comments on the cost-effectiveness analysis for this industry, which incorporates consideration of air emission of volatile organic chemicals.

(6) EPA solicits comments on the foreign trade analysis performed for this analysis. In particular, commenters are requested to provide data on those products which would become less competitive as a result of these rules.

#### List of Subjects

##### 40 CFR Part 414

Chemicals, Water pollution control, Waste treatment and disposal.

##### 40 CFR Part 416

Plastics materials and synthetics, Water pollution control, Waste treatment and disposal.

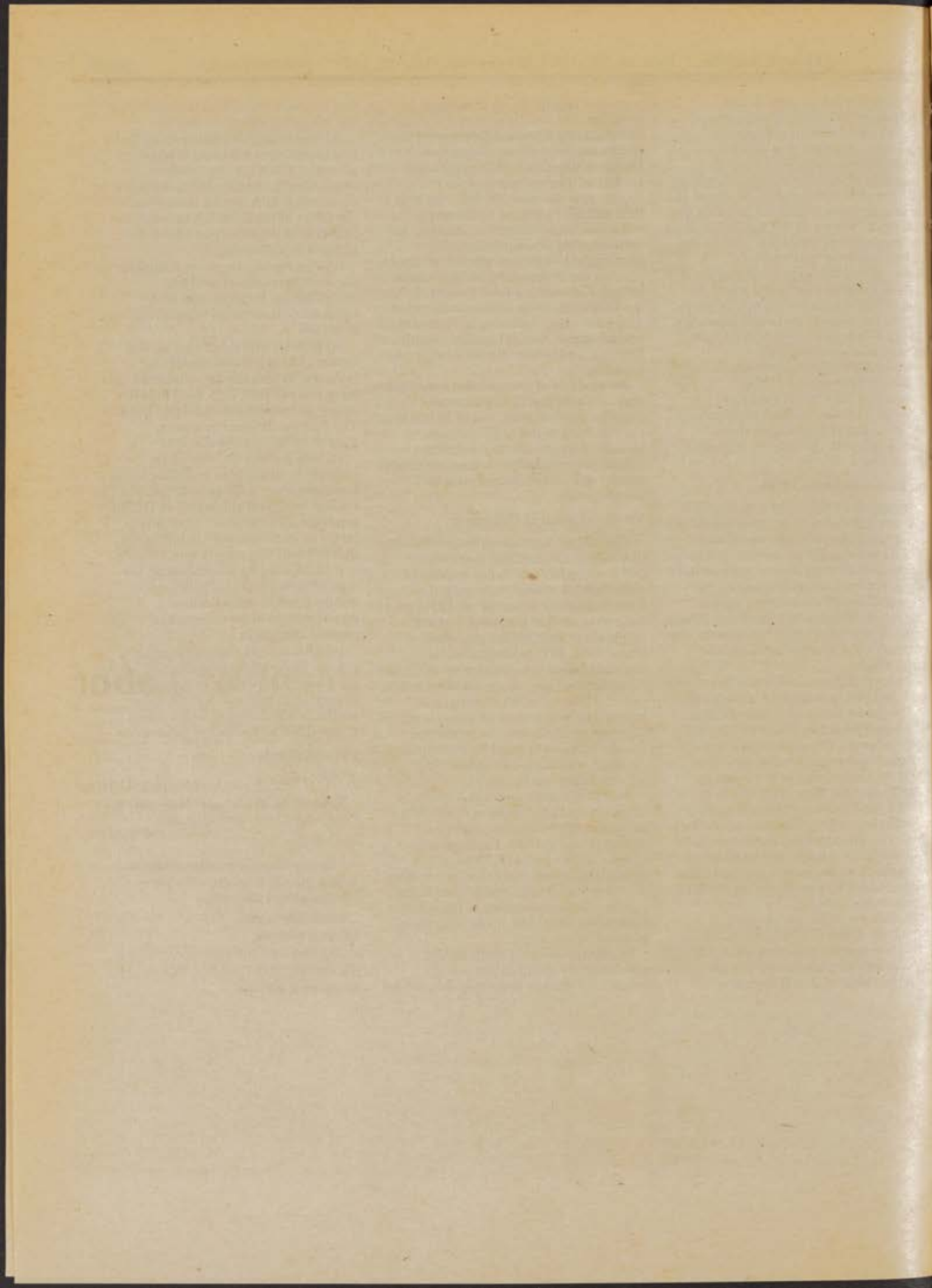
Dated: July 1, 1985.

Edwin L. Johnson,

Acting Assistant Administrator for Water.

[FR Doc. 85-16589 Filed 7-16-85; 8:45 am]

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# **federal register**

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Wednesday  
July 17, 1985

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**Part III**

## **Department of Labor**

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**Office of the Secretary**

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**Recordkeeping Guidelines for  
Occupational Injuries and Illnesses Under  
the Occupational Safety and Health Act  
of 1970 and 29 CFR Part 1904; Request  
for Comment**

## DEPARTMENT OF LABOR

## Office of the Secretary

## Recordkeeping Guidelines for Occupational Injuries and Illnesses Under the Occupational Safety and Health Act of 1970 and 29 CFR Part 1904; Request for Comment

## Background

On July 20, 1984 (49 FR 29484), the Bureau of Labor Statistics (BLS), U.S. Department of Labor, announced in the *Federal Register* in accordance with the Paperwork Reduction Act (44 U.S.C. Chapter 35) that it was proposing a revision in its recordkeeping package for the Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200) and Supplementary Record of Occupational Injuries and Illnesses (OSHA No. 101). The proposal consisted of revised recordkeeping guidelines, Recordkeeping Guidelines for Occupational Injuries and Illnesses, which BLS made available to the public for comment. After reviewing the public comments, the BLS felt that further modifications were needed, and decided to substitute the guidelines which had been in effect since 1978, Report 412-3, "What Every Employer Needs to Know About OSHA Recordkeeping," as interim guidelines for the recordkeeping package. The Office of Management and Budget (OMB) subsequently approved the continued use of the existing log and summary (OSHA No. 200), supplementary record (OSHA No. 101), and Report 412-3, assigning approval number 1220-0029 to each of the forms, and to Report 412-3.

## Subsequent Review Completed

BLS evaluated the comments received on the initial draft, and modified the document to address many of the expressed concerns. BLS also utilized input from: the Occupational Safety and Health Administration (OSHA); the Labor Department's Office of the Solicitor (SOL); the National Institute for Occupational Safety and Health, Department of Health and Human Services (NIOSH); and the BLS Business Research Advisory Council and Labor Research Advisory Council Committees on Occupational Safety and Health Statistics. In addition to modifying the detailed recordkeeping guidelines published previously, BLS developed an abbreviated version of the guidelines as a ready reference, and to assist employers with small-sized establishments or firms in low hazard industries.

## Comments and Questions:

To facilitate public review both the long and short versions of the BLS recordkeeping guidelines are presented in their entirety in the sections that follow. Written comments or questions concerning either of these documents should be directed to William M. Eisenberg, Office of Occupational Safety and Health Statistics, U.S. Department of Labor, 601 D Street, N.W., Room 4014, Washington, D.C. 20212, telephone (202) 272-3467.

## Dates:

Written comments must be submitted no later than October 15, 1985.

Signed at Washington, D.C. this 8th day of July, 1985.

Paul E. Larson,  
*Departmental Clearance Office.*

## SECTION I

## Recordkeeping Guidelines for Occupational Injuries and Illnesses: Ready Reference

*The Occupational Safety and Health Act of 1970 and 29 CFR 1904*

U.S. Department of Labor, Bureau of Labor Statistics, 1985

## Preface

The information in this pamphlet briefly explains the requirements of the Occupational Safety and Health Act of 1970 and 29 CFR Part 1904 for recording and reporting occupational injuries and illnesses. The Occupational Safety and Health Act of 1970 requires employers to prepare and maintain records of occupational injuries and illnesses. The Act made the Secretary of Labor responsible for the collection, compilation, and analysis of statistics of work-related injuries and illnesses. The Bureau of Labor Statistics (BLS) administers this recordkeeping and reporting system. In most States, a State agency cooperates with BLS in administering these programs.

Records of injuries and illnesses are necessary for carrying out the purposes of the Act. They provide a basis for a statistical program which produces reliable injury and illness data which are used by OSHA in directing the agency's efforts. The records are also helpful to employers and employees in identifying many of the factors which cause injuries or illnesses in the workplace. In addition, OSHA records are designed to assist safety and health compliance officers in making OSHA inspections.

This pamphlet summarizes the OSHA recordkeeping requirements of 29 CFR Part 1904, and provides basic

instructions and guidelines to assist employers in fulfilling their recordkeeping and reporting obligations. Many specific standards and regulations of the Occupational Safety and Health Administration (OSHA) have additional requirements for the maintenance and retention of records of medical surveillance, exposure monitoring, inspections, accidents and other activities and incidents relevant to occupational safety and health, and for the reporting of certain information to employees and to OSHA. These additional requirements are not covered in this pamphlet. For information on these requirements, employers should refer directly to the OSHA standards or regulations or contact their OSHA Area Office.

Further information on the requirements outlined in this pamphlet is available in the free detailed report, Recordkeeping Guidelines for Occupational Injuries and Illnesses, which may be obtained by using the order form on the inside of the back cover. Assistance can also be obtained by contacting the BLS regional office for your area. These are also listed on the inside of the back cover.

The following government agencies are involved in OSHA recordkeeping:

A. *The Occupational Safety and Health Administration, U.S. Department of Labor.* The Occupational Safety and Health Administration is responsible for developing, implementing, and enforcing safety and health standards and regulations. OSHA works with employers and employees to foster effective safety and health programs which reduce workplace hazards.

B. *Bureau of Labor Statistics, U.S. Department of Labor.* The Bureau of Labor Statistics is responsible for administering and maintaining the OSHA recordkeeping system, and for collecting, compiling, and analyzing work injury and illness statistics. A list of BLS Regional Offices is provided inside the back cover of this pamphlet.

C. *State Agencies.* Many States cooperate with BLS in administering the OSHA recordkeeping and reporting programs. Some States have their own safety and health laws which may impose different or additional obligations. Employers should consult their State safety and health laws concerning these requirements.

These guidelines were prepared in the Office of Occupational Safety and Health Statistics, by Stephen Newell, under the general direction of William M. Eisenberg, Acting Associate Commissioner.

## Contents

- Chapter I. Employers Subject to the Recordkeeping Requirements of the Occupational Safety and Health Act of 1970
- Chapter II. OSHA Recordkeeping Forms
- Chapter III. Location, Retention, and Maintenance of Records
- Chapter IV. Deciding Whether a Case Should be Recorded and How to Classify It
- Chapter V. Categories for Evaluating the Extent or Outcome of Recordable Cases
- Chapter VI. Employer Obligations for Reporting Occupational Injuries and Illnesses
- Chapter VII. Access to OSHA Records and Penalties for Failure to Comply with Recordkeeping Obligations
- Glossary of Terms

### I. Employers Subject to the Recordkeeping Requirements of the Occupational Safety and Health Act of 1970

The recordkeeping requirements of the Occupational Safety and Health Act of 1970 apply to almost all private sector employers in all 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, Guam, and the Trust Territories of the Pacific Islands.

#### A. Employers Who Must Keep OSHA Records

Employers with 11 or more employees in the following industries must keep OSHA records. The industries are identified by name and by the appropriate Standard Industrial Classification (SIC) code.

- Agriculture, forestry, and fishing (SIC's 07-09);
- Oil and gas extraction (SIC 13);
- Construction (SIC's 15-17);
- Manufacturing (SIC's 20-39);
- Transportation and public utilities (SIC's 40-49);
- Wholesale trade (SIC's 50-51);
- Building materials and garden supplies (SIC 52);
- General merchandise and food stores (SIC's 53 and 54);
- Hotels and other lodging places (SIC 70);
- Repair services (SIC's 75 and 76);
- Amusement and recreation services (SIC 79); and
- Health services (SIC 80).

If employers in agriculture, forestry, and fishing; oil and gas extraction; construction; manufacturing; transportation and public utilities; and wholesale trade have more than one establishment with combined employment of 11 or more employees, records must be kept for *each* individual establishment.

#### B. Employers Who Infrequently Must Keep OSHA Records

Employers in the industries listed below are normally exempt from OSHA recordkeeping. However, each year a small rotating sample of these employers is required to keep records and participate in a mandatory statistical survey of occupational injuries and illnesses. Their participation is necessary to produce national estimates of occupational injuries and illnesses for *all* employers (both exempt and nonexempt) in the private sector. If an employer who is regularly exempt is selected to maintain records and participate in the Annual Survey of Occupational Injuries and Illnesses, he will be notified in advance and supplied with the necessary forms and instructions. Employers who normally do not have to keep OSHA records include:

1. All employers with no more than 10 full- or part-time employees *at any one time* in the previous calendar year.
2. Employers in the following retail trade, finance, insurance and real estate, and services industries (identified by SIC codes):
  - Automotive dealers and gasoline service stations (SIC 55);
  - Apparel and accessory stores (SIC 56);
  - Furniture, home furnishings, and equipment stores (SIC 57);
  - Eating and drinking places (SIC 58);
  - Miscellaneous retail (SIC 59);
  - Banking (SIC 60);
  - Credit agencies other than banks (SIC 61);
  - Security, commodity brokers, and services (SIC 62);
  - Insurance (SIC 63);
  - Insurance agents, brokers, and services (SIC 64);
  - Real estate (SIC 65);
  - Combined real estate, insurance, etc. (SIC 66);
  - Holding and other investment offices (SIC 67);
  - Personal services (SIC 72);
  - Business services (SIC 73);
  - Motion pictures (SIC 78);
  - Legal services (SIC 81);
  - Educational services (SIC 82);
  - Social services (SIC 83);
  - Museums, botanical, zoological gardens (SIC 84);
  - Membership organizations (SIC 86);
  - Private-households (SIC 88); and
  - Miscellaneous services (SIC 89).

Even though recordkeeping requirements are reduced for employers in these industries, they, like nonexempt employers, must comply with OSHA standards, display the OSHA poster, and report to OSHA within 48 hours any

accident which results in one or more fatalities or the hospitalization of five or more employees. Also, some State safety and health laws may require regularly exempt employers to keep injury and illness records.

#### C. Employers and Individuals Who Never Keep OSHA Records

The following employers and individuals do not have to keep OSHA injury and illness records:

- *Self employed individuals;*
- *Partners with no employees;*
- *Employers of domestics* in the employers' private residence for the purposes of housekeeping or child care, or both; and
- *Employers engaged in religious activities* concerning the conduct of religious services or rites. Employees engaged in such activities; include clergy, choir members, organists and other musicians, ushers, and the like. However, records of injuries and illnesses occurring to employees while performing secular activities must be kept. Recordkeeping is also required for employees of private hospitals and certain commercial establishments owned or operated by religious organizations.

State and Local Government Agencies are usually exempt from OSHA recordkeeping. However, in certain States, agencies of State and local governments are required to keep injury and illness records in accordance with State regulations.

#### D. Employers Subject to Other Federal Safety and Health Regulations

Employers subject to injury and illness recordkeeping requirements of other Federal safety and health regulations are not exempt from OSHA recordkeeping. However, records used to comply with other Federal recordkeeping obligations may also be used to satisfy the OSHA recordkeeping requirements. The forms used must be equivalent to the log and summary (OSHA No. 200) and the supplementary record (OSHA No. 101).

### II. OSHA Recordkeeping Forms

Only two forms are used for OSHA recordkeeping. One form, the OSHA No. 200, serves as both the Log of Occupational Injuries and Illnesses, on which the occurrence and extent of cases are recorded during the year; and as the Summary of Occupational Injuries and Illnesses, which is used to summarize the log at the end of the year to satisfy employer posting obligations. The other form, the Supplementary Record of Occupational Injuries and

Illnesses. OSHA No. 101, provides additional information on each of the cases that have been recorded on the log.

*A. The Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200*

The log is used for recording and classifying occupational injuries and illnesses, and for noting the extent of each case. The log shows when the occupational injury or illness occurred, to whom, the regular job of the injured or ill person at the time of the injury or illness exposure, the department in which the person was employed, the kind of injury or illness, how much time was lost, and the final determination of the case. The log consists of three parts: A descriptive section which identifies the employee and briefly describes the injury or illness; a section covering the extent of the injuries recorded; and a section on the type and extent of illnesses.

Usually, the OSHA No. 200 form is used by employers as their record of occupational injuries and illnesses. However, a private form equivalent to the log, such as a computer printout, may be used if it contains as much detail as the OSHA No. 200 and is as readable and comprehensible as the OSHA No. 200 to a person not familiar with the equivalent form. It is important that the columns of the equivalent form have the same identifying number as the corresponding columns of the OSHA No. 200 because the instructions for completing the survey of occupational injuries and illnesses refer to log columns by number. It is advisable that employers have private equivalents of the log form reviewed by BLS to insure compliance with the regulations.

The portion of the OSHA No. 200 to the right of the dotted vertical line is used to summarize injuries and illnesses in an establishment for the calendar year. Every nonexempt employer who is required to keep OSHA records must prepare an annual summary for each establishment based on the information contained in the log for each establishment. The summary is prepared by totaling the column entries on the log (or its equivalent) and signing and dating the certification portion of the form at the bottom of the page.

*B. The Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101*

For every injury or illness entered on the log, it is necessary to record additional information on the supplementary record, OSHA No. 101. The supplementary record describes how the accident or illness exposure

occurred, lists the objects or substances involved, and indicates the nature of the injury or illness and the part(s) of the body affected.

The OSHA No. 101 is not the only form that can be used to satisfy this requirement. To eliminate duplicate recording, workers' compensation, insurance, or other reports may be used as supplementary records if they contain all of the items on OSHA No. 101. If they do not, the missing items must be added to the substitute or included on a separate attachment.

Completed supplementary records must be present in the establishment within six workdays after the employer has received information that an injury or illness has occurred.

**III. Location, Retention, and Maintenance of Records**

Ordinarily, injury and illness records must be kept by employers for each of their establishments. This chapter describes what is considered to be an establishment for recordkeeping purposes, where the records must be located, how long they must be kept, and how they should be updated.

*A. Establishments*

If an employer has more than one establishment, a separate set of records must be maintained for each one. The recordkeeping regulations define an establishment as "a single physical location where business is conducted or where services or industrial operations are performed." Examples include a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office.

The regulations specify that distinctly separate activities performed at the same physical location (for example, contract construction activities operated from the same physical location as a lumber yard) shall each be treated as a separate establishment for recordkeeping purposes. Production of dissimilar products; different kinds of operational procedures; different facilities; and separate management, personnel, payroll, or support staff are all indicative of separate activities and separate establishments.

*B. Location of Records*

Injury and illness records (the log, OSHA No. 200, and the supplementary record, OSHA No. 101) must be kept for every physical location where operations are performed. Under the regulations, the location of these records depends upon whether or not the employees are associated with fixed establishment. The distinction between

fixed and nonfixed establishments generally rests on the nature and duration of the operation and not on the type of structure in which the business is located. A nonfixed establishment usually operates at a single location for a relatively short period of time. A fixed establishment remains at a given location on a long-term or permanent basis. Also, fixed establishments are generally places where clerical, administrative, or other business records are kept.

*1. Employees associated with fixed establishments.* Records for these employees should be located as follows:

a. Records for employees working at fixed locations, such as factories, stores, restaurants, warehouses, etc., should be kept at the work location.

b. Records for employees who report to a fixed location but work elsewhere should be kept at the place where the employees report each day. These employees are generally engaged in activities such as agriculture, construction, transportation, etc.

c. Records for employees whose payroll or personnel records are maintained at a fixed location, but who do not report or work at a single establishment, should be maintained at the base from which they are paid or the base of their firm's personnel operations. This category includes generally unsupervised employees such as traveling salespeople, technicians, or engineers.

*2. Employees not associated with fixed establishments.* Some employees are subject to common supervision, but do not report or work at a fixed establishment on a regular basis. These employees are engaged in physically dispersed activities that occur in construction, installation, repair, or service operations. Records for these employees should be located as follows:

a. Records may be kept at the field office or mobile base of operations.

b. Records may also be kept at an established central location. If the records are maintained centrally: (1) The address and telephone number of the place where records are kept must be available at the worksite; and (2) there must be someone available at the central location during normal business hours to provide information from the records.

*C. Location Exception for the Log (OSHA No. 200)*

Although the supplementary record and the annual summary must be located as outlined in the previous section, it is possible to prepare and maintain the log at an alternate location

or by means of data processing equipment, or both. Two requirements must be met: (1) Sufficient information must be available at the alternate location to complete the log within 6 workdays after receipt of information that a recordable case has occurred; and (2) a copy of the log updated to within 45 calendar days must be present at all times in the establishment. This location exception applies only to the log, and not to the other OSHA records. Also, it does not affect the employer's posting obligations.

#### D. Retention of OSHA Records

The log and summary, OSHA No. 200, and the supplementary record, OSHA No. 101, must be retained in each establishment for 5 calendar years following the end of the year to which they relate. If an establishment changes ownership, the new employer must preserve the records for the remainder of the 5-year period. However, the new employer is not responsible for updating the records of the former owner.

#### E. Maintenance of the Log (OSHA No. 200)

In addition to keeping the log on a calendar year basis, employers are required to update this form to include newly discovered cases and to reflect changes which occur in recorded cases after the end of the calendar year. Maintenance or updating of the log is different from the retention of records discussed in the previous section. Although all OSHA injury and illness records must be retained, only the log must be maintained by the employer.

If during the 5-year retention period, there is a change in the extent or outcome of an injury or illness which affects an entry on a previous year's log, then the first entry should be lined out and a corrected entry made on that log. Also, new entries should be made for

previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year in which the case occurred. The entire entry should be lined out for recorded cases that are later found nonrecordable.

#### IV. Deciding Whether a Case Should Be Recorded and How To Classify It

This chapter presents guidelines for determining whether a case must be recorded under the OSHA recordkeeping requirements. These requirements should not be confused with recordkeeping requirements of various workers' compensation systems, internal industrial safety and health monitoring systems, the ANSI Z.16 standards for recording and measuring work injury and illness experience, and private insurance company rating systems. Reporting a case on the OSHA records should not affect recordkeeping determinations under these or other systems. Also,

*Recording an injury or illness under the OSHA system does not necessarily imply that management was at fault, that the worker was at fault, that a violation of an OSHA standard has occurred, or that the injury or illness is compensable under workers' compensation or other systems.*

#### A. Employees vs. Other Workers On Site

Employers must maintain injury and illness records for their own employees at each of their establishments, but they are not responsible for maintaining records for employees of other firms or for independent contractors, even though these individuals may be working temporarily in their establishment or on one of their jobsites at the time an injury or illness exposure occurs. Therefore, before deciding

whether a case is recordable an employment relationship needs to be determined.

Employee status generally exists when the employer supervises not only the output, product, or result to be accomplished by the person's work, but also the details, means, methods, and processes by which the work is accomplished. Independent contractors are not considered employees; they are primarily subject to supervision by the using firm only in regard to the result to be accomplished or end product to be delivered.

Other Factors which should be considered in determining employee status are: (1) Whom the worker considers to be his or her employer; (2) who pays the worker's wages; (3) who withholds the worker's Social Security taxes; (4) who hired the worker; and (5) who has the authority to terminate the worker's employment.

#### B. Method Used for Case Analysis

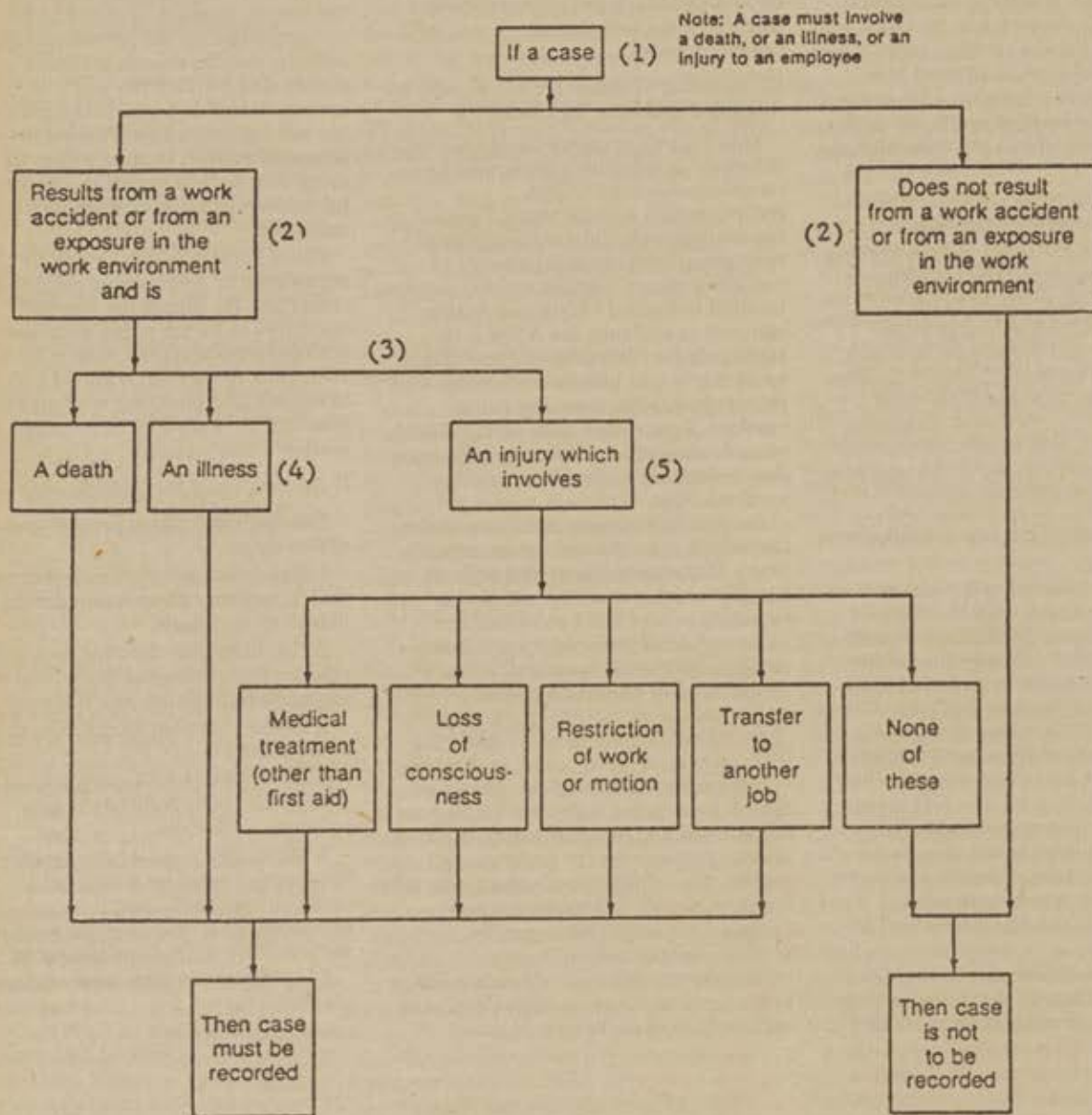
The decisionmaking process consists of five steps:

1. Determine whether a case occurred; that is, whether there was a death, illness, or an injury;
2. Establish that the case was work related; that it resulted from an event or exposure in the work environment;
3. Decide whether the case is an injury or an illness;
4. If the case is an illness, record it and check the appropriate illness category on the log;
5. If the case is an injury, decide if it is recordable based on a finding of medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

Chart 1 presents this methodology in graphic form.

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Chart 1. Guide to Recordability of Cases Under the Occupational Safety and Health Act



### C. Determining Whether a Case Occurred

The first step in the decisionmaking process is the determination of whether or not an injury or illness has occurred. Employees have nothing to record unless an employee has experienced a work-related injury or illness. In most instances, recognition of these injuries and illnesses is a fairly simple matter. However, some situations have troubled employers over the years. Two of these are:

1. *Hospitalization for observation.* If an employee goes to or is sent to a hospital for a brief period of time for observation, it is not recordable, assuming no medical treatment was given, or no illness was recognized. The determining factor is not that the employee went to the hospital or the length of the stay, but whether the incident is recordable as a work-related illness or as an injury requiring medical treatment or involving loss of consciousness, restriction of work or motion, or transfer to another job.

2. *Differentiating a new case from the recurrence of a previous injury or illness.* Employers are required to make new entries on their OSHA forms for each new recordable injury or illness. However, new entries should not be made for the recurrence of symptoms from previous cases, and it is sometimes difficult to decide whether or not a situation is a new case or a recurrence. The following guidelines address this problem.

a. *Injuries.* The aggravation of a preexisting injury almost always results from some movement by the employee. Consequently, when work related, these new incidents should be recorded as new cases.

b. *Illnesses.* Generally, each occupational illness should be recorded with a separate entry on the OSHA No. 200. However, certain illnesses, such as silicosis, may have prolonged effects which recur over time. The recurrence of these symptoms should not be recorded as new cases on the OSHA forms. The recurrence of symptoms of previous illnesses may require adjustment of entries on the log for previously recorded illnesses to reflect possible changes in the extent or outcome of the particular case.

### D. Establishing Work Relationship

The Occupational Safety and Health

Act of 1970 requires employers to record only those injuries and illnesses that are work related. *Work relationship is established under the OSHA recordkeeping system when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: (1) The employer's premises, and (2) other locations where employees are engaged in work-related activities or are present as a condition of their employment.* When an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed. The employer's premises encompass the total establishment, including not only the primary work facility, but also such areas as company storage facilities and restricted company parking lots. In addition to physical locations, equipment or materials used in the course of an employee's work are also considered part of the employee's work environment.

1. *Injuries and illnesses resulting from events or exposures on the employer's premises.* Injuries and illnesses that result from an event or exposure on the employer's premises are generally considered work related. The employer's premises consist of the total establishment. They include the primary work facilities and other areas which are considered part of the employer's general work area.

However, the presumption of work relationship for activities on the employer's premises is rebuttable. Situations where the presumption would not apply include: (1) When a worker is on the employer's premises as a member of the general public and not as an employee, and (2) when employees have symptoms that merely surface on the employer's premises, but are the result of a nonwork-related event or exposure off the premises.

The following subjects warrant special mention:

a. Company restrooms, hallways, and cafeterias are all considered to be part of the employer's premises and constitute part of the work environment. Therefore, injuries occurring in these places are generally considered work related.

b. For OSHA recordkeeping purposes, the definition of work premises *excludes* employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar

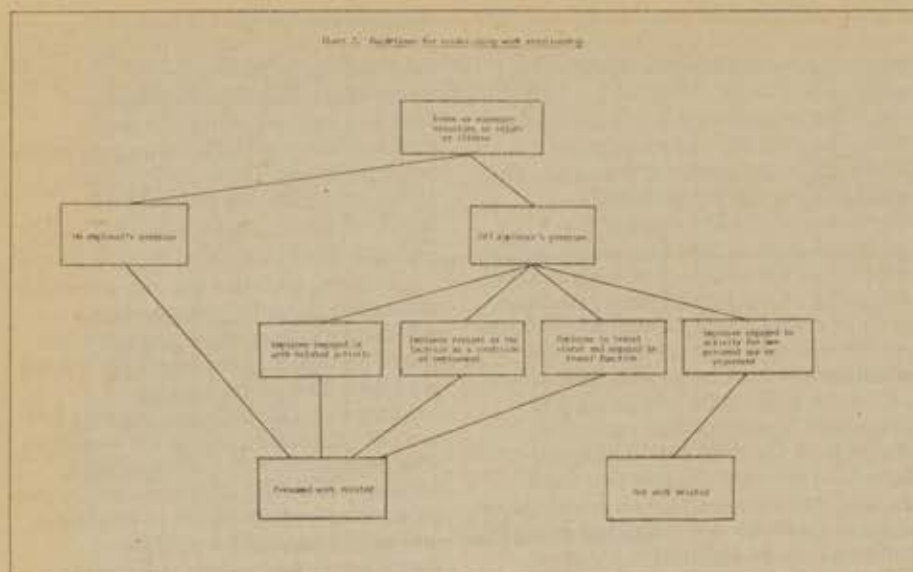
recreational facilities which are *basically apart from the workplace and used primarily by employees during off-work hours.* However, recreational facilities located within the work environment are included as part of the work premises. These may include company controlled gymnasiums, handball courts, racketball courts, etc. *that are located within the work facility.*

c. Parking facilities that are generally accessible to both employees and members of the general public are *not* considered part of the employer's work premises. Therefore, injuries to employees on these public parking lots are not recordable unless the employee was engaged in some work-related activity. However, injuries to employees on parking lots restricted to employee and visitor use only would be considered on-premises and hence presumed work related.

2. *Injuries and illnesses resulting from events or exposures off the employer's premises.* When an employee is off the employer's premises and suffers an injury or an illness exposure, work relationship must be established; it is not presumed. Injuries and illness exposures off premises are considered work related if the employee is engaged in a work activity or if they occur in the work environment. The work environment in these instances includes locations where employees are engaged in job tasks or work-related activities, or places where employees are present due to the nature of their job or as a condition of their employment.

Employees in travel status are treated somewhat differently than other employees working off premises. An employee in travel status is considered to be in the work environment 24 hours a day. All of the employee's activities required by the trip are considered to be work related. These include such necessary travel-related functions as working, eating, sleeping, and traveling. However, activities unrelated to the normal scope of the trip and solely for the employee's own personal use or enjoyment should not be recorded. Examples of these non-recordable events would be injuries on excursions, such as ski trips, or injuries which occur in public places when the employee is there only for recreational purposes.

Chart 2 provides a guide for establishing the work relationship of cases.



### E. Distinguishing Between Injuries and Illnesses

Under the OSH Act, all work-related illnesses must be recorded, while injuries are recordable only when they require medical treatment (other than first aid), or involve loss of consciousness, restriction of work or motion, or transfer to another job. The distinction between injuries and illnesses, therefore, has significant recordkeeping implications.

Whether a case involves an injury or illness is determined by the nature of the original event or exposure which caused the case, not by the resulting condition of the affected employee. Injuries are caused by instantaneous exposures in the work environment. Cases resulting from anything other than instantaneous events are considered illnesses. This concept of illnesses includes acute illnesses which result from exposures of relatively short duration.

Some conditions may be classified as either an injury or an illness (but not both), depending upon the nature of the event that produced the condition. For example, a loss of hearing resulting from an explosion (an instantaneous event) is classified as an injury; the same condition arising from exposure to industrial noise over a period of time would be classified as an occupational illness.

### F. Recording Occupational Illnesses

Employers are required to record the occurrence of all occupational illnesses, which are defined in the instructions of the log and summary as:

"Any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact."

The instructions also refer to recording illnesses which were "diagnosed or recognized." Illness exposures ultimately result in conditions of a chemical, physical, biological, or psychological nature.

Occupational illnesses must be diagnosed to be recordable. However, they do not necessarily have to be diagnosed by a physician or other medical personnel. Diagnosis may be by a physician, registered nurse, or a person who by training or experience is qualified to make such a determination. Employers, employees, and others may be able to detect some illnesses such as skin diseases or disorders without the benefit of specialized medical training. However, a case more difficult to diagnose, such as silicosis, would require evaluation by properly trained medical personnel.

In addition to recording the occurrence of occupational illnesses, employers are required to record each illness case in 1 of the 7 categories on the front of the log. The back of the log form contains a listing of types of illnesses or disorders and gives examples for each illness category. These are only examples, however, and should not be considered as a complete list of types of illnesses under each category.

Recording and classifying occupational illnesses is difficult for employers, especially the chronic and long term latent illnesses. Many illnesses are not easily detected; and once detected, it is often difficult to determine whether an illness is work-related. Also, employees may not report illnesses because the symptoms may not be readily apparent, or because they do not think their illness is serious or work related.

The following material is provided to assist in detecting occupational illnesses and in establishing their work relationship.

1. *Detection and diagnosis of occupational illnesses.* An occupational illness is defined as any work-related abnormal condition or disorder (other than an occupational injury). Detection of these abnormal conditions or disorders, the first step in recording illnesses, is often difficult. When an occupational illness is suspected, employers may want to consider the following:

a. A routine medical examination of the employee's physiological systems:

- Head and neck;
- Eyes, ears, nose, and throat;
- Endocrine;
- Genitourinary;
- Musculoskeletal;
- Neurological;
- Respiratory;
- Cardiovascular;
- Gastrointestinal.

b. Observation and evaluation of behavior related to emotional status;

c. Specific examination for health effects of suspected or possible disease agents by competent medical personnel;

d. Comparison of date of onset of symptoms with occupational history;

e. Evaluation of results of any past biological or medical monitoring (blood, urine, other sample analysis) and previous physical examinations; and

f. Evaluation of laboratory tests: Routine (complete blood count, blood chemistry profile, urinalysis) and specific tests for suspected disease agents (e.g., blood and urine tests for specific agents, chest or other X-rays, liver function tests, pulmonary function tests.)

2. *Determining whether the illness is occupationally related.* The instructions on the back of the log define occupational illnesses as those "caused by environmental factors associated with employment." In some cases, such as contact dermatitis, the relationship between an illness and work-related

exposure is easy to recognize. In other cases, where the occupational cause is not direct and apparent, it may be difficult to determine accurately whether an employee's illness is occupational in nature. In these situations, it may help employers to ask the following questions:

- a. Has an illness condition clearly been established?
- b. Does it appear that the illness resulted from, or was aggravated by, suspected agents or other conditions in the work environment?
- c. Are these suspected agents present (or have they been present) in the work environment?
- d. Was the ill employee exposed to these agents in the work environment?
- e. Was the exposure to a sufficient degree and/or duration to result in the illness condition?
- f. Is the illness attributable to a nonoccupational exposure?

#### G. Deciding if Work-Related Injuries Are Recordable

Although the OSH Act requires that all work-related deaths and illnesses be recorded, the recording of injuries is limited to certain specific types of cases: Those which require medical treatment or involve loss of consciousness; restriction of work or motion; or transfer to another job. Minor injuries requiring only first aid treatment are *not* recordable.

1. *Medical treatment.* It is important to understand the distinction between medical treatment and first aid treatment since many work-related injuries are recordable only because medical treatment was given.

The regulations and the instructions on the back of the log and summary, OSHA No. 200, define medical treatment as any treatment, other than first aid treatment, administered to injured employees. Essentially, medical treatment involves the provision of medical or surgical care for injuries that are not minor through the application of procedures or systematic therapeutic measures.

The act also specifically states that work-related injuries which involve only first aid treatment need not be recorded. First aid is commonly thought to mean emergency treatment of injuries before regular medical care is available. However, first aid treatment has a different meaning for OSHA recordkeeping purposes. The regulations define first aid treatment as: "any one-time treatment, and any follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care. Such one-time treatment,

and follow-up visit for the purpose of observation, is considered first aid even though provided by a physician or registered professional personnel."

The distinction between medical treatment and first aid depends not only on the treatment provided, but also on the severity of the injury being treated. First aid is: (1) Limited to one-time treatment and subsequent observation; and (2) involves treatment of only minor injuries, *not* emergency treatment of serious injuries. Injuries are *not* minor if:

- a. They can be treated only by a physician or licensed medical personnel;
- b. They impair bodily function (i.e., normal use of senses, limbs, etc.)
- c. They result in damage or harm to the physical structure of a nonsuperficial nature (e.g., hairline fractures); or
- d. They involve complications requiring follow-up medical treatment.

Physicians or registered medical professionals, working under the standing orders of a physician, routinely treat minor injuries. Such treatment may constitute first aid. Also, some visits to a doctor do not involve treatment at all. For example, a visit to a doctor for an examination or other diagnostic procedure to determine whether the employee has an injury does not constitute medical treatment. Conversely, medical treatment can be provided to employees by someone other than a physician or registered medical personnel.

The following classifications list certain procedures as either medical treatment or first aid treatment.

#### Medical Treatment

The following are generally considered medical treatment. Work-related injuries for which the type of treatment was provided or should have been provided are almost always recordable.

- Treatment of INFECTION
- Application of ANTISPETICS during second or subsequent visits to medical personnel
- Treatment of SECOND OR THIRD DEGREE BURN(S)
- Application of BUTTERFLY ADHESIVE DRESSING(S)
- Application of SUTURES (stitches)
- Removal of FOREIGN BODIES EMBEDDED IN EYE
- Removal of FOREIGN BODIES from wound; if procedure is COMPLICATED because of depth of embedment, size, or location
- Use of PRESCRIPTION MEDICATIONS
- Use of hot or cold SOAKING THERAPY during second or subsequent visit to medical personnel

- Application of hot or cold COMPRESS(ES) during second or subsequent visit to medical personnel
- CUTTING AWAY DEAD SKIN (surgical debridement)
- Application of HEAT THERAPY during second or subsequent visit of medical personnel
- Use of WHIRLPOOL BATH THERAPY during second or subsequent visit of medical personnel
- POSITIVE X-RAY DIAGNOSIS (fractures, broken bones, etc.)
- ADMISSION TO A HOSPITAL or equivalent medical facility for treatment or prolonged observation

#### First Aid Treatment

The following are generally considered first aid treatment (e.g., one-time treatment and subsequent observation of minor injuries) and need not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job.

- Application of ANTISEPTICS during first visit to medical personnel
- Treatment of FIRST DEGREE BURN(S)
- Application of BANDAGE(S) during first visit to medical personnel
- Use of ELASTIC BANDAGE(S) during first visit to medical personnel
- Removal of FOREIGN BODIES NOT EMBEDDED IN EYE if only irrigation is required
- Removal of FOREIGN BODIES from wound, if procedure is UNCOMPLICATED, and is, for example, by tweezers or other simple technique
- Use of NONPRESCRIPTION MEDICATIONS
- SOAKING THERAPY ON INITIAL VISIT to medical personnel or removal of bandages by SOAKING
- Application of hot or cold COMPRESS(ES) during first visit to medical personnel
- Application of OINTMENTS to abrasions to prevent drying or cracking
- Application of HEAT THERAPY during first visit to medical personnel
- Use of WHIRLPOOL BATH THERAPY during first visit to medical personnel
- NEGATIVE X-RAY DIAGNOSIS
- BRIEF OBSERVATION of injury during visit to medical personnel

**Note.**—The administration of a TETANUS SHOT or BOOSTER, by itself, is not considered medical treatment. However, these shots are often given in conjunction with the more serious injuries. Therefore, injuries requiring tetanus shots may be recordable for other reasons.

2. *Loss of consciousness.* If an employee loses consciousness as the result of a work-related injury, the case must be recorded no matter what type of treatment was provided. The rationale behind this recording requirement is that loss of consciousness is generally associated with the more serious injuries.

3. *Transfer to another job.* Injuries requiring transfer of the employee to another job are also considered serious enough to be recordable regardless of the type of treatment provided. Transfers are seldom the sole criterion for recordability because injury cases are almost always recordable on other grounds, primarily medical treatment or restriction of work or motion.

4. *Restriction of work or motion.* Restricted work activity occurs when the employee, because of the impact of a job-related injury, is physically or mentally unable to perform all or any part of his or her normal assignment during all or any part of the workday or shift. The emphasis is on the employee's ability to perform normal job duties. Restriction of work or motion may result in either a lost worktime injury or a non-lost worktime injury, depending upon whether the restriction extended beyond the day of injury.

## V. Categories For Evaluating the Extent of Recordable Cases

Once the employer decides that a recordable injury or illness has occurred, the case must be evaluated to determine its extent or outcome. There are three categories of recordable cases: Fatalities, lost workday cases, and cases without lost workdays. Every recordable case must be placed in only one of these categories.

### A. Fatalities

All work-related fatalities must be recorded, regardless of the time between the injury and the death, or the length of the illness.

### B. Lost Workday Cases

Lost workday cases occur when the injured or ill employee experiences either days away from work, days of restricted work activity, or both. In these situations, the injured or ill employee is affected to such an extent that: (1) Days must be taken off from the job for medical treatment or recuperation; or (2) the employee is unable to perform his or her normal job duties over a normal work shift, even though employee may be able to continue working.

1. Lost workday cases involving days away from work are cases resulting in days the employee would have worked but could not because of the job-related

injury or illness. The focus of these cases is on the employee's inability, because of injury or illness, to be present in the work environment during his or her normal work shift.

2. Lost workday cases involving days of restricted work activity are those cases where, because of injury or illness, (1) the employee was assigned to another job on a temporary basis, or (2) the employee worked at a permanent job less than full time, or (3) the employee worked at his or her permanently assigned job but could not perform all the duties normally connected with it. Restricted work activity occurs when the employee, because of the job-related injury or illness, is physically or mentally unable to perform all or any part of his or her normal workday or shift. The emphasis is on the employee's inability to perform normal job duties over a normal work shift.

Injuries and illnesses are not considered lost workday cases unless they affect the employee beyond the day of injury or onset of illness. When counting the number of days away from work or days of restricted work activity, do not include the initial day of injury or onset of illness, or any days on which the employee would not have worked even though able to work.

### C. Cases Not Resulting in Death or Lost Workdays

These cases consist of the relatively less serious injuries and illnesses which satisfy the criteria for recordability but which do not result in death or require the affected employee to have days away from work or days of restricted work activity beyond the date of injury or onset of illness.

## VI. Employer Obligations for Reporting Occupational Injuries and Illnesses

This chapter focuses on the requirements of Section 8(c)(2) of the Occupational Safety and Health Act of 1970 and Title 29, Part 1904, of the Code of Federal Regulations for employers to make reports of occupational injuries and illnesses. It does not include the reporting requirements of other standards or regulations of the Occupational Safety and Health Administration (OSHA) or of any other State or Federal agency.

### A. The Annual Survey of Occupational Injuries and Illnesses

The survey is conducted on a sample basis, and firms required to submit reports of their injury and illness experience are contacted by BLS or a participating State agency. A firm not contacted by its State agency or BLS

need not file a report of its injury and illness experience. Employers should note, however, that even if they are not selected to participate in the annual survey for a given year, they must still comply with the recordkeeping requirements listed in the preceding chapters as well as with the requirements for reporting fatalities and multiple hospitalization cases provided in the next section of this chapter.

Participants in the annual survey consist of two categories of employers: (1) Employers who maintain OSHA records on a regular basis; and (2) a small, rotating sample of employers who are regularly exempt from OSHA recordkeeping. The survey procedure is different for these two groups of employers.

1. *Participation of firms regularly maintaining OSHA records.* When employers regularly maintaining OSHA records are selected to participate in the Annual Survey of Occupational Injuries and Illnesses, they are mailed the survey questionnaire in February of the year following the reference calendar year of the survey. (A firm selected to participate in the 1984 survey would have been contacted in February of 1985.) The survey form, the Occupational Injuries and Illnesses Survey Questionnaire, OSHA No. 200-S, requests information about the establishment(s) included in the report and the injuries and illnesses experienced during the previous year. Information for the injury and illness portion of the report form usually can be copied directly from the totals on the log and summary, OSHA No. 200, which the employer should have completed and posted in the establishment by the time the questionnaire arrives. The survey form also requests summary information about the type of business activity and number of employees and hours worked at the reporting unit during the reference year.

2. *Participation of normally exempt small employers and employers in low-hazard industries.* A few regularly exempt employers (those with fewer than 11 employees in the previous calendar year and those in designated low-hazard industries) are also required to participate in the annual survey. Their participation is necessary for the production of injury and illness statistics that are comparable in coverage to the statistics published in years prior to the exemptions. These employers are notified prior to the reference calendar year of the survey that they must maintain injury and illness records for the coming year. (A firm selected to participate in the 1984 survey would

have been contacted in December 1983). At the time of notification, they are supplied with the necessary forms and instructions. During the reference calendar year, prenotified employers make entries on the log, OSHA No. 200, but are not required to complete a Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101, or post the summary of the OSHA No. 200 the following February (like the regularly participating employers).

#### *B. Reporting Fatalities and Multiple Hospitalizations*

All employers are required to report accidents resulting in one or more fatalities or the hospitalization of five or more employees.

The report is made to the nearest office of the Area Director of the Occupational Safety and Health Administration, U.S. Department of Labor, unless the State in which the accident occurred is administering an approved State plan under Section 18(B) of the OSH Act. Those 18(B) States designate a State agency to which the report must be made.

The report must contain three pieces of information: (1) Circumstances surrounding the accident(s), (2) number of fatalities, and/or (3) the number of hospitalized injuries. If necessary, the OSHA Area Director may require additional information on the accident.

#### **VII. Access to OSHA Records and Penalties for Failure To Comply With Recordkeeping Obligations**

The preceding chapters describe recordkeeping and reporting requirements. This chapter covers subjects related to insuring the integrity of the OSH recordkeeping process—access to OSHA records and penalties for recordkeeping violations.

##### *A. Access to OSHA Records*

All OSHA records, which are being kept by employers for the 5-year retention period, should be available for inspection and copying by authorized Federal and State government officials. Employees, former employees, and their representatives are provided access to only the log, OSHA No. 200.

Government officials with access to the OSHA records include: Representatives of the Department of Labor, including OSHA safety and health compliance officers and BLS representatives; representatives of the Department of Health and Human Services while carrying out that department's research responsibilities; and representatives of States accorded jurisdiction for inspections or statistical compilations. "Representatives" may

include Department of Labor officials inspecting a workplace or gathering information, officials of the Department of Health and Human Services, or contractors working for the agencies mentioned above, depending on the provisions of the contract under which they work.

Employee access to the log is limited to the records of the establishment in which the employee currently works or formerly worked. All current logs and those being maintained for the 5-year retention period must be made available for inspection and copying by employees, former employees, and their representatives. An employee representative can be a member of a union representing the employee, or any person designated by the employee or former employee. Access to the log is to be provided in a reasonable manner and at a reasonable time. Redress for failure to comply with the access provisions of the regulations can be obtained through a complaint to OSHA.

##### *B. Penalties for Failure To Comply With Recordkeeping Obligations*

Employers committing recordkeeping and reporting violations are subject to the same sanctions as employers violating other OSHA requirements such as safety and health standards and regulations.

#### **Glossary of Terms**

**Annual summary.**—Consists of a copy of the occupational injury and illness totals for the year from the OSHA No. 200, and the following information: The calendar year covered; company name; establishment address; certification signature, title, and date.

**Annual survey.**—Each year, BLS conducts an annual survey of occupational injuries and illnesses to produce national statistics. The OSHA injury and illness records maintained by employers in their establishments serve as the basis for this survey.

**Bureau of Labor Statistics (BLS).**—The Bureau of Labor Statistics is the agency responsible for administering and maintaining the OSHA recordkeeping system, and for collecting, compiling, and analyzing work injury and illness statistics.

**Certification.**—The person who supervises the preparation of the Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200, certifies that it is true and complete by signing the last page of, or by appending a statement to that effect to, the annual summary.

**Cooperative program.**—A program jointly conducted by the States and the Federal Government to collect

occupational injury and illness statistics.

**Employee.**—One who is employed in the business of his or her employer affecting commerce.

**Employee representative.**—Anyone designated by the employee for the purpose of gaining access to the employer's log of occupational injuries and illnesses.

**Employer.**—Any person engaged in a business affecting commerce who has employees; this does not include the United States Government or any State or political subdivision of a State.

**Establishment.**—A single physical location where business is conducted or where services or industrial operations are performed; the place where the employees report for work, operate from, or from which they are paid.

**First aid.**—Any one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care. Such treatment and observation is considered first aid even though provided by a physician or registered professional personnel.

**First report of injury.**—A workers' compensation form which may qualify as a substitute for the supplementary record, OSHA No. 101.

**Incidence rate.**—The number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The common exposure base enables one to make accurate interindustry comparisons, trend analysis over time, or comparisons among firms regardless of size. This rate is calculated as:

$$\frac{N}{EH} \times 200,000$$

where:

N = number of injuries and illnesses or lost workdays

EH = total hours worked by all employees during calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week 50 weeks per year).

**Low-hazard industries.**—Selected industries in retail trade; finance, insurance, and real estate; and services which are regularly exempt from OSHA recordkeeping. To be included in this exemption, an industry must fall within an SIC not targeted for general schedule inspections and must have an average lost workday case injury rate for a designated 3-year measurement period at or below 75 percent of the private sector average rate.

Log and Summary (OSHA No. 200).—The OSHA recordkeeping form used to list injuries and illnesses and to note the extent of each case.

Lost workday cases.—Cases which involve days away from work or days of restricted work activity, or both.

Lost workdays.—The number of workdays (consecutive or not), beyond the day of injury or onset of illness, the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

(1) Lost workdays—away from work.

The number of workdays (consecutive or not) on which the employee would have worked but could not because of occupational injury or illness.

(2) Lost workdays—restricted work activity.

The number of workdays (consecutive or not) on which, because of injury or illness: (1) The employee was assigned to another job on a temporary basis; or (2) the employee worked at a permanent job less than full time; or (3) the employee worked at a permanently assigned job but could not perform all duties normally connected with it.

The number of days away from work or days of restricted work activity does not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

Medical treatment.—Includes treatment of injuries administered by physicians, registered professional personnel, or lay persons. Medical treatment does not include first aid treatment (one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

Occupational illness.—Any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact, and which can be included in the categories listed below. The following categories should be used by employers to classify recordable occupational illnesses on the log in the columns indicated:

Column 7a. Occupational skin diseases or disorders.

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome

ulcers; chemical burns or inflammations; etc.

Column 7b. Dust diseases of the lungs (pneumoconioses).

Examples: Silicosis, asbestosis, coal worker's pneumoconiosis, byssinosis, and other pneumoconioses.

Column 7c. Respiratory conditions due to toxic agents.

Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes, farmer's lung, etc.

Column 7d. Poisoning (systemic effects of toxic materials).

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics, and resins; etc.

Column 7e. Disorders due to physical agents (other than toxic materials).

Examples: Heatstroke, sunstroke, heat exhaustion, and other effects of environmental heat; freezing, frostbite, and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of nonionizing radiation (welding flash, ultra-violet rays, microwaves, sunburn); etc.

Column 7f. Disorders associated with repeated trauma.

Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis; Raynaud's phenomena; and other conditions due to repeated motion, vibration, or pressure.

Column 7g. All other occupational illnesses.

Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors, food poisoning, histoplasmosis, coccidioidomycosis, etc.

Occupational injury.—Any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from a single instantaneous exposure in the work environment.

Note.—Conditions resulting from bites, such as insect or snake bites, and from one-time exposure to chemicals are considered to be injuries.

Occupational injuries and illnesses; extent and outcome.—All occupational injuries or illnesses result in either:

(1) Fatalities, regardless of the time between the injury and death, or the length of illness; or

(2) Lost workday cases, other than fatalities, that result in lost workdays; or

(3) Nonfatal cases without lost workdays.

Occupational Safety and Health Administration (OSHA).—OSHA is the Federal agency within the Department of Labor responsible for developing, implementing, and enforcing safety and health standards and regulations. OSHA works with employers and employees to foster effective safety and health programs which reduce workplace hazards.

Premises, employer's.—Consist of the employer's total establishment; they include the primary work facility and other areas in the employer's domain such as company storage facilities, cafeterias, restrooms, and restricted company parking lots.

Posting.—The annual summary of occupational injuries and illnesses must be posted at each establishment by February 1 and remain in place until March 1 to provide employees with the record of their establishment's injury and illness experience for the previous calendar year.

Recordable cases.—All work-related deaths and illnesses, and those work-related injuries which result in: Loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid.

Recordkeeping system.—Refers to the nationwide system for recording and reporting occupational injuries and illnesses mandated by the Occupational Safety and Health Act of 1970 and implemented by Title 29, Code of Federal Regulations, Part 1904. This system is the only source of reliable national statistics on job-related injuries and illnesses occurring in the private sector.

Regularly exempt employers.—Employers regularly exempt from OSHA recordkeeping include: (A) All employers with no more than 10 full- or part-time employees at any one time in the previous calendar year; and (B) all employers in retail trade; finance, insurance, and real estate; and services industries; i.e., SIC's 52-89 (except building materials and garden supplies, SIC 52, general merchandise and food stores, SIC's 53 and 54; hotels and other lodging places, SIC 70; repair services, SIC's 75 and 76; amusement and recreation services, SIC 79; and health services, SIC 80).

Report form.—Refers to survey form OSHA No. 200-S which is completed and returned by the surveyed reporting unit.

**Restriction of work or motion.**—Occurs when the employee, because of the result of a job-related injury or illness, is physically or mentally unable to perform all or any part of his or her normal assignment during all or any part of the workday or shift.

**Small employers.**—Employers with no more than 10 employees among all the establishments of their firm at any one time during the previous calendar year.

**Standard Industrial Classification (SIC).**—A classification system developed by the Office of Management and Budget, Executive Office of the President, for use in the classification of establishments by type of activity in which engaged. Each establishment is assigned an industry code for its major activity which is determined by the product or services rendered. Establishments may be classified in 2-, 3-, or 4-digit industries according to the degree of information available.

**State (when mentioned alone).**—Refers to a State of the United States, the District of Columbia, and U.S. territories and jurisdictions.

**State agency.**—State agency administering the OSHA recordkeeping and reporting system. Many States cooperate directly with BLS in administering the OSHA recordkeeping and reporting programs. Some States have their own safety and health laws which may impose different or additional obligations.

**Supplementary Record (OSHA No. 101).**—The form (or equivalent) on which additional information is recorded for each injury and illness entered on the log.

**Title 29 of the Code of Federal Regulations, Parts 1900-1999.**—The parts of the Code of Federal Regulations which contain OSHA regulations.

**Workers' compensation systems.**—State systems that provide medical benefits and/or indemnity compensation to victims of work-related injuries and illnesses.

**Work environment.**—Consists of the employer's premises and other locations where employees are engaged in work-related activities or are present as a condition of their employment. The work environment includes not only physical locations, but also the equipment or materials used by the employee during the course of his or her work.

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Please complete this form and mail it to the appropriate BLS regional office.

#### SECTION II

##### Recordkeeping Guidelines for Occupational Injuries and Illnesses

*The Occupational Safety and Health Act of 1970 and 29 CFR 1904*

U.S. Department of Labor, Bureau of Labor Statistics, 1985

The Occupational Safety and Health (OSH) Act of 1970 requires covered employers to prepare and maintain records of occupational injuries and illnesses. The Bureau of Labor Statistics of the U.S. Department of Labor is responsible for administering the recordkeeping system established by the act. The recordkeeping regulations in 29 CFR 1904 provide specific recording and reporting requirements which comprise the framework of the OSH recording system.

Under this system it is essential that data recorded by employers be uniform

to assure the validity of the statistical data. To assure uniformity, BLS has issued guidelines which provide official agency interpretations, answers and explanations to questions employers most frequently ask about recordkeeping and reporting of occupational injuries and illnesses. On reviewing the guidelines, the Office of Management and Budget (OMB) has indicated that the guidelines are not regulations, but rather supplemental instructions to the OSHA recordkeeping forms (OSHA Nos. 200, 101, and 200-S). This document replaces all previous editions of the BLS recordkeeping guidelines.

For recordkeeping and reporting questions not covered in this publication, employers may contact the BLS regional office or the participating State agency serving their area. Addresses and telephone numbers for the regional offices are listed on the back cover; those for the State agencies are in appendix D. Recordkeeping forms can be obtained by completing the order form on page 94 and mailing it to the appropriate BLS regional office.

The information included here deals only with the requirements of the Occupational Safety and Health Act of 1970 and Part 1904 of Title 29, Code of Federal Regulations, for recording and reporting occupational injuries and illnesses. Some employers may be subject to additional recordkeeping and reporting requirements not covered in this report. Many specific standards and regulations of the Occupational Safety and Health Administration (OSHA) have additional requirements for the maintenance and retention of records for medical surveillance, exposure monitoring, inspections, and other activities and incidents relevant to occupational safety and health, and for the reporting of certain information to employees and to OSHA. For information on these requirements, which are not covered in this report, employers should refer directly to the OSHA standards or regulations or contact their OSHA regional office.

These guidelines were prepared in the Office of Occupational Safety and Health Statistics, by Stephen Newell, under the general direction of William M. Eisenberg, Acting Associate Commissioner.

#### User's Guide

This document is formatted to make the information on OSHA recordkeeping easy to access and comprehend. Recordkeeping requirements have been categorized into several major subject areas. Each subject area is divided into two parts: The first reviews relevant

sections of the act or regulations and provides basic concepts of recordability; the second provides answers to questions most frequently asked about recording and reporting occupational injuries and illnesses. These questions and answers elaborate on the basic recordkeeping concepts and further define the subject matter in each section.

Chapter I. Provides information which should enable you to determine whether or not your establishment must keep OSHA records.

Chapter II. Describes which forms should be used and how the forms should be completed.

Chapter III. Outlines where the OSHA records must be located, how they should be updated, and the length of time they must be kept.

Chapter IV. Provides a brief description of the types of decisions employers make in the recordkeeping process. Also, this chapter shows how to distinguish between employees, whose injuries employers must record, and other workers at the establishment (such as independent contractors).

Chapter V. If you have any questions concerning whether or not a particular case should be recorded on the log, turn to Chapter V. This chapter provides guidelines for determining the key issues of recordability: which cases are work-related; what constitutes an occupational injury; how to distinguish medical treatment from first aid; criteria for detecting occupational illnesses; etc.

Chapter VI. Provides guidelines for determining the extent or outcome of recordable cases, and for making appropriate entries in columns 1-6 or 8-13 on the OSHA log.

Chapter VII. Describes employer obligations for reporting occupational injuries and illnesses. This reporting may be through the BLS annual survey, or in the case of a fatality or multiple hospitalization, it may be directly to an OSHA area office.

Chapter VIII. Discusses some of the checks and balances built into the system to ensure accurate recording and reporting of occupational injuries and illnesses.

The appendices provide a glossary of terms and sample recordkeeping and reporting forms. Appendix C lists illness conditions that have been associated with exposure in the workplace. Addresses and telephone numbers of participating State agencies and OSHA Regional Offices are listed in appendixes D and E. Appendix F provides capsule guidelines for distinguishing medical treatment from first aid.

Finally, included at the back of this publication is a detailed index which lists particular subjects in alphabetical order along with the page numbers where each topic may be referenced.

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### Chapter I. Employers Subject to OSHA Recordkeeping Requirements

The coverage of the Occupational Safety and Health Act of 1970 is very extensive. However, the requirements under the act for recording and reporting occupational injuries and illnesses have been modified by regulation to reduce the burden on employers and permit the focusing of safety and health efforts on high-risk industries and establishments. This chapter describes which industries and employers are subject to OSHA recordkeeping and reporting requirements.

#### A. Coverage of the Occupational Safety and Health Act

The OSHA Act covers nearly all employers in the private sector. Section 2(b) of the act describes its purpose as providing safe and healthful working conditions for "every working man and woman in the Nation." Section 4(a) defines the scope of the act's coverage:

This Act shall apply with respect to employment performed in a workplace in a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, Guam, the Trust Territory of the Pacific Islands, Wake Island, Outer Continental Shelf Lands, defined in the Outer Continental Shelf Lands Act, Johnson Island, and the Canal Zone.

The act's coverage is defined in terms of two criteria: Work activities and geographic areas. The activities covered relate to "employment performed in a workplace." The boundaries of geographic coverage are limited to the United States and its territories.

The employment described in Section 4(a) is not limited to the execution of specific work assignments. Section 2 of the act addresses injuries and illnesses arising out of "work situations." Sections 2(b) (1), (2), and (4) of the act

refer to "places of employment" and the provision of safe and healthful "working conditions." Section 2(b)(7) of the act deals with preventing employee illness as a result of their "work experience." These and other references in the act indicate that its coverage is intended to go beyond specific job tasks to encompass the total work environment. Also, the scope of employments covered is extensive. The act defines an employer in Section 3(5):

The term "employer" means a person engaged in a business affecting commerce who has employees, but does not include the United States or any State or political subdivision of a State.

(See section E of this chapter for a special discussion of State and local government coverage.)

It should be noted the term "employer" applied to persons engaged in "a business affecting commerce," not just "interstate commerce." Therefore, the coverage of the act is extensive since there are few employers who do not affect commerce.

Part 1975.3(d) of the regulations also interprets the term "business" as:

... any commercial or noncommercial activity affecting commerce and involving the employment of one or more employees. . . .

Part 1975.4(a) states:

Any employer employing one or more employees would be an "employer engaged in a business affecting commerce who has employees" and, therefore, he is covered by the Act as such.

However, despite the broad coverage afforded by the act, the regulations have excluded the following groups of employers:

1. *Religious establishments.* The performance of, or participation in, religious services does not constitute employment under the act according to Part 1975.4(c) of the regulations. However, churches are considered employers when they employ one or more persons in secular activities.

2. *Employers of household workers.* Those who employ persons for ordinary domestic household tasks are not considered to be employers under Part 1975.6 of the regulations.

A-1. Q. Who is considered to be an employer under the OSH Act?

A. Section 3(6) of the act defines an employee as one who is employed in the business of his employer.

The traditional common law definition of an employer is one who has the right to control and direct his employees, not only regarding the result to be accomplished by the work, but also as to the details and means by which the work objective is accomplished.

The term "employee" has been broadly interpreted under the OSH Act. Employee status involves a current employment relationship. Under the act, this status is generally limited to situations where the employee receives some sort of compensation (not necessarily money) from the employer for services rendered.

A-2. Q. Are volunteer workers considered employees under the Occupational Safety and Health Act?

A. Volunteer workers may or may not be considered employees under the act; their status would depend upon the facts of the particular situation.

Volunteers are generally not considered employees for recordkeeping purposes if they serve of their own free will and do not receive compensation. Compensation in this context may be wages or salaries, or it may consist solely of nonmoney benefits. The fact that paid workers may normally perform the same duties or functions has no bearing on this determination. Under these criteria, hospital volunteers are usually not considered to be employees for the purposes of the act; volunteer firemen are usually considered to be employees.

A-3. Q. Are people working in sheltered workshops considered employees? What about persons in job training programs?

A. If these workers receive some form of compensation and satisfy the criteria listed in question A-1, they are considered employees under the act.

A-1. Q. Are stockholders in a corporation considered employers?

A. No. The corporation is the employer. On the other hand, stockholders employed by the corporation are employees; these include managers and corporate officers.

A-5. Q. Two partners operate a small electrical contracting firm. They have no employees. Are they covered by the OSH Act?

A. No. Partners are not considered employees. A firm with no employees is not covered by the act and does not have to maintain OSHA records.

A-6. Q. Are activities of self-employed individuals covered by the Occupational Safety and Health Act?

A. No. These activities are not covered because self-employed individuals are not considered employers under the act. Part 1975.4(a) of the regulations limits employer status to those individuals employing one or more employees.

A-7. Q. Does the act cover persons employed by charitable and nonprofit organizations?

A. No. Partners are not considered employees. A firm with no employees is not covered by the act and does not have to maintain OSHA records.

A-8. Q. Are activities of self-employed individuals covered by the Occupational Safety and Health Act?

A. No. These activities are not covered because self-employed individuals are not considered employers under the act. Part 1975.4(a) of the regulations limits employer status to those individuals employing one or more employees.

A. Yes. Whether or not an organization is operated at a profit is not important since Part 1975.4(b)(4) provides that "... any charitable or nonprofit organization which employs one or more employees is covered under the ... Act. ..."

A-8. Q. Since the OSH Act governs all establishments engaged in interstate commerce, how are such establishments identified? For example, would a local grain elevator or farm feed and seed retail store be covered?

A. Yes. These operations would be covered. Coverage of the OSH Act is not limited to establishments engaged in interstate commerce. The law says "affecting commerce," which is far broader than "engaged in interstate commerce." Section 3(3) of the act broadly defines the term "commerce" as meaning "trade, traffic, commerce, transportation, or communications. . . ." Use of equipment made out-of-State has been deemed sufficient.

A-9. Q. Are farmers covered under the OSH Act?

A. A very broad interpretation has been given to the coverage of the act. Farmers are included, according to Part 1975.4(b)(2) of the regulations, because they affect commerce. However, small farmers (those with fewer than 11 employees) have been exempt from recordkeeping requirements since 1976.

A-10. Q. Are the working family members of farmers or ranchers considered employees? Must the farmer maintain records to cover them?

A. No. Immediate family members of farm employers are not regarded as employees under Part 1975.4(b)(2) of the regulations, even though they may receive compensation. Consequently, OSHA records need not be maintained for them.

A-11. Q. How does the act apply to migrant labor camps? Is it the same as for other areas of the economy?

A. Yes. Migrant labor camps are covered the same as any other segment of the economy. (See question A-5 of chapter IV for an explanation of who must keep the OSHA records for migrant laborers.)

A-12. Q. Do records have to be maintained for employees traveling overseas on business?

A. No. Records need not be kept for these employees when they are outside the geographic scope of coverage prescribed by Section 4(a) of the act—the United States and its territories.

A-13. Q. What about airline employees working aboard airplanes? When are these activities covered?

A. These activities are covered under the act while the airplane is in the

official air space of the United States and its territories.

A-14. Q. Are employers required to keep records of injuries and illnesses occurring to employees aboard ships? When are the employees engaged in these activities covered by the OSH Act?

A. The coverage of the Occupational Safety and Health Act is limited to the United States and its territories. Therefore, work activities would be covered aboard ships on inland and intercoastal waterways and up to the boundary of State jurisdiction, which is usually the 3-mile limit. (In Louisiana and Texas, the State boundaries extend 12 miles into the Gulf of Mexico.)

A-15. Q. Are churches or religious organizations required to keep records under the act if they employ persons in secular activities?

A. Yes. The act covers hospitals, schools, commercial establishments, and administrative or office personnel employed by religious organizations. Excluded from coverage are clergy and other participants in religious services.

A-16. Q. Do injury and illness records have to be kept for domestics?

A. No. According to Part 1975.6 of the regulations, employers of domestics in the employers' private residence for the usual purposes of housekeeping or child care, or both, are not required to keep records.

#### *B. Employers Required To Keep OSHA Records*

The recordkeeping requirements of the Occupational Safety and Health Act of 1970 apply to most private sector employers. Part 1904.1 of the regulations covers the purpose and scope of the recordkeeping regulations:

These sections provide for recordkeeping and reporting by employers covered under the Act, as necessary or appropriate for enforcement of the Act, for developing information regarding causes and prevention of occupational accidents and illnesses, and for maintaining a program of collection, compilation, and analysis of occupational safety and health statistics.

Initially, the regulations for employer recordkeeping mirrored the broad coverage of the act as described in the preceding section. However, the regulations have been modified to exempt certain employers with historically low rates of injuries and illnesses.

B-1. Q. Must employers keep OSHA injury and illness records if they are not covered by the Occupational Safety and Health Act?

A. No. Employers must maintain OSHA records only if they are within the coverage of the Occupational Safety

and Health Act of 1970. The scope of the OSHA recordkeeping regulations presently does not exceed the scope of the OSH Act.

#### *C. Employers Regularly Exempt From OSHA Recordkeeping*

Federal regulations have made the following employers regularly exempt from OSHA recordkeeping, i.e., from keeping the log of injuries and illnesses, completing a supplementary record, and filling out and posting an annual summary:

1. *Small employers.* Although subject to the overall coverage of the Occupational Safety and Health Act of 1970, most small employers are not required to keep injury and illness records because of their exemption in 29 CFR 1904.15. (A few States still require all small employers to maintain OSHA records. Check with your State.) This section of the regulations was promulgated to reduce the burden on employers after findings of relatively low levels of hazard in small establishments. Part 1904.15 states:

An employer who had no more than ten (10) employees at any time during the calendar year immediately preceding the current calendar year need not comply with any of the requirements of this part except the following:

- (a) Obligation to report under Part 1904.8 concerning fatalities or multiple hospitalization accidents; and
- (b) Obligation to maintain a log of occupational injuries and illnesses under Part 1904.2 and to make reports under Section 1904.21 upon being notified in writing by the Bureau of Labor Statistics that the employer has been selected to participate in a statistical survey of occupational injuries and illnesses.

For the purposes of the small employer exemption, the employment figure refers to the calendar year immediately preceding the year for which records will be kept. Also, the test for the small employer exemption is the number of employees in the entire firm, not the number in an individual establishment. Therefore, a firm with two establishments, each of which had six employees during the previous calendar year, has to keep OSHA injury and illness records during the current year because the total employment of the firm was greater than 10. Partners, self-employed, and family members on a farm are not considered employees.

2. *Employers in low-hazard industries.* In most States, employers in low-hazard industries in retail trade; finance, insurance, and real estate; and services are exempt from OSHA recordkeeping under Part 1904.16 of the regulations:

An employer whose establishment is classified in SIC's 52-89, (excluding 52-54, 70, 75, 76, 79, and 80) need not comply, for such establishment, with any of the requirements of this part except the following:

(a) Obligation to report under Section 1904.8 concerning fatalities or multiple hospitalization accidents; and

(b) Obligation to maintain a log of occupational injuries and illnesses under Section 1904.2 and make reports under Section 1904.21 upon being notified in writing by the Bureau of Labor Statistics that the employer has been selected to participate in a statistical survey of occupational injuries and illnesses.

The Federal exemption applies to all employers in low-hazard industries in States under exclusive Federal jurisdiction. States with approved State plans under Section 18(b) of the act may continue to require employers in these industries to maintain records. The following States and territories currently operate their own OSHA programs under Section 18(b): Alaska, Arizona, California, Connecticut, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, the Virgin Islands, Washington, and Wyoming. In these areas, employers should contact their respective State agency to determine if the low-hazard industry exemption has been adopted. State agency addresses and telephone numbers are listed in appendix D.

The exempt industries are identified and categorized according to the *Standard Industrial Classification Manual (SIC)*. They include:

Some retail trade industries (SIC's 55-59) which include establishments engaged in selling merchandise to the general public for personal or household consumption. Some of these retail trades are: automotive dealers, apparel and accessory stores, furniture and home furnishings stores, and eating and drinking places.

All finance, insurance, and real estate industries (SIC's 60-67) including establishments engaged in banking, credit other than banking, security dealings, insurance, and real estate.

Some service industries (SIC's 70-89, except 70, 75, 76, 79, and 80) including establishments with a variety of services for individuals, businesses, government agencies, and other organizations. Some of these service industries are: personal and business services in addition to legal, educational, social, and cultural services, and membership organizations.

In order to be included in this exemption, the major industry group has to meet two criteria: (1) The industry must fall within SIC's not now targeted for general schedule inspections; and (2) for a designated 3-year measurement period, the industry must have had an average lost workday case injury rate

at or below 75 percent of the comparable private sector average.

Therefore, building materials and garden supplies (SIC 52); general merchandise and food stores (SIC's 53, 54); hotels and other lodging places (SIC 70); repair services (SIC's 75, 76); amusement and recreation services (SIC 79); and health services (SIC 80) were not included among the industries initially proposed for exemption. These industries, although not targeted for general schedule inspections, have lost workday case injury rate averages above 75 percent of the private sector average for the 3-year period.

**C-1. Q.** Is the small employer exemption determined by the number of employees currently working in the establishment?

**A. No.** The small employer exemption focuses on the number of employees working for the entire firm at any time during the previous calendar year.

**C-2. Q.** For the purposes of the small employer exemption, how do you distinguish between an establishment and a firm?

**A.** The distinction between an establishment and a firm refers to the structure of the business. An establishment is a single physical location where business is conducted or where services or industrial operations are performed. A firm consists of the entire business enterprise (the corporation, company, partnership, etc.) and may include one or more establishments.

**C-3. Q.** How is the number of employees determined for the small employer exemption? Do employers qualify if they had an average of no more than 10 employees during the previous calendar year?

**A. No.** The average number of employees is not the determining factor. To qualify, employers must not have had more than 10 employees at any one time in the previous calendar year.

**C-4. Q.** Two partners operate an automobile repair shop with nine employees. Does the small employer exemption apply to them?

**A. Yes.** The partners themselves are employers; therefore, the auto repair shop has only nine employees. As long as the firm has no more than 10 employees at any one time during the previous calendar year, it qualifies for the small employer exemption.

**C-5. Q.** How were the industries selected for the low-hazard industry exemption?

**A.** Safety statistics were examined for major industry groups. An industry group was exempted if it was not currently targeted for routine safety

inspections and had a lost workday case rate for injuries at or below 75 percent of the private sector average for a designated 3-year period.

**C-6. Q.** How do employers determine the appropriate SIC code for their establishment to see if they qualify for the exemption of low-hazard industries?

**A.** First, employers should determine the principal activity of the establishment. If an establishment does more than one kind of business, it is classified in the category that generates the greatest dollar volume. Employers may then refer to the 1972 edition of the *Standard Industrial Classification Manual (SIC)* prepared by the Executive Office of the President, Office of Management and Budget. This publication is usually available in most corporate or public libraries or can be purchased from the Government Printing Office. Employers may also contact their State or BLS regional offices for assistance in making the proper SIC determination. Addresses and telephone numbers for the BLS regional offices are listed on the back cover; those for the State agencies are in appendix D.

**C-7. Q.** Must employers in the exempted low-hazard industries have written certification from BLS or OSHA that their firm is exempt from OSHA recordkeeping?

**A. No.** Written certification is not necessary since public notification was made in the *Federal Register*, news releases, etc.

**C-8. Q.** Does the exemption for low-hazard industries apply to all low-hazard establishments?

**A. No.** Only establishments in the specified major industry groups are exempt. The fact that an establishment in a high-risk industry has an excellent safety record or that its workers have jobs that seem as safe as those in the exempted industries does not mean that it is exempt.

**C-9. Q.** How do large employers with multiple establishments handle the exemption of low-hazard activities?

**A.** Large employers with multiple establishments may find that some of their establishments qualify for exemption while others do not. For example, an automobile manufacturer may have assembly plants and retail sales offices. The manufacturing establishments would not be exempt from OSHA recordkeeping; the sales offices would.

**C-10. Q.** Do recordkeeping exemptions apply uniformly in all States and territories?

**A.** The exemption for small employers is in effect in all States and territories except Wyoming and the Virgin Islands.

The recordkeeping exemption for low-hazard industries applies to all eligible workplaces under the jurisdiction of Federal OSHA and to establishments in many States with approved State plans under Section 18(b) of the act. However, some States with approved State plans have not adopted the low-hazard exemption. Employers in States with approved plans should contact their State agency to determine if it has adopted the exemptions. State agency addresses and telephone numbers are listed in appendix D, which also indicates those States with approved plans.

#### *D. Exceptions to Exemption for Small Employers and Employers in Low-Hazard Industries*

There are two exceptions to the exemption from OSHA recordkeeping for small employers and employers in low-hazard industries:

1. Although OSHA recordkeeping requirements are normally eliminated for small employers and employers in low-hazard industries, they must still comply with OSHA standards, display the OSHA poster, and report to OSHA within 48 hours any work-related accident which results in a fatality or the hospitalization of five or more employees. (Some States have more stringent catastrophic reporting requirements.)

2. A small percentage of the regularly exempt employers have to maintain records for 1 year if they are selected to participate in the Annual Survey of Occupational Injuries and Illnesses. As stated in Parts 1904.15(b) and 1904.16(b) of the regulations, each year BLS selects a rotating sample of small employers and employers in low-hazard industries to participate in the annual survey. These employers, required by law to participate, are notified prior to the beginning of the reference calendar year that they have been selected. They are required to maintain a log and summary (OSHA No. 200), but do not have to prepare any other OSHA injury and illness records. At the end of the calendar year, they must report their injury and illness experience on the survey questionnaire, the OSHA No. 200-S. They are not required to post a summary of their injury and illness experience at the end of the reference year.

D-1. Q. Why are some regularly exempt small employers and employers in low-hazard industries selected each year to keep records and participate in the Annual Survey of Occupational Injuries and Illnesses?

A. A small sample of these regularly exempt employers is required to

participate each year so that their injury and illness experience can be incorporated in the BLS survey data. This is necessary to produce estimates which are comparable in coverage to estimates for pre-exemption years.

D-2. Q. How is the survey sample selected for the regularly exempt firms that will be required to keep records? If a regularly exempt firm is selected to participate 1 year, will it be required to participate every year thereafter?

A. The regularly exempt firms notified in advance that they must participate in the annual survey are selected on a random sample basis. Usually, other firms will be selected to participate in subsequent surveys. In some situations, however, a firm may be asked to participate more than once; i.e., when there are not enough firms in a particular industry or employment-size group to insure adequate coverage from a rotating sample.

#### *E. State and Local Government*

All States that operate their own safety and health plans require all employers, including State and local government agencies, to maintain records of injuries and illnesses. Part 1952.4(a) of the regulations provides:

States must adopt recordkeeping and reporting regulations which are identical to 29 CFR Part 1904 "Recording and Reporting Occupational Injuries and Illnesses" except for Part 1904.13 of this chapter, which provides for variances.

Part 1956.10(i) requires these State and local government employers to maintain records and make reports in conformance with the standards and procedures required of private sector employers under the act. State and local government agencies are usually exempt in States which do not operate their own State plans.

E-1. Q. What is the legal basis for the requirement that certain State and local government agencies are required to participate in the recordkeeping and reporting provisions of the act?

A. Section 18(c)(6) of the Federal OSH Act requires States with approved State plans to have State and local government agencies participate in recordkeeping and reporting activities to the extent permitted by State law. Also, nonplan States may require recordkeeping under their own laws and regulations. Participating States, like private sector employers, may use their own recordkeeping forms as long as they are substantially the same as the Federal forms.

E-2. Q. Which States have plans requiring participation of State and local

government agencies in OSHA recordkeeping and reporting?

A. The States and territories listed in section C of this chapter have approved plans requiring State and local government participation. These States are identified in appendix D.

E-3. Q. Must private universities and colleges keep records?

A. Although covered by the act, these institutions normally do not have to keep OSHA records because of the recordkeeping exemption discussed in section D above. However, as with other normally exempt industries, a small sample will have to keep records for 1 year if asked to participate. When this occurs, these private universities and colleges must keep records of injuries and illnesses for their employees; students are not included unless they are employed on a full- or part-time basis. Graduate students with paid teaching and research assignments are covered.

State and local government colleges and universities must keep OSHA records if their State has a plan approved for implementing the provisions of the act.

E-4. Q. Are employees of local school districts covered by the act?

A. These employees are covered only in States which have an approved State plan for implementing the provisions of the act.

#### *F. Applicability of OSHA Recordkeeping Requirements to Employers Subject to Other Federal Safety and Health Regulations*

Many employers subject to injury and illness recordkeeping requirements of other Federal safety and health regulations are not exempt from OSHA recordkeeping. However, records used to comply with other Federal recordkeeping obligations may also be used to satisfy the OSHA recordkeeping requirements. The forms and definitions used must be equivalent to the OSHA forms and definitions.

F-1. Q. To what extent are motor carriers covered by OSHA recordkeeping regulations since they are under Department of Transportation safety regulations?

A. Motor carriers must maintain injury and illness records in conformance with or equivalent to the OSHA records required by 29 CFR 1904.

F-2. Q. Is the mining industry, which generally comes under the inspection jurisdiction of the Mine Safety and Health Administration, required to participate in the OSHA recordkeeping program?

A. No. A recordkeeping and reporting system has been developed by the Mine Safety and Health Administration (in cooperation with the Bureau of Labor Statistics) which provides information on mining activities equivalent to the OSHA injury and illness statistics.

However, the injury and illness experience of some mining company employees working in establishments not related to mining will be maintained on OSHA records. For example, if a mining company has a company store, and the Mine Safety and Health Administration does not require that injury and illness records be kept for the store, it would fall under OSHA jurisdiction.

F-3. Q. Are railroad employers required to keep records of injuries and illnesses of their employees?

A. Yes. In recent years, the Federal Railroad Administration has adopted the definitions of the OSHA recordkeeping system. Railroad employers report occupational injury and illness data annually to the Federal Railroad Administration, which in turn provides the data to BLS for statistical purposes.

## Chapter II. The Mechanics of OSHA Recordkeeping

Only two forms are used for OSHA recordkeeping. One form, the OSHA No. 200, serves two purposes: (1) As the Log of Occupational Injuries and Illnesses on which the occurrence, extent, and outcome of cases are recorded during the year; and (2) as the Summary of Occupational Injuries and Illnesses which is used to summarize the log at the end of the year to satisfy employer posting obligations. The other form, the Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101, provides additional information on each of the cases that have been recorded on the log. (These forms are provided in appendix B.)

### A. The Log of Occupational Injuries and Illnesses, OSHA No. 200

The log is used for recording and classifying recordable occupational injuries and illnesses, and for noting the extent and outcome of each case. The log shows when the occupational injury or illness occurred, to whom, what the injured or ill person's regular job was at the time of the injury or illness exposure, the department in which the person was employed, the kind of injury or illness, how much time was lost, and the final determination of the case.

Part 1904.2 of the *Code of Federal Regulations* (CFR) provides the basic requirements for the Log and Summary of Occupational Injuries and Illnesses:

(a) Each employer shall except as provided in paragraph (b) of this section, (1) maintain in each establishment a log and summary of all recordable occupational injuries and illnesses for that establishment; and (2) enter each recordable injury and illness on the log and summary as early as practicable but no later than 6 working days after receiving information that a recordable injury or illness has occurred. For this purpose, form OSHA No. 200 or an equivalent which is as readable and comprehensible to a person not familiar with it shall be used. The log and summary shall be completed in the detail provided in the form and instructions on form OSHA No. 200.

(b) Any employer may maintain the log of occupational injuries and illnesses at a place other than the establishment or by means of data-processing equipment, or both. Under the following circumstances:

(1) There is available at the place where the log is maintained sufficient information to complete the log to date within 6 working days after receiving information that a recordable case has occurred as required by paragraph (a) of this section.

(2) At each of the employer's establishments, there is available a copy of the log which reflects separately the injury and illness experience of that establishment complete and current to a date within 45 calendar days.

The log consists of three parts: A descriptive section which identifies the employee and briefly describes the injury or illness; a section covering the extent of the injuries recorded; and a section on the type and extent of illnesses. A complete OSHA No. 200 log form is shown in appendix B.

While most of the columns seem self-explanatory, there are some important requirements to be considered when completing the log. The following information pertains to the descriptive section of the log shown on the following page.

**Column A.** Enter a number that is unique for each case. This is very important because each case must be identified and examined "separately." The simplest method of numbering may be the best; i.e. 1, 2, 3. Employers may also number cases by month, for example, 7-15 would indicate the 15th case occurring during July.

**Column B.** For occupational injuries, enter the date of the work accident which resulted in injury. For occupational illnesses, enter date of initial diagnosis of illness, or, if absence from work occurred before diagnosis,

enter the first day of absence attributable to the illness which was later diagnosed or recognized. Cases do not necessarily fall consecutively by date, because injuries and illnesses are recorded as an employer learns that a case has occurred.

**Column C.** Insert 1 of 2 entries: (1) First name, middle initial, and last name; or (2) first initial, middle initial, and last name.

**Column D.** Specify the injured or ill employee's regular job title even if the employee was working outside his or her regularly assigned occupation at the time of the injury or illness exposure.

**Column E.** State the department in which the injured or ill person is regularly employed. Enter the department in which the injury or illness exposure occurred only if it is the regularly assigned station. If an employee is regularly assigned in the maintenance department, but was injured while working in the shipping department, the correct entry would be "maintenance."

**Column F.** Briefly describe the nature of the injury or illness and part(s) of the body affected. For example, amputation—finger, is not sufficiently detailed. A correct entry would be amputation—second joint, forefinger, left hand. This tells which hand, which finger, and to what degree. The examples listed in the heading for column F on the log form are good indications of how entries should be made.

The injury portion of the log is reproduced on the following page. The following instructions concern entries made in this section.

**Column 1.** The date of death must be entered if an occupational injury results in a fatality. In some cases, an employee may be injured, but not die until several weeks or months later. It does not matter how much time has elapsed; if the injury was work-related, the entry on the log must be changed to reflect a fatality; the entries in columns 2 through 6 must be lined out, and the date of death entered in column 1.

**Column 2.** If a case involves lost workdays due to an injury, check this column. Lost workdays include both days away from work and days of restricted work activity, or both. The number of lost workdays should not include the day of injury or any days on which the employee would not have worked even though able to work (i.e., weekends, paid holidays, etc.).

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Before preparing the summary which is shown on the next page, the employer should review the log to be sure the entries are correct and current. Each case should be checked to make sure that it is in only one of the "extent" categories on the log (fatalities, lost workday cases, nonfatal cases without lost workdays). Any open case involving a loss of workdays which is continuing at the time the summary is prepared should be completed by estimating the number of future workdays the employee will lose. The estimated number of future lost workdays should be added to the number of workdays already lost, and the combined total entered on the log and included in the summary. (The log should be revised at a later date to reflect the number of days that were actually lost.)

The yearly totals on the log are all that is needed for posting. Employers may prepare the summary in 1 of 2 ways: (1) They can use the last page of the log they have been maintaining during the year by folding the log so that the portion to the left of the dotted line is turned under to conceal the names of the injured or ill employees; or (2) they can use a photocopy or separate form, such as a blank OSHA No. 200.

Completing the summary is a relatively simple procedure. The right hand portion of the log (to the right of the dotted fold line) is used for this purpose. Employers complete the top portion of the page by entering the year to which the records relate, the company name (and the establishment name, if different from the company), and the address. Then the entries in columns 1 through 13 are added vertically and totaled on the bottom line. Note that, although all the column entries for cases and lost workdays must be totaled, employers need not total the asterisks on the log signifying illnesses resulting in termination of employment or permanent transfer, since these are primarily for the information of authorized Federal or State officials. The summary is completed with the signature of the person responsible for the summary information and the date of that person's signature at the bottom of the page.

B-1. Q. What is supposed to be accomplished by posting an annual summary in the workplace?

A. Posting the annual summary: (1) Provides employees with their establishment's record of injuries and illnesses; (2) makes employers and employees more safety conscious; and

(3) promotes joint labor-management safety and health efforts.

B-2. Q. What form must be used for the summary?

A. The OSHA No. 200 or a private equivalent may be used. Employers are allowed to use private equivalents if they are readable and comprehensible to persons not familiar with the equivalents. A blank copy of the OSHA No. 200 is often posted beside the equivalent for clear understanding by employees. Copies of the OSHA No. 200 can be obtained from BLS regional offices or from the BLS national office. (See back cover for BLS regional office addresses and telephone numbers.)

B-3. Q. How long must the summary be posted at each establishment?

A. The annual summary is to be posted by February 1 of each year and is to remain in place until March 1. It must be posted at each establishment in a conspicuous place where notices to employees are customarily posted.

B-4. Q. Who is responsible for the preparation of the annual summary?

A. The employer is ultimately responsible for preparation of the annual summary. However, in many instances an employee actually prepares and certifies the annual summary.

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B-5. Q. What is meant by certification of the summary?

A. The summary must be signed and dated by the employer, or whoever is delegated responsibility for completing it, to certify that it is true and complete to the best of that person's knowledge.

B-6. Q. If no recordable cases occurred during a reporting period, must a summary be prepared?

A. Yes. Even though there were no recordable cases during the previous year, the summary portion of the OSHA No. 200 must be completed and posted in each establishment no later than February 1 and remain in place until March 1. Zeros should be entered in all categories on the "totals" line. All summaries must be retained for 5 years following the end of the year to which they relate.

B-7. Q. Can the summary at the end of the year be on a total company basis, or does it have to be completed for each establishment?

A. A summary must be prepared for each establishment and posted in each establishment.

B-8. Q. Must a copy of the annual summary be posted on every bulletin board, or will the posting of only one copy comply with the requirements of the law?

A. It depends upon the particular establishment. The regulations state that the annual summary is to be posted "at each establishment in a conspicuous place where notices to its employees are posted customarily." In some circumstances, this may require more than one posting.

B-9. Q. How do workers review the annual summary when they don't work at a fixed worksite?

A. During the posting period, employers are required to present or mail a copy of the annual summary to employees with no fixed worksite.

B-10. Q. Is it necessary to post the annual summary if an establishment closes?

A. It is not necessary to post a summary in an establishment which has closed by the time the summary is prepared. The primary purpose of posting is to inform employees of the past year's injury and illness record.

B-11. Q. Must the employer post the annual summary at the jobsite of a seasonal operation if the site is shut down during the posting period?

A. Posting informs the employees of the past year's injury and illness experience for that establishment. Since posting in a vacated establishment would not accomplish this purpose, posting is not required. However, employers in these situations shall

present or mail a copy of the annual summary to their permanent employees.

B-12. Q. When will an establishment have to send its annual summary to the Bureau of Labor Statistics?

A. Never. The employer must retain the recordkeeping forms, the log and summary, OSHA No. 200, and the supplementary record, No. 101, in the establishment for 5 years after the reference year of the records. Establishments selected to participate in the statistical survey will receive a survey reporting form in the mail. If an establishment does not receive a form, the employer need only maintain and retain the records according to the regulations.

B-13. Q. How is a lost workday case handled on the summary if it carries over into the next year? What if, for example, an employee is injured in December 1983 and is still out on January 31, 1984?

A. Two important considerations are involved: (1) The same case should not appear in the records for 2 years; and (2) it is important not to lose the count of the actual number of lost workdays, which is a measure of the severity of the case.

The original entry for this case should be on the 1983 log. At the end of calendar year 1983, the employer should estimate the number of workdays the employee is expected to lose in 1984 and add that to the count of workdays lost up to the time of making that estimate. That number should be entered in column 4 or column 11 of the 1983 log, depending on the type of case. When the employee returns to work and is able to perform all the duties of his or her regular job or the count of lost workdays is otherwise ended, the employer should verify the actual count of lost workdays (days away from work and any days of restricted activity) and correct the entry on the 1983 log as necessary. No entries should be made for this case on the 1984 log. Also, the summary for 1983 does not have to be corrected.

#### C. The Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101

For every injury or illness entered on the log, it is necessary to record additional information on the supplementary record, OSHA No. 101. The supplementary record describes how the accident or illness exposure occurred, lists the objects or substances involved, and indicates the nature of the injury or illness and the part(s) of the body affected.

Part 1904.4 of the *Code of Federal Regulations* provides the requirements for the supplementary record:

In addition to the log of occupational injuries and illnesses provided for under Section 1904.2, each employer shall have available for inspection at each establishment within 6 working days after receiving information that a recordable case has occurred, a supplementary record for each occupational injury or illness for that establishment. The record shall be completed in the detail prescribed in the instructions accompanying Occupational Safety and Health Administration Form OSHA No. 101. Workmen's compensation insurance or other reports are acceptable alternative records if they contain the information required by Form OSHA No. 101. If no acceptable alternative record is maintained for other purposes, Form OSHA No. 101 shall be used or the necessary information shall be otherwise maintained.

Most items in the supplementary record shown on the next page are self-explanatory. However, the following items are highlighted:

*The OSHA case or file number must be the same number used to identify the case or file number in column A of the log, OSHA No. 200.*

*Occupation (item 8) refers to the employee's regular job title. If an employee is working in a capacity other than the regular occupation at the time of an injury or illness exposure, item 8 must show the regular job title. This is the same title used in column D of the log.*

*Department (item 9) refers to the department or division in which the employee is regularly employed, even if an employee should be temporarily working in another department at the time of the injury or illness exposure. This is the same department named in column E of the log.*

*Premises (item 11) refers to whether the accident or exposure occurred on the employer's premises.*

*Injury or illness and part(s) of body affected (item 14) should be in agreement with the information entered in column F of the log.*

C-1. Q. When must a supplementary record be prepared?

A. A supplementary record must be prepared for each case within the same time frame required for entering a case on the log—within 6 workdays after receipt of information that a recordable case has occurred.

C-2. Q. Must all employers complete the OSHA No. 101 or equivalent for any case entered on the log of occupational injuries and illnesses?

A. Yes, all employers regularly keeping OSHA records must complete a supplementary record for each entry on the log, OSHA No. 200.

However, there is one exception to this rule. As noted in section D, chapter

II. a small percentage of firms regularly exempt from OSHA recordkeeping is selected each year to participate in the Annual Survey of Occupational Injuries and Illnesses. Those selected are required to maintain a log of occupational injuries and illnesses but are not required to complete any other OSHA records.

C-3. Q. What form must be used as the supplementary record?

A. Either the OSHA No. 101 or any other form which contains the same information may be used. Employers are not required to prepare an OSHA No. 101 if they complete any other form which contains identical information. Many State workers' compensation first report of injury forms contain all the OSHA No. 101 items. In addition, many large employers prepare internal accident report forms which contain all the necessary items.

C-4. Q. Does this mean employers don't need to complete OSHA No. 101 if

they presently use a State workers' compensation form?

A. It depends upon the particular workers' compensation form used. Workers' compensation first report of injury forms are acceptable if they contain all the items on the OSHA No. 101 or are supplemented to do so. Employers should be sure that all OSHA No. 101 items are on the first report forms; otherwise, missing items may be entered on a separate attachment. Many States have modified their first report forms to include this information. Employers should consult the State agency which is cooperating in the program with the Bureau of Labor Statistics or the BLS regional or national office to determine whether any items are missing from their State's form. The addresses and telephone numbers of these agencies and offices are listed in the appendix D and on the back cover of this report.

C-5. Q. Our State workers' compensation form lists only disabling

injuries. How can we use this in place of OSHA No. 101?

A. If a State requires reports of disabling injuries only, the employer will have to complete additional forms to comply with the OSHA requirements. The OSHA No. 101 or some acceptable substitute such as an insurance form or internal accident report form may be used to record the nondisabling injuries.

C-6. Q. Who evaluates a State's first report of injury form to insure that it satisfies the requirements of the OSHA No. 101?

A. The Bureau of Labor Statistics is available to evaluate State first report of injury forms upon request.

C-7. Q. If a company's injury form, which is generally similar to OSHA No. 101, does not include information such as social security number, sex, etc., must the company apply to BLS for a variance?

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Bureau of Labor Statistics  
Supplementary Record of  
Occupational Injuries and Illnesses

U.S. Department of Labor



This form is required by Public Law 91-596 and must be kept in the establishment for 5 years. Failure to maintain can result in the issuance of citations and assessment of penalties.

Case or File No.

Form Approved  
O.M.B. No. 1220-0029

## Employer

1. Name

2. Mail address (No. and street, city or town, State, and zip code)

3. Location, if different from mail address

## Injured or Ill Employee

4. Name (First, middle, and last)

Social Security No.

5. Home address (No. and street, city or town, State, and zip code)

6. Age

7. Sex: (Check one)

Male Female 

8. Occupation (Enter regular job title, not the specific activity he was performing at time of injury.)

9. Department (Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

## The Accident or Exposure to Occupational Illness

If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.

10. Place of accident or exposure (No. and street, city or town, State, and zip code)

11. Was place of accident or exposure on employer's premises?

Yes No 

12. What was the employee doing when injured? (Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)

13. How did the accident occur? (Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

## Occupational Injury or Occupational Illness

14. Describe the injury or illness in detail and indicate the part of body affected. (E.g., amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)

15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)

16. Date of injury or initial diagnosis of occupational illness

17. Did employee die? (Check one)

Yes No 

## Other

18. Name and address of physician

19. If hospitalized, name and address of hospital

Date of report

Prepared by

Official position

A. No. Also, it is not mandatory that the OSHA form be used as the supplementary record; any other form may be used if it contains all of the OSHA No. 101 items or is supplemented to do so. In this case, a longhand entry concerning the individual's sex, social security number, and other missing information would satisfy the need. An alternative record which does not contain all of the OSHA No. 101 items can be supplemented by adding the missing items.

C-8. Q. Does information on the supplementary record (OSHA No. 101) need to be on one form? What if a company wants to split this information between the mailing department, safety department, and workers' compensation department?

A. Yes. This information must be on one form, either the OSHA No. 101 or a satisfactory substitute. Therefore, the information should not be split between different departments.

### Chapter III. Location, Retention, and Maintenance of Records

Ordinarily, injury and illness records must be kept for each establishment covered by the Occupational Safety and Health Act. The regulations require that records be located and maintained at this level to assist government agencies in administering and enforcing the act, to increase employer-employee awareness, and to promote injury and illness prevention. This chapter describes requirements for location of records and employer responsibilities for records retention and maintenance.

#### A. Establishments Required To Keep and Maintain Records

The establishment is the basic organizational unit in the private sector among different firms and operations in different industries. It is the focus of the requirements for records location and maintenance, since the regulations require that records be kept at the establishment level. Therefore, it is imperative that everyone involved in the recordkeeping process have a clear understanding of what constitutes an establishment for recordkeeping purposes.

Part 1904.12(g)(1) of the regulations provides a concise definition of the term "establishment." An establishment is defined as a single physical location where business is conducted or where services or industrial operations are performed. The examples provided include a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office.

The regulations specify that distinctly separate activities performed at a single physical location (for example, where contract construction activities are operated from the same physical location, as a lumber yard), shall each be treated as a separate establishment for recordkeeping purposes.

A-1. Q. What is the definition of a "single physical location?"

A. While the regulations do not require that worksites be contiguous to comprise a single physical location, these sites should at least be in proximity to one another. This relationship is a matter of degree—depending upon the size and nature of the operations of the unit under consideration.

A-2. Q. Our company has several different operations at several different locations. For unemployment insurance purposes, these units have always been considered one establishment. In addition, we are mailed only one survey form for all these operations when we are selected to participate in the BLS Annual Survey of Occupational Injuries and Illnesses. Must we keep more than one set of injury and illness records for these operations?

A. Yes. The regulations require that injury and illness records be maintained for each establishment, which is defined as a single physical location where business is conducted or where operations are performed. The fact that employers may consolidate records for survey reporting and other purposes does not affect this requirement.

A-3. Q. Even though individual establishments must maintain individual records, may a company file a consolidated report of these operations to the Bureau of Labor Statistics in Washington or to the regional offices? If so, how do employers know which operations to include?

A. Reports of injuries and illnesses need not be filed with BLS unless the company is selected to participate in the BLS annual survey. If a company is selected to participate, it will be mailed a survey form on which to report its occupational injuries and illnesses. The form will identify which establishments are to be included in the report. Sometimes all establishments in a specified area, such as a county, are included; sometimes they are not.

A-4. Q. What is meant by the term, "a distinctly separate activity?"

A. These is no clear-cut definition of what constitutes a "distinctly separate activity." Production of dissimilar products; different kinds of operational procedures; different facilities; and separate management, personnel, payroll, or support staff are all

indicative of separate activities and separate establishments.

A-5. Q. How many sets of records must be kept in the following case? At one location, workers in Division A make metal tools, while workers in Division B make wooden chairs.

A. If Divisions A and B are managed independently of each other, then they would be considered separate establishments and each division would keep its own records.

A-6. Q. What about auxiliary operations, such as personnel offices or medical facilities?

A. These may be either separate establishments or subunits, departments, or divisions within an establishment, depending on the nature of operations and degree of autonomy the particular unit has in relation to the main organization. (See question A-4 above.)

A-7. Q. Would a manufacturing operation with a warehouse attached need to keep separate records for the warehouse?

A. Only if the warehouse is a distinctly separate activity. Factors to consider include whether the warehouse is an integral part of the manufacturing operation and whether it stores materials for any operation other than the manufacturing facility. Other factors to evaluate are listed in question A-4.

A-8. Q. Do separate OSHA records have to be kept for trucking operations associated with manufacturing facilities?

A. If a trucking fleet is a distinctly separate activity, it requires separate OSHA records. There are, of course, situations where separate OSHA records for truckdrivers would not be kept. These involve operations with a limited number of trucks under the same supervision as the rest of the facility. In these situations, it is usually difficult to differentiate between truckdrivers and other employees in the employment records. Question A-4 of this section lists other considerations.

A-9. Q. A firm has several operational facilities at several locations, each having its own management. However, all facilities utilize one medical department and one personnel office. Are separate records required for each of these facilities or can one set of records be kept for all the facilities?

A. These facilities constitute separate establishments, and hence require separate records. The regulations require that records be maintained at the establishment level so that both management and employees have information on their injury and illness experience.

A-10. Q. How are records kept for a firm that rotates its employees among several different fixed establishments?

A. Separate records shall be kept for each separate establishment. Each establishment's records should reflect the injuries and illnesses which occurred in that particular establishment. (See chapter VI, question B-21, for recording lost workdays in these situations.)

A-11. Q. Must employers maintain separate records for exposure hours for each establishment in situations where the employees are rotated among the firm's different establishments?

A. Separate records for exposure hours do not necessarily have to be maintained. However, employers should at least be able to provide an estimate of the exposure hours worked at each establishment.

#### B. Location of Records

Injury and illness records (the log and summary, OSHA No. 200, and the supplementary record, OSHA No. 101) must be kept for every physical location where operations are performed. Under the regulations, the location of the records depends upon whether or not the employees are associated with fixed establishments.

1. *Employees associated with fixed establishments.* Records for these employees should be located as follows:

a. Records for employees working at fixed locations, such as factories, stores, restaurants, warehouses, etc., should be kept at the work location.

b. Records for employees who report to a fixed location but work elsewhere should be kept at the place to which the employees report each day. These employees are generally engaged in activities such as agriculture, construction, transportation, etc.

c. Records for employees whose payroll or personnel records are maintained at a fixed location, but who do not report or work at a single establishment, should be maintained at the base from which they are paid or the base of their firm's personnel operations. This category includes generally unsupervised employees such as traveling salespeople, technicians, or engineers.

2. *Employees not associated with fixed establishments.* Some employees are subject to common supervision, but do not report or work at a fixed establishment on a regular basis. These employees are engaged in physically dispersed activities that occur in construction, installation, repair, or service operations. Records for these employees should be located as follows:

a. Records may be kept at the field office or mobile base of operations.

b. Records may also be kept at an established central location. If the records are kept centrally: (1) The address and telephone number of the place where the

records are kept must be available at the worksite; and (2) there must be someone available at the central location during normal business hours to provide information from the records.

B-1. Q. I manage a grocery store that is part of a supermarket chain. May we keep the OSHA records for our employees at our company's central administrative office?

A. No. The OSHA records for these employees should be maintained at the work location to satisfy the requirements of the regulations and to insure maximum effectiveness of the records in injury and illness prevention. However, even though the summary and supplementary records must be kept at the establishment, see the next section for the location exception for the log, OSHA No. 200.

B-2. Q. Our company employs several salesmen who operate within a limited geographic area on a commission basis. Where should the records for these people be located?

A. If these employees do not ordinarily report to a single location and are generally unsupervised in their daily work, the records should be kept at the location from which they are paid or the base of their firm's personnel operations.

If these employees report to a given location each day before beginning their sales activities, the records should be kept at the place to which they report.

B-3. Q. Do construction subcontractors and construction contractors have to keep OSHA records at each individual jobsite, or can the records be located at their regional or central office?

A. Location of the records depends upon the nature of the operation. If the employees report to a given place each day but work elsewhere, OSHA records should be kept at the location where they report. For example, if an employer is a plumbing contractor with trucks going from the shop to different sites each day, the establishment is the shop. This is the location where records must be kept. However, if the employees of a plumbing firm report directly to transient jobsites each day, the firm has discretion regarding where the records are kept. Records for employees subject to common supervision who do not report or work at a fixed establishment on a regular basis may be kept at either: (1) The field office or mobile base of operations; or (2) at an established central location, provided the employer satisfies the two requirements listed above for employees not associated with fixed establishments.

B-4. Q. How do you distinguish between fixed and nonfixed establishments for the purpose of

determining where OSA records should be kept?

A. The distinction between these two types of establishments generally rests on the nature and duration of the operation and not on the type of structure in which the business is located.

A nonfixed establishment usually operates at a single location for a relatively short period of time. A fixed establishment remains at a given location on a long-term or permanent basis and often involves repetitious activities. Also, fixed establishments are generally places where clerical, administrative, or other business records are kept. For example, a construction crew repairing a bridge for 2 months is considered working in a nonfixed establishment, while a crew repairing a bridge for a year and half is considered working at a fixed establishment.

#### C. Location Exception for the Log (OSHA No. 200)

Although the supplementary record and the annual summary must be located as outlined in the previous section, it is possible to prepare and maintain the log at an alternate location or by means of data processing equipment, or both. Two requirements must be met: (1) Sufficient information must be available at the alternative location to complete the log within 6 workdays after receipt of information that a recordable case has occurred; and (2) a copy of the log updated to within 45 calendar days must be present at all times in the establishment. This location exception applies only to the log, and not to the other OSHA records. Also, it does not affect the employer's posting obligations.

C-1. Q. Can we maintain the logs for our different facilities in one central administrative office rather than in each individual establishment?

A. Yes. For centralized recordkeeping, the log, OSHA No. 200, may be maintained in some place other than the establishment, such as the central office. If that is done, the requirements listed above must be followed. Note, however, that separate records must be maintained for each establishment.

C-2. Q. To qualify for the location exception for the log, must I use a computer to maintain the records at the alternative location?

A. A computer may be used for this purpose, but it is not mandatory.

#### D. Retention of OSHA Records

The regulations require that the log and summary, OSHA No. 200, and the

supplementary record, OSHA 101, must be retained in each establishment for 5 calendar years following the end of the year to which they relate. This requirement pertains to the log and summary, OSHA No. 200, and to the supplementary record, OSHA No. 101.

D-1. Q. Must a new owner retain the OSHA records of an existing establishment he or she just purchased?

A. When a change in ownership of an establishment occurs, the new owner must retain OSHA injury and illness records of the previous owner for 5 years following the end of the year to which they relate. However, the new owner does not have to update these records.

D-2. Q. Must a construction company retain OSHA records for completed projects, such as completed buildings, bridges, etc., if the company's business continues at another location after the completion?

A. Yes. In these situations, the OSHA records must be retained by the company for the 5-year retention period.

D-3. Q. When a firm goes out of business, does the employer still have to retain the OSHA records?

A. In this situation, the firm ceases to exist at the time the employer closes down operations. The employer no longer has to retain the OSHA records once the firm ceases to exist.

D-4. Q. Must records still be retained if a firm undergoes a fundamental change in business structure, such as changing from a privately owned enterprise to a corporation?

A. Yes. The OSHA records must still be retained since the existence of the establishment remains unchanged.

D-5. Q. What is the employer's responsibility for retention of OSHA records if the establishment goes bankrupt?

A. The employer's responsibility in this situation depends upon the nature of the proceeding in bankruptcy. If the firm undergoes a reorganization in bankruptcy, the employer must retain the OSHA records. If a firm undergoes a bankruptcy that results in liquidation, the employer's responsibility terminates upon liquidation. The difference between these two situations is that, in the former, the establishment continues to exist as an organization entity; in the latter, it does not.

D-6. Q. Does an establishment cease to exist for recordkeeping purposes when it seasonally closes down operations? Do these employers have to retain their OSHA records?

A. Just because a firm temporarily closes down operations on a seasonal or cyclical basis does not mean that it ceases to exist as an establishment. If

the firm's operations are basically ongoing in nature, the employer is still required to retain the OSHA records. The retention requirement ceases only when the establishment permanently goes out of business.

D-7. Q. An employer with a number of establishments is dissolving her business. Some establishments are being transferred to another firm; some are being closed. What should be done with the OSHA records?

A. For those establishments in which there is a change of ownership, the occupational injury and illness records should be transferred to the new owner. The new owner must preserve those records for 5 years following the end of the year to which they relate; however, the new owner is not responsible for updating log entries. The new owner will, of course, be responsible for work injury and illness records subsequent to the takeover date.

For those establishments which are discontinued as part of a general dissolution, the obligation to preserve or maintain the injury and illness records is ended. If the employer's business were continuing, the injury and illness records for the discontinued establishments should be transferred to a central office (or another establishment if there is no central office) and maintained for the 5-year retention period.

#### *E. Maintenance of the Log (OSHA No. 200)*

In addition to keeping the log on a calendar year basis, employers are required to update this form to reflect changes which occur in recorded cases after the end of the calendar year. Maintenance or updating of the log is different from the retention of records discussed in the previous section. Although all OSHA injury and illness records must be retained, only the log must be maintained by the employer.

If, during the 5-year retention period, there is a change in the extent or outcome of an injury or illness which affects an entry on a previous year's log, then the first entry should be lined out and a corrected entry made on that log. Also, new entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year in which the case occurred.

E-1. Q. If a change in the ownership of an establishment occurs, does the new owner have to maintain the previous owner's log?

A. No. Although the new owner must retain the previous owner's OSHA records for 5 years, he or she is not

responsible for maintaining the previous owner's log.

E-2. Q. Must the new owner maintain the previous owner's log when a change of ownership occurs during mid-year?

A. No. The new owner should retain the previous owner's records, but he doesn't have to maintain them. Instead he should prepare and maintain OSHA injury and illness records which begin with his assumption of ownership and go through the end of the calendar year.

E-3. Q. If an employer reorganizes the structure of his or her business from a private owned enterprise to a corporation, must he or she still maintain logs for the establishment prior to the reorganization?

A. It depends upon the degree of reorganization and the amount of control the original owner still exercises over the operation. New owners need not maintain a previous employer's records. However, records must still be maintained where a firm merely reorganizes its business structure while continuing under the direction and control of the original owner.

E-4. Q. When a firm goes out of business, does the employer have to maintain the OSHA log?

A. No. Employers no longer have to retain their OSHA records or maintain the OSHA log once the establishment goes out of business.

#### **Chapter IV. Employer Decisionmaking**

This chapter covers questions which often arise regarding recordkeeping decisions which must be made at the establishment level. It focuses on the legislative and regulatory assignment of decisionmaking authority to employers, and describes the safeguards built into the system to insure the integrity of the records and the validity of the statistics that the records provide.

##### *A. Types of Decisions Employers Make in the Recordkeeping Process*

1. *Distinguishing between employees and other workers on site.* The Occupational Safety and Health Act of 1970 and Part 1904 of the Code of Federal Regulations require employers to maintain injury and illness records for their own employees at each of their establishments. Employers are not responsible for maintaining records for employees of other firms or for independent contractors, even though these individuals may be temporarily at work in their establishment or on one of their jobsites at the time an injury or illness exposure occurs. Therefore, before deciding whether a case is recordable, an employment relationship needs to be determined.

2. *Deciding if injuries and illnesses occurring to employees are recordable. Employers decide which cases are to be entered on the OSHA records.* This decision must be made in good faith, according to the requirements of the act and Part 1904 of the regulations. Chapter V of this report provides a detailed description of these recordkeeping requirements and furnishes criteria for determining recordability. It presents an overview of the Department of Labor recordkeeping interpretations and guidelines which have been followed by most employers in making recordkeeping determinations since their original issuance in 1972.

3. *Determining the extent or outcome of recordable cases.* Employers must also determine the extent and outcome of the recordable cases. Part 1904.12(c) of the regulations provides the categories in which recordable cases must be classified. These categories are discussed at length in chapter VI.

A-1. Q. How do you differentiate between employees and independent contractors for recordkeeping purposes?

A. This should be evaluated on a case-by-case basis. Employee status generally exists when the employer supervises not only the output, product, or result to be accomplished by the person's work, but also the details, means, methods, and processes by which the work objective is accomplished.

Independent contractors are primarily subject to supervision by the using firm only in regard to the result to be accomplished or end product to be delivered.

Other factors which should be considered in determining employee status are: (1) Whom the worker considers to be his or her employer; (2) who pays the worker's wages; (3) who withholds the worker's Social Security taxes; (4) who hired the worker; and (5) who has the authority to terminate the worker's employment.

People considered independent contractors for other reasons may be considered employees for OSHA recordkeeping purposes.

A-2. Q. Sometimes, businesses use workers from temporary help supply services on a contract basis. Should the using firm record the injuries and illnesses of these temporary workers, or should the service?

A. If the temporary workers are being supplied for indefinite periods of time, or if they are subject to the supervision of the using firm, the temporary help supply service contractor is acting merely as a personnel department for the using firm, and the using firm must

keep the records for the personnel supplied by the service.

If the temporary workers are supplied for short periods, and remain subject primarily to the supervision of the supply service, the records must be kept by the service. (See question A-1 above for other considerations.)

A-3. Q. If an employee working in a plant on a contract basis is injured, is the injury recorded on the plant's records or on the records of the contractor?

A. In most situations, the contractor supervises the employee's general work activities and is responsible for maintaining the employee's injury and illness records.

There are exceptional situations, however, where the contractor has no responsibility for supervision of the employee's day-to-day work activities. In these cases, the using firm assumes responsibility for recording his or her injury and illness experience on its records; hours worked for this group of employees should also be obtained.

A-4. Q. Are independent truckdrivers operating on a contract basis considered employees of the company for which they are hauling?

A. Generally, these workers are not considered employees of the using firm. However, see the preceding questions for other factors to be considered in making this evaluation.

A-5. Q. Who is responsible for maintaining records in migrant labor camps?

A. Employing farmers are responsible for maintaining these records if they exercise supervision over the day-to-day work activities of the migrant laborers.

However, if the migrant workers are supplied to the farmers on a purely contractual basis, the farm labor contractors should maintain OSHA records for the migrant laborers. (See question A-1 above for the other considerations in making this determination.)

#### *B. Decisionmaking Authority for Recordkeeping Determinations*

1. *Delegation of authority by the Occupational Safety and Health Act of 1970 and Part 1904 of the Code of Federal Regulations.* Both the recordkeeping portion of the act and Part 1904 of the regulations are explicit in assigning recordkeeping responsibilities to employers. Section 8(c)(1) of the act requires employers to complete and preserve records of occupational injuries and illnesses:

Each employer shall make, keep and preserve, and make available to the Secretary or the Secretary of Health, Education, and Welfare, such records

regarding his activities relating to this Act as the Secretary, in cooperation with the Secretary of Health, Education, and Welfare, may prescribe by regulation as necessary or appropriate for the enforcement of this Act or for developing information regarding the causes and prevention of occupational accidents and illnesses.

In addition, Part 1904.2(a) of the regulations carefully states employer recordkeeping obligations:

Each employer shall, except as provided in paragraph (b) of this section, (1) maintain in each establishment a log and summary of all recordable occupational injuries and illnesses for that establishment; and (2) enter each recordable injury and illness on the log and summary as early as practicable. . . .

Parts 1904.4 and 1904.5 of the regulations describe employer responsibilities concerning the supplementary record and the annual summary.

2. *Requirement of good faith.* Although employers ultimately decide if and how a particular case should be recorded, their decision must not be an arbitrary one, but should be made in accordance with the requirements of the act, regulations, the instructions on the forms, and the guidelines in this report. Information from medical, hospital, or supervisors' records should be reviewed along with other pertinent information, and the employee should be interviewed to determine his or her medical condition and ability to perform normal job duties.

3. *Checks and balances within the recordkeeping system.* The validity of the records is enhanced by the involvement of all participants in the recordkeeping and reporting system. Employers need accurate and meaningful injury and illness information so that they can focus safety and health efforts on high-risk areas and activities to eliminate workplace hazards. Consequently, they should make every effort to accurately record their firm's injury and illness experience. In addition, OSHA periodically reviews workplace records to verify their accuracy. Further, the posting and access provisions in Part 1904 of the regulations allow employees to review the records to insure the validity of recordkeeping determinations. Chapter II of this report discusses the posting requirements; employee access is covered in chapter VIII.

4. *Penalties for recordkeeping violations.* Part 1904.9(a) provides the penalties for falsification of records or reports. This part incorporates the language of Section 17(g) of the act:

Whoever knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to this Act shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment, for not more than 6 months, or both.

Additional information is available on penalties for recordkeeping violations in chapter VIII.

**B-1. Q.** What entries, if any, need to be made in instances of employer-employee disputes involving State workers' compensation measures to determine the facts related to alleged injuries, illnesses, or deaths?

**A.** Workers' compensation determinations should not impact the OSHA recordability of cases under OSHA. Some cases may be covered by workers' compensation but are not recordable; others may be OSHA recordable but are not covered by workers' compensation. Cases should be evaluated solely on the basis of OSHA requirements.

**B-2. Q.** Who decides if an injured employee is capable of working?

**A.** This decision must be the employer's. There will be a few cases in which the employer and the employer's physician feel certain that an employee is perfectly able to work, but the employee disagrees. If the employer is absolutely certain about the case, it should not be entered on the log, OSHA No. 200. However, if the employer has any doubt about the case, it should be entered on the log and lined out later if it turns out that, in fact, the employee was able to perform his or her job. The employee may file a complaint if he disagrees with the employer's decision.

**B-3. Q.** Why does the employer always decide what is recordable? Why can't it be the company doctor since the doctor or the medical department usually decides whether an employee is capable of working after an injury?

**A.** The act says that the employer is responsible for keeping the records. The employer may delegate the responsibility to someone else, or may rely on the determination of a doctor. However, the decision is ultimately the employer's.

**B-4. Q.** Who has the legal liability for making recordkeeping determinations—the person who signs the forms, the local manager, or the company executive officer?

**A.** The liability belongs to the employer who is ultimately responsible for recording and reporting. Each of the aforementioned persons is a representative of the employer.

**B-5. Q.** The act states that whoever supplies false information is subject to

penalty. Does this cover both the employer and the employee if either knowingly supplies false information?

**A.** Most of the penalty provisions in Section 17 of the act apply to "any employer," but the penalty for false statements applies to "whoever knowingly makes any false statement. . . ." This has been interpreted by the Occupational Safety and Health Review Commission to include both employers and employees.

**B-6. Q.** How are disagreements on recordability or the extent of a case resolved when a dispute arises between an employer and an employee, or between an employer and an OSHA compliance officer?

**A.** Employers have the final responsibility for making bona fide recordkeeping determinations. However, employers' decisions may be challenged. Persons challenging these decisions may contact OSHA, who, in turn, will contact the employer. If no resolution can be obtained through discussions, the following steps are involved: (1) After examining the records and investigating the work situation, an OSHA compliance officer may request that the employer make changes in his OSHA records; (2) if the employer refuses, the compliance officer may recommend to the OSHA Area Director that a citation be issued; (3) if a citation is issued, the employer has an opportunity for an informal conference with the OSHA Area Director to present his viewpoint (the OSHA Area Director may uphold or reduce the proposed penalty as a result of this conference); (4) if the dispute remains unresolved, the employer can still contest the citation; (5) contested cases are litigated before an administrative law judge of the Occupational Safety and Health Review Commission; and (6) thereafter are subject to the statutory appeals process.

Employers and other parties interested in the enforcement process should contact their closest OSHA area office or their OSHA regional office. This process is described in detail in the OSHA pamphlet, *Employer Rights and Responsibilities Following an OSHA Safety Inspection*. Addresses and telephone numbers for OSHA regional offices are listed in appendix E of this report.

#### Chapter V. Analysis of Recordability of Cases

This chapter presents guidelines for determining whether a case must be recorded under the recordkeeping requirements of the Occupational Safety and Health Act of 1970, as well as how to classify recorded cases. These requirements should not be confused

with recordkeeping requirements of various workers' compensation systems, internal industrial safety and health monitoring systems, the ANSI Z.16 standards for recording and measuring work injury and illness experience, and private insurance company rating systems. Reporting a case on the OSHA records should not affect recordkeeping determinations under these or other systems. Also:

*Recording an injury or illness under the OSHA system does not necessarily imply that management was at fault, that the worker was at fault, that a violation of an OSHA standard has occurred, or that the injury or illness is compensable under worker's compensation or other systems.*

At the outset, it should be noted that the scope of recordability of the OSHA system detailed in this chapter is broader and more inclusive than that of most other recordkeeping systems. Some injuries and illnesses are included that may not be "compensable" in the workers' compensation context, or "recordable" under individual company safety and health recordkeeping systems. These cases were included in order to make the system as simple and equitable as possible. The alternative of developing a detailed list of exceptions for not recording specific injuries and illnesses was felt to impose far greater administrative and reporting burdens on most employers than requiring that a relatively small number of borderline cases be recorded. The relatively simple OSHA recording boundaries assure a valid, consistent, and uniform recordkeeping system that is capable of producing reliable statistical information.

The OSH Act provides a basic description of which cases are to be recorded. The recordkeeping regulations in 29 CFR Part 1904 provide specific recording and reporting requirements which comprise the framework of the OSH recordkeeping system. The regulations also expand upon the basic definition of recordability in the act.

In a few situations, the criteria of the act, regulations, or the guidelines listed in this report may seem inappropriate. However, it would be virtually impossible to enact legislation, draft regulations, or issue guidelines that address every possible recordkeeping situation. The recordkeeping system currently encompasses over 5 million workplaces throughout the United States. Wide variations exist in the training of individuals making recordkeeping determinations and the resources firms can allocate to the recordkeeping process. Recordkeeping

criteria must be sufficient to meet the needs of safety and health professional maintaining complex programs, while also remaining comprehensible to those maintaining records without the benefit of specialized safety and health training (such as some employers with small-sized establishments) and the approximately 75 million employees involved in the recordkeeping process through the posting and access provisions of the regulations.

Although generally well intentioned, employers or trade associations are discouraged from formulating their own guidelines for recordability which differ in substance from these guidelines or deviate from the OSHA regulations. If employers follow different guidelines, differences in interpretation might be injected into the system which could jeopardize the uniformity of the records and the validity of the statistical data. The BLS guidelines represent official agency interpretations of employer recordkeeping requirements. They provide recordkeeping principles that were developed through a cooperative effort between government, business, and labor prior to and following the implementation of the act, and have been followed by most employers in making recordkeeping determinations since their issuance in 1972. The guidelines provide the Department of Labor's interpretation of the requirements of the OSH Act and regulations, and are considered supplemental instructions to the recordkeeping forms.

Employers with questions on OSHA recordkeeping and reporting not specifically addressed in this report should contact the State agency cooperating with BLS in administering the recordkeeping program or the BLS regional or National offices.

#### A. Method Used for Case Analysis

Sections 8(c)(2) and 24(a) of the Occupational Safety and Health Act provide the basic definition of the types of cases to be recorded:

... work-related deaths, injuries and illnesses other than 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.

Part 1904.12(c) of the *Code of Federal Regulations* contains a definition of recordable injuries and illnesses which follows this language and incorporates criteria for determining the extent or outcome of these cases. Under this part,

injuries and illnesses are classified as deaths, lost-time cases, or non-lost-time cases.

The definition of a recordable case in the heading of the log (OSHA No. 200) reflects the language of the act and regulations:

**RECORDABLE CASES:** You are required to record information about every occupational death; every nonfatal occupational illness; and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid).

This definition provides sufficient guidance for the analysis of the vast majority of cases under the OSHA recordkeeping system. Chart I presents this methodology in graphic form and outlines the line of thought employers should apply in deciding whether or not to record a particular case. Only a very small proportion of the cases require additional criteria to determine recordability.

The decisionmaking process consists of five steps:

1. Determine whether a case occurred; that is, whether there was a death, illness, or an injury;
2. Establish that the case was work related; that it resulted from an event or exposure in the work environment;
3. Decide whether the case is an injury or an illness;
4. If the case is an illness, record it and check the appropriate illness category on the log;
5. If the case is an injury, decide if it is recordable based on a finding of medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

#### B. Determining Whether or Not a Case Occurred

The first step in the decisionmaking process is the determination of whether or not an injury or illness occurred. Employers have nothing to record unless an employee has experienced a work-related injury or unless a work-related illness is recognized. In most instances, recognition of these injuries and illnesses is a fairly simple matter. However, some of the following situations have troubled employers over the years.

**B-1. Q.** If an injury or illness occurs, does it matter for the purposes of recordability who was at fault in causing the accident or illness exposure?

**A.** No. Fault plays no role in the OSHA recordkeeping system. Injury and

illness statistics produced by such a system would not accurately reflect overall worker experience (i.e., it would be missing those cases reported for which employers are not at fault) and consequently would not satisfy the coverage requirements of the Occupational Safety and Health Act of 1970. Section 2(b)(12) of the act states that one of its purposes is to provide for appropriate reporting procedures "... which will accurately describe the nature of the occupational safety and health problem." Sections 8(c)(2) and 24(a) of the act specifically define what is a recordable injury. They make no distinction between incidents that are compensable under State workers' compensation laws, incidents caused by employer neglect, incidents that are preventable, or the random incidents that seem to happen when no one is at fault.

In addition, there are serious practical limitations. Recording cases on the basis of fault would necessitate the introduction of extremely complex recording criteria to be evaluated by both employers and employees. And whose judgment would prevail as to who was at fault in causing the injury or illness? Such determinations would almost certainly result in employers and employees contesting a significant number of recordkeeping decisions.

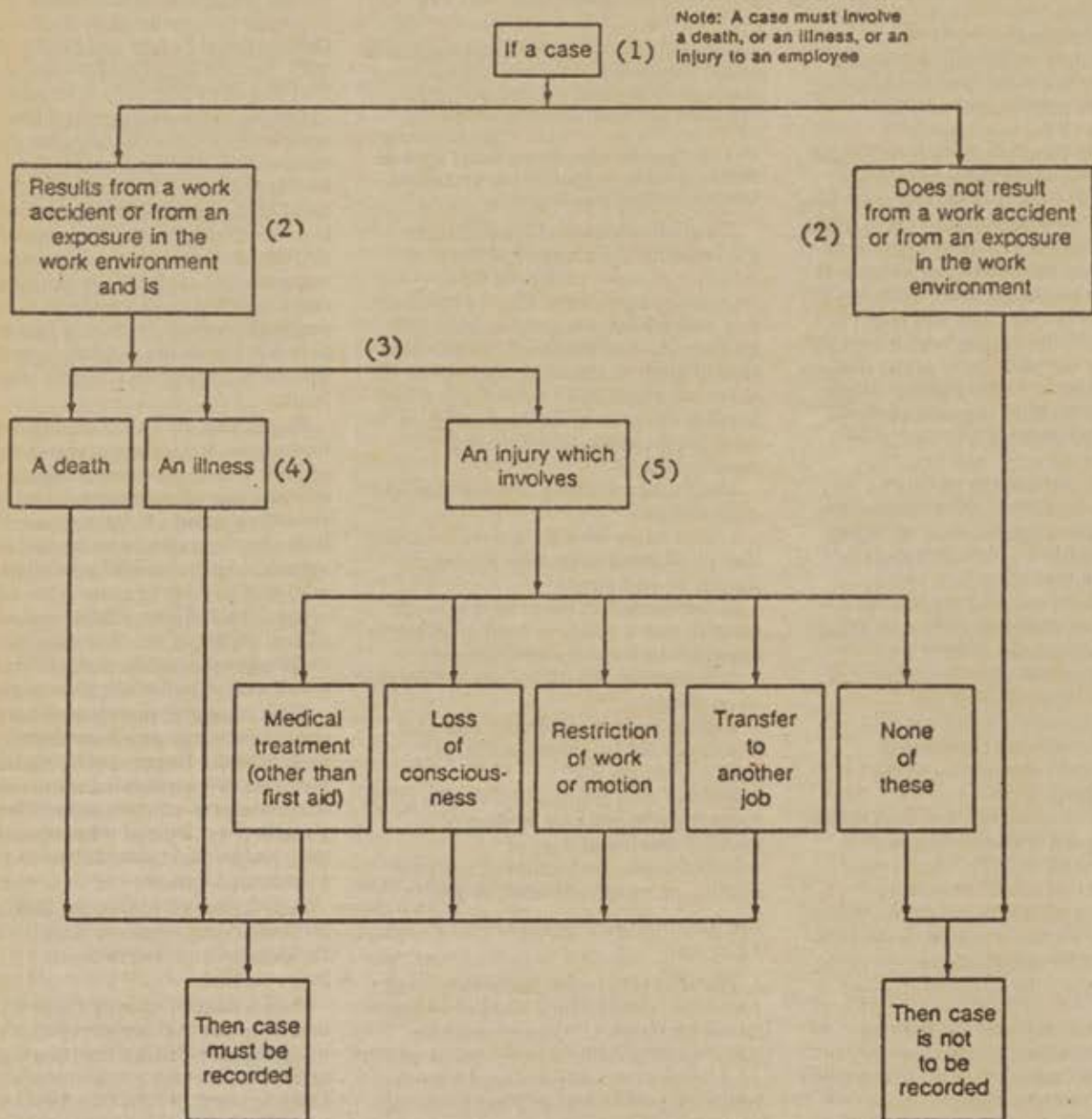
The concept of fault has never been a consideration in any recordkeeping system of the Department of Labor, nor has it been incorporated into various State workers' compensation systems or statistical systems of other agencies such as the American National Standards Institute.

**B-2. Q.** Does it matter for OSHA recordkeeping purposes whether or not the injuries and illnesses are preventable?

**A.** No. Recording only those injuries and illnesses that are preventable would not produce sufficient information to meet the coverage requirements of the OSH Act and 29 CFR Part 1904, nor would it satisfy the needs of the Occupational Safety and Health Administration for comprehensive injury and illness information. Focusing on whether or not the injuries and illnesses experienced were preventable would result in employers and employees contesting a significant number of recordkeeping decisions, and would unduly complicate many recordkeeping determinations.

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**Chart 1. Guide to Recordability of Cases Under the Occupational Safety and Health Act**



**B-3. Q.** Must an employee be involved in a specific job task for an injury or illness to be recordable?

**A.** No. For a case to be recordable, the worker must have been an employee of the firm at the time of the injury or illness exposure. Workers are considered employees while in pay status. In this context, pay status refers to the overall employment relationship whereby the worker is receiving wages or some other form of compensation for the employer for services rendered. It does not mean that the worker must be involved in some specific job task at the time of the injury or illness exposure for the case to be recordable, or that cases are recordable only if they occur during hours for which wages are paid. (See section C of this chapter for a discussion of work relationship.)

**B-4. Q.** Are cases recordable if they are discovered after the injured or ill employee has been terminated or has retired?

**A.** These cases are recordable throughout the 5-year record retention period (see chapter III), so long as the employee was on active duty or in pay status when the injury or illness exposure occurred. The worker does not need to be an active employee or in pay status at the time the case is recorded. Such cases should be recorded on the log of the year of the injury or illness exposure.

**B-5. Q.** Are there time limits in recording cases. Suppose a worker says he hurt his back 2 weeks ago, but there was no record or report of it at that time. Is it subsequently recordable on this OSHA No. 200?

**A.** Yes. If it is established that a recordable back injury did occur, it must be included on the OSHA No. 200, even though the determination was made several weeks after the injury occurred. The actual date of injury should be entered in column B of the log.

Employers are required to make entries on the OSHA logs for all recordable injuries and illnesses experienced by their employees. This obligation exists not only during the year that the injury or illness exposure took place, but also throughout the 5-year maintenance and retention period. (See chapter III, sections D and E.)

**B-6. Q.** Are exposures to harmful substances recordable?

**A.** These exposures, in and of themselves, are not recordable under Part 1904 of the regulations. Entries on the log, OSHA No. 200, and on the supplementary record, OSHA No. 101, need be made only when the exposure results in a recordable work injury or illness.

However, in addition to the general recording requirements in Part 1904, some specific OSHA standards or State regulations may require the recording of exposures to particular substances. These requirements are not addressed in this report. Employers should consult the appropriate OSHA standards or State regulations to ascertain their additional recordkeeping obligations.

**B-7. Q.** Are permanent or temporary transfers to another job to remove employees from further exposure to hazards considered recordable cases for the purposes of OSHA recordkeeping?

**A.** If these transfers are preventive in nature, and if no work-related illness has occurred, they are not considered recordable events.

Employers usually make such transfers either: (1) To control the amount of employee exposure during a specific period of time, or (2) to remove an employee from an area to control adverse health effects.

**B-8. Q.** If a driver involved in an auto accident is sent for a physical examination without any specific injury, should the case be recorded?

**A.** This would be in the nature of preventive medicine and would not be recorded unless the examination reveals that a recordable injury resulted from the accident.

**B-9. Q.** If a hospital employee contracts an illness from a patient and all employees in the hospital unit are inoculated to prevent spread of the illness, is each person so treated considered a recordable case?

**A.** No. Such cases would not be recordable because the employees are receiving preventive care and are not injured or ill. Of course, the case of the hospital employee who contracted the illness should be recorded.

**B-10. Q.** Is hospitalization for observation recordable?

**A.** If an employee goes to or is sent to a hospital for a brief period of time for observation, it is not recordable, provided that no medical treatment was given, or no illness was recognized. While hospitalization for observation under these circumstances is not recordable on the OSHA 200 form, if 5 or more such hospitalizations occurs as the result of a single incident at a worksite, the incident shall be reported to OSHA within 48 hours. (See 29 CFR 1904.8, chapter VII, section B of these guidelines, or the OSHA Field Operation Manual Instructions.)

**B-11. Q.** What if the employee is admitted to the hospital or stays in the hospital for observation for several hours? Is this still not recordable?

**A.** These cases are recordable. The focus, however, is not on the length of

the stay, but on whether medical treatment was provided or whether the incident is recordable on one of the other grounds. Prolonged hospital stays are usually associated with the more serious cases and often involve some form of medical treatment, even though they may be initiated for primarily diagnostic purposes.

**B-12. Q.** How do you differentiate between a new incident and the recurrence or further complication of a previous injury or illness? What is the difference between these two situations for OSHA recordkeeping purposes?

**A.** Employers are required to make new entries on their OSHA forms for each new recordable injury or illness. New entries should not be made for the recurrence of symptoms from previous cases.

*Injuries.* The aggravation of a preexisting injury almost always results from some movement by the employee. Consequently, when work-related, these new incidents should be recorded as new cases on the OSHA forms, assuming they meet the criteria for recordability described in sections C, D, and E of this chapter.

*Illnesses.* Deciding whether the emergence of illness symptoms constitutes a new event or the recurrence of a previous illness is more complex. Generally, each occupational illness should be recorded with a separate entry on the OSHA No. 200. However, certain illnesses, such as silicosis, may have prolonged effects which recur over time. The recurrence of these symptoms should not be recorded as a new case on the OSHA forms.

The recurrence of symptoms of previous illnesses may require adjustment of entries on the log for previously recorded illnesses to reflect possible changes in the extent or outcome of the particular case.

**B-13. Q.** Should an employee's pre-existing condition be taken into account in making OSHA recordkeeping determinations?

**A.** Pre-existing conditions are not considered relevant in making determinations of recordability under the OSH Act except for the recurrence of symptoms of work-related illnesses discussed in B-12 above. Employers should record each case resulting from an event (such as a slip, trip, fall, or overexertion) and each exposure that results in a recordable work injury or illness regardless of the employee's pre-existing condition. This is essential to the maintenance of a workable system that produces statistics that accurately reflect the incidence (and not

prevalence) of work injuries and illnesses.

**B-14. Q.** Does this mean that when an employee is hired with a known physical defect, such as a trick knee, a work accident partially attributable to this defect would result in a recordable case?

**A.** Yes. An employee's physical defect or pre-existing physical condition does not affect the determination of recordability. If such a case results from an event or exposure in the work environment and meets the other criteria for recordability, the employer must enter it on the OSHA forms without regard to the employee's pre-existing physical condition. If injury results solely from a physical defect (i.e., employee falls while walking when trick knee gives way AND there is no environmental factor), it is *not* occupational. However, if the work environment or a work event contributes (i.e., employee steps on stone or slips, trick knee gives way, and he falls), any resulting injury is occupational.

**B-15. Q.** Are there specific requirements for evaluating the occurrence of back or hernia cases?

**A.** No. Back and hernia cases should be evaluated in the same manner as any other case. Questions concerning the recordability of these cases usually revolve around: (1) The impact of a previous back or hernia condition on the recordability of the case, or (2) whether or not the back injury or hernia was work related.

Pre-existing conditions generally do not impact the recordability of cases under the OSHA system. (See preceding questions 13 and 14.)

For a back or hernia case to be considered work related, it must have resulted from a work-related event or exposure in the work environment. Employers may sometimes be able to distinguish between back injuries that result from an event in the work environment, and back injuries that are caused elsewhere and merely *surface* in the work environment. The former are recordable; the latter are not. (See section C of this chapter for a discussion of work relationship.)

**B-16. Q.** An employee's back goes out while performing routine activity at work. Assuming the employee was not involved in any stressful activity, such as lifting a heavy object, is the case recordable?

**A.** Particularly stressful activity is not required. If an event occurred in the work environment that caused or contributed to the injury, the case would be recordable, assuming it meets the other requirements for recordability.

**B-17. Q.** Must there be an identifiable event or exposure in the work environment for there to be a recordable case? What if someone experiences a backache, but cannot identify the particular movement which caused the injury?

**A.** Usually, there will be an identifiable event or exposure to which the employer or employee can attribute the injury or illness. However, this is not necessary for recordkeeping purposes. If it seems likely that an event or exposure in the work environment either caused or contributed to the case, the case is recordable, even though the exact time or location of the particular event or exposure cannot be identified.

If the backache is known to result from some nonwork-related activity outside the work environment and merely surfaces at work, then the employer need not record the case. In these situations, employers may want to document the reasons they feel the case is not work related.

**B-18. Q.** What about cases where the employee alleges that an injury or illness has occurred? Must employers record these cases without any medical verification?

**A.** Medical verification is not required for recordability. However, employers have ultimate responsibility for making good-faith recordkeeping determinations. If an employer doubts the validity of an employee's alleged injury or illness and there is no substantive or medical evidence supporting the allegation, the employer need not record the case.

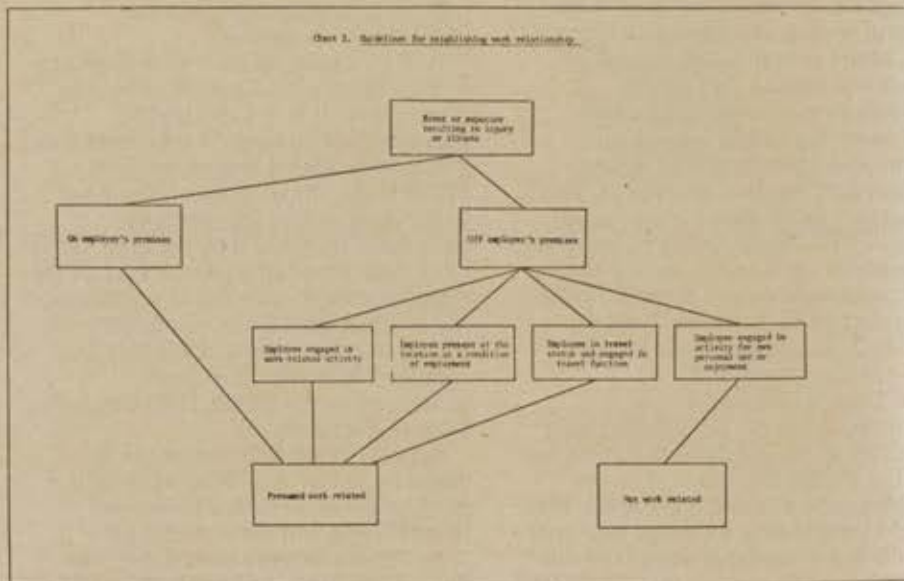
**B-19. Q.** Must occupational injuries and illnesses that are disputed be recorded?

**A.** Within 6 workdays after receiving information that an injury or illness has occurred, the employer must determine whether the case is recordable. Questionable cases should be entered on the log, OSHA No. 200, and lined out at a later date if they are found not recordable.

### C. Establishing Work Relationship

Work relationship is the next requirement for recordability. The Occupational Safety and Health Act of 1970 requires employers to record injuries and illnesses that are work related. *Work relationship is established under the OSHA recordkeeping system when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: (1) The employer's premises, and (2) other locations where employees are engaged in work-related activities or are present as a condition of their employment.* When an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed. The employer's premises encompass the total establishment. This includes not only the primary facility, but also such areas as company storage facilities and restricted company parking lots. In addition to physical locations, equipment, or materials used in the course of an employee's work are also considered part of the employee's work environment.

Chart 2 provides a guide for establishing the work relationship of cases.



1. *Injuries and illnesses resulting from events or exposures on the employer's premises.* Generally, injuries and illnesses that result from an event or exposure on the employer's premises are considered work related. The employer's premises consist of the total establishment. They include the primary work facility and other areas which are considered part of the employer's general work area.

C-1. Q. Are injuries of employees in company restrooms, hallways, or cafeterias considered to be work related?

A. Yes. These areas are generally all considered to be part of the employer's premises and constitute part of the work environment. Injuries occurring in the work environment are considered work related. The specific activity the employee was engaged in at the time of the injury is not the controlling factor.

C-2. Q. Do the employer's premises include employer controlled recreational facilities such as company ball fields, golf courses, etc.?

A. For OSHA recordkeeping purposes, the definition of work premises excludes employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, and other similar recreational facilities which are *basically apart from the workplace and dedicated primarily to employee use during off-work hours.* However, recreational facilities located within the work environment are included as part of the work premises. These may include company controlled gymnasiums, handball courts, racketball courts, etc. *that are located within the work facility.*

C-3. Q. Are company parking lots considered part of the employer's work premises?

A. Parking facilities that are generally accessible to both employees and members of the general public are not considered part of the employer's work premises. Therefore, injuries to employees on these public parking lots are not recordable unless the employee was engaged in some specific work activity. However, injuries to employees on parking lots restricted to employee and visitor use only would be considered on premises and hence presumed work related.

Visitor parking spaces are distinguished from parking for general public by the firm's ability to limit or revoke driver access.

C-4. Q. An employer neither owns nor leases the property on which he conducts his business operations. Under the regulations, would the property be

considered part of the employer's premises?

A. The determination of whether a particular location constitutes part of the employer's premises depends upon whether the location is considered part of the employer's domain, not whether he owns or leases it. As a general rule, if the site is part of an establishment of the employer, it is considered part of his premises.

An establishment is a single physical location where business is conducted or where services or industrial operations are performed.

C-5. Q. Is a right-of-way used by a utility company considered to be part of the utility company's premises?

A. Yes. A utility company has a sufficient relationship to these rights-of-way to have them considered part of its premises. Injuries and illnesses occurring to utility workers in these areas are presumably work related.

C-6. Q. What about cases that occur on the premises during nonduty hours? If a case occurs either before or after normal work hours, or on the weekends and holidays when work is not scheduled, is it recordable?

A. Presence on the employer's premises is normally sufficient to establish work relationship. It does not matter whether or not the incident occurs during regular working hours if the worker is present to perform some job task or receive some employment benefit, or if his presence is in some way *related to his status as an employee.* (For further clarification, see the answers to questions C-9 and C-10.)

C-7. Q. Is every case resulting from an event or exposure on the employer's premises considered work related?

A. No. The general rule is that all injuries and illnesses which result from events or exposures occurring to employees on the employer's premises are presumed to be work related. Under the recordkeeping system, the premises include the total establishment. The nature of activity which the employee is engaged in at the time of the event or exposure, the degree of employer control over the employee's activity, the preventability of the incident, or the concept of fault do not affect the determination.

There are cases which occur on the employer's premises and which do not seem to have anything to do with the work but which must still be recorded to maintain the simplicity of the recording criteria and the integrity of the statistics. Some examples are: employee chokes while eating lunch in company cafeteria; injuries resulting from employee

horseplay; and, an employee injured while playing basketball in the company gymnasium during lunch break. These are included to keep relatively simple recording boundaries necessary for maintaining a workable system which can be used by the 5 million employers and 75 million employees subject to the recordkeeping regulations.

C-8. Q. Under the OSHA recordkeeping system, work relationship is presumed when the employee is on the employer's premises. Is this presumption rebuttable? If so, describe some situations where the employee's presence on the premises would not be sufficient, by itself, to establish work relationship.

A. The presumption is rebuttable. One situation where the presumption would not apply would be where a worker is on the employer's premises as a member of the general public and not as an employee. (See question C-9, for a further description of these situations.) Another example would be a case, with symptoms that merely surface on the employer's premises, where the symptoms are the result of a nonwork-related event or exposure off premises. (See questions B-15 and B-17 for the application of this type of analysis to back cases.)

C-9. Q. How do you determine those situations where a worker is off duty and is on the employer's premises as a member of the general public and not as an employee? For example, a department store employee returns to the store during off-duty hours solely to shop and is injured. Is this case work related?

A. No. The case is not work related. For cases such as this to be recordable, there must be some relationship between the person's presence on the premises and his or her status as an employee. Employers should ask themselves: Would the person have been on the premises but for the fact that he or she was an employee? It is important to note that the focus is on the *status* of the person as an employee, not on the activity the person was engaged in at the time of the event or exposure.

The example provided above is not recordable because the worker was present on the premises solely to shop; his presence on the premises had no relationship whatsoever to his status as an employee. Any member of the general public could come into the store to shop. This exclusion applies even if the employee is receiving some employment benefit such as an employee discount in a department store, or using public restrooms while on the employer's work facilities for

personal reasons, e.g., filling station employee working on his or her own car. Identical cases which occur when an employee is in work status would, however, be considered work related and hence recordable. The following situations illustrate cases where there is sufficient connection between an off-duty employee and the job to establish work relationship:

1. The employee is injured on the premises while going to or from a work shift.

2. The employee is injured on the premises while picking up a pay check during off-duty hours.

3. An employee is injured on the premises during lunch or coffee breaks.

C-10. Q. Please define "premises" for the trucking industry. Is the cab of the truck the premises? What about loading and unloading? Is the area around the truck used for loading and unloading considered part of the premises?

A. A truck on the road or loading and unloading away from its home base would be off the employer's premises. However, injury or illness exposures experienced during these activities would still be work related because the employees are engaged in work-related activities. The truck and its surroundings are considered part of the work environment even though they are not part of the employer's premises.

C-11. Q. Why record injuries and illnesses other than those that occur during the execution of a specific work assignment undertaken at the direction of management?

A. The stated purpose of the Occupational Safety and Health Act of 1970 requires a broader scope of coverage than "the execution of specific work assignments." Section 2 of the act addresses injuries and illnesses arising out of "work situations." Sections 2(b)(1), (2), and (4) of the act refer to "place of employment" and the provisions of safe and healthful "working conditions." Section 2(b)(7) of the act deals with preventing employee ill health as a result of the "work experience." Section 2(b)(12) states that one of the purposes of the act is to provide for appropriate reporting procedures "... which will accurately describe the nature of the occupational safety and health problem." These and other references throughout the act indicate that its coverage is intended to go beyond specific job tasks to encompass the total work environment.

In addition, the inclusion of these cases is necessary for the maintenance of a simple and equitable recordkeeping system capable of furnishing statistically reliable information.

C-12. Q. Do employers have to record an injury on the employer's premises that occurs to an employee as a result of horseplay? Would they have to record a case if it resulted from a robbery?

A. Yes. Both would be recordable. Activities on the employer's premises are presumed to be work related. The basis for determining work relationship for OSHA recordkeeping purposes is that the event occurred in the work environment.

Sections 8(c)(2) and 24(a) of the OSH Act specifically define recordable injuries and illnesses. They make no distinction between incidents that are compensable under State workers' compensation laws, incidents that are caused by worker negligence, incidents caused by employer neglect, incidents that are preventable, or the random incidents that seem to happen when no one is at fault.

2. *Injuries and illnesses resulting from events or exposures off premises.* When an employee is off the employer's premises and suffers an injury or an illness exposure, work relationship must be established; it is not presumed. Injuries and illness exposures off premises are considered work related if the employee is engaged in a work activity or if they occur in the work environment. The work environment in these instances includes locations where employees are engaged in job tasks or work-related activities, or places where employees are present due to the nature of their job or as a condition of their employment.

C-13. Q. Our employees participate in many off premises activities such as picnics, impromptu softball games at noon, bowling leagues at night, and a football team which plays its games on weekends. If any of our employees are injured in these activities and require medical treatment, should the injuries be recorded?

A. They need only be recorded if they are connected with the injured person's job. If the employees are paid for sports activities or are required by their employer to participate, any resulting injuries are work related and should be recorded. If not, the injuries which occur are not recordable, even though the employer may be providing uniforms and equipment.

C-14. Q. Is a case recordable if an employee is injured while walking to work on a public sidewalk from a public parking lot? What if an employee gets into a fight or is attacked in this situation?

A. These cases do not appear to be work related since the injuries did not occur in the work environment, and the employees were not engaged in work-

related activities. Public places are generally not part of the work environment unless the employee has begun work and is performing a work-related activity, or is present at the public location as a condition of his or her employment. For example, the work environment for a route salesperson may include public streets, highways, sidewalks, etc.

C-15. Q. Would an injury which took place after a person checked into work, but occurred while he or she was off the company premises on an errand be recordable?

A. This case is recordable if the employee was engaged in a work-related activity or if the person's presence at the location of the injury was required by his or her job. If the errand was personal in nature, the injury should not be recorded.

C-16. Q. Are the employee's activities off the employer's premises all deemed work related once the employee's work shift has begun?

A. No. Work relationship must be established for employee activities off premises—it is not presumed. To be engaged in a work-related activity off premises, the employee must have been performing some job, task, or service for the employer, or must have been present at the off-premises location in connection with his or her employment. If the employee is off the employer's premises, and leaves the normal area of operations entirely for his or her own purpose, then these activities would not be considered work related.

C-17. Q. Is an injury occurring during the lunch of an employee working off the employer's premises in nontravel status considered work related?

A. This case would be work related if it occurred in the off-premises work environment or if it was a work-related luncheon.

C-18. Q. Are injuries considered work related when they occur to employees who work on the employer's premises, but leave the premises for lunch and are injured?

A. No. Injuries occurring to employees while they are off the employer's premises and out of the work environment on lunch are not recordable unless the luncheon is in some way required by their job.

C-19. Q. How are employees in travel status handled differently?

A. All of the employee's activities required by the trip are considered to be work related. The rationale is that the traveling employee would not be exposed at this location but for the travel requirement of his or her job.

An employee's work-related activities on a business trip include such necessary travel-related functions as eating, sleeping and traveling. However, extraneous activities unrelated to the normal scope of the trip and solely for the employee's own personal use or enjoyment should not be recorded. Examples of these non-recordable events would be injuries on excursions, such as ski trips, or injuries which occur in public places when the employee is there for recreational purposes only.

C-20. Q. Are there any time limitations imposed on the work relationship designation for employees in travel status?

A. An employee in travel status is considered to be in the work environment 24 hours a day. However, see question C-19 above for the substantive limitations.

C-21. Q. When is work relationship first established for an employee in travel status? When he or she leaves home? At the airport, train station, etc.?

A. For recordkeeping purposes, work-related activities begin when the employee leaves home, assuming the employee did not intend to report to his or her office prior to beginning the trip. If the employee first reports to the office, travel status begins when the employee leaves the office to begin the trip. Travel status ends once the employee returns to the point of origin of the trip. (Employers should refer to questions A-12-14 in chapter I for a discussion of the geographic coverage limitations on travel status.)

C-22. Q. How do you differentiate between employees working off premises in nontravel status and employees in travel status?

A. Employees off premises in nontravel status still work within their normally scheduled hours and normal geographic area of operation. Employees in travel status must either be: (1) Outside their normal area of operation, or (2) working off premises for more than a normal workday (such as staying overnight).

#### D. Distinguishing Between Injuries and Illnesses

Under the OSH Act, all work-related illnesses must be recorded, while only those injuries which required medical treatment (other than first aid), or involve loss or consciousness, restriction of work or motion, or transfer to another job are recordable. The distinction between injuries and illnesses, therefore, has significant recordkeeping implications.

The determination of whether a case involves an injury or illness is determined by the nature of the original

event or exposure which caused the case, not by the resulting condition of the affected employee. Injuries are caused by *instantaneous* exposures in the work environment. Cases resulting from anything other than instantaneous events are considered illnesses. This concept of illnesses includes acute illnesses which result from exposures of relatively short duration.

An occupational injury is defined on the back of the log and summary form, OSHA No. 200, as follows:

*Occupational Injury* is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from an exposure involving a single incident in the work environment.

**Note.**—Conditions resulting from animal bites, such as insect or snake bites, or from one-time exposure to chemicals are considered to be injuries.

A single incident involving a *one-time instantaneous* exposure to chemicals is classified as an injury. Occupational injuries are analyzed in detail in the following section of this chapter.

An occupational illness is defined on the back of the log and summary form, OSHA No. 200:

*Occupational Illness* of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact.

Some conditions may be classified as either an injury or an illness (but not both), depending upon the nature of the event that produced the condition. For example, a loss of hearing resulting from an explosion (an instantaneous event) is classified as an injury; the same condition arising from exposure to industrial noise over a period of time would be classified as an occupational illness. Similarly, irritation of the throat from exposure to chlorine gas fumes could be classified as either an injury or an illness. If the exposure was instantaneous and occurred when a cylinder of gas ruptured, the case would be considered an injury. The case would be an illness if the employee was exposed to the agent over time, such as working in an area where chlorine fumes from a bleaching process were present.

This seeming inconsistency in recording certain types of cases has its foundation in industrial safety practice. The safety measures required to avoid instantaneous events are considered fundamentally different from those required to prevent exposures over a period of time which result in conditions of ill health. The classification of a case as an injury or an illness is intended to reflect this distinction.

D-1. Q. Should an adverse reaction to a tetanus shot given for a laceration be classified as an injury or an illness?

A. This should be classified as an injury because the classification is based on the original event—the laceration—not on the subsequent developments.

D-2. Q. Should the following two cases be recorded differently; if so, what is the rationale behind the differentiation?

a. Lacerations resulting from a chemical explosion.

b. A respiratory ailment resulting from a chemical explosion.

A. Both of these cases would be classified as injuries because of the nature of the original event, a chemical explosion.

D-3. Q. How do you distinguish an injury from an illness? For example, it appears that a burn can be one or the other.

A. The basic definition of an occupational injury includes those cases which result from a work accident or from an exposure involving a *single instantaneous incident* in the work environment. Contact with a hot surface or a caustic chemical which produces a burn in a single instantaneous moment of contact is an injury. Sunburn or welding flash burns which result from prolonged exposure to sunrays or welding flashes are considered illnesses. Similarly, a one-time blow which damages the tendons of the hand is considered an injury; while repeated trauma or repetitious movement which produces tenosynovitis is considered an illness.

The basic determinant is the single-incident concept. If the case resulted from something that happened in one instant, it is classified as an injury. If the case resulted from something that was not instantaneous, such as prolonged exposure to hazardous substances or other environmental factors, it is considered an illness.

D-4. Q. How should back cases be classified—as injuries or illnesses? What about a situation where an employee complains of his back hurting, but is unable to associate it with a single instantaneous event?

A. Back cases should be classified as injuries because they are usually triggered by an instantaneous event.

Classifying back cases as injuries is appropriate not only for cases resulting from identifiable events, but also for cases where the specific event cannot be pinpointed, since back cases are usually triggered by some specific movement. Such generalizations are necessary to keep recordkeeping

determinations as simple and equitable as possible.

D-5. Q. Should carpal tunnel syndrome be classified as an injury or an illness?

A. Carpal tunnel syndrome is a condition involving compression of the median nerve in the wrist which results in tingling, discomfort, and numbness in the thumb, index, and long fingers. Because carpal tunnel syndrome cases almost always result from repetitive movement, they should be classified as occupational illnesses. The entry for these cases should be in column 7(f) of the log for disorders associated with repeated trauma.

D-6. Q. Is the following case recordable? A chemical worker contracted a mild case of dermatitis on both hands while working in a solution for several hours. The employee was sent to the doctor, who recommended application of a topical lotion (a commercial, nonprescription remedy). The employee bought a bottle of the lotion and treated the rash for a few days until it disappeared. There were no subsequent visits to the doctor. The rash did not prevent the employee from performing all the duties of the job.

A. The case is a recordable occupational illness. The answer to this question is based on the distinction between an injury and an illness. If considered an injury, the case would not be recordable since no medical treatment was provided. However, since the case almost certainly did not involve a single instantaneous exposure, it should be classified as an occupational illness. Consequently, the kind of treatment given by the doctor (none in this case) is immaterial, since all occupational illnesses are recordable.

#### E. Recording Occupational Illnesses

The Occupational Safety and Health Act of 1970 and the recordkeeping regulations in 29 CFR Part 1904 require employers to record the occurrence of all occupational illnesses. However, neither the act nor the regulations provide a precise definition of what constitutes an occupational illness.

An occupational illness is defined in the instructions on the back of the log and summary form, OSHA No. 200:

Occupational illness of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact.

The instructions also refer to recording illnesses which were "diagnosed or recognized."

Therefore, for OSHA recordkeeping purposes occupational illnesses include any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. Illness exposures ultimately result in conditions of a chemical, physical, biological, or psychological nature.

Occupational illnesses must be diagnosed to be recordable. However, they do not necessarily have to be diagnosed by a physician or other medical personnel. Diagnosis may be by a physician, registered nurse, or a person who by training or experience is qualified to make such a determination. Employers, employees, and others may be able to detect some illnesses, such as skin diseases or disorders, without the benefit of specialized medical training. However, a case more difficult to diagnose, such as silicosis, would require evaluation by properly trained medical personnel.

In addition to recording the occurrence of occupational illnesses, employers are required to record each illness case in 1 of the 7 categories on the front of the log.

The back of the log form contains a listing of types of illness or disorders and gives examples for each illnesses category. These are only examples, however, and should not be considered as a complete list of types of illnesses under each category. See Appendix A—Glossary of Terms for a list of these illness categories.

Recording and classifying occupational illnesses is difficult for employers, especially the chronic and long term latent illnesses. Many illnesses are not easily detected; and it is often difficult to determine whether an illness is work related. Also, employees may not report illnesses because the symptoms may not be readily apparent, or because they do not think their illness is serious or work related.

Lack of expertise in occupational medicine is not limited to employers and employees. Few doctors in private practice have adequate training in occupational medicine. Even physicians in the workplace have difficulty determining the influence of a job on a worker's health.

The following material is provided to assist in detecting occupational illnesses and in determining their work relationship.

#### 1. Detection and diagnosis of occupational illnesses.

An occupational illness is defined in the instructions on the log as any work-related abnormal condition or disorder

(other than an occupational injury). Detection of these abnormal conditions or disorders, the first step in recording illnesses, is often difficult. When an occupational illness is suspected, employers may want to consider the following:

a. A routine medical examination of the employee's physiological systems; e.g.,

- Head and neck;
- Eyes, ears, nose and throat;
- Endocrine;
- Genitourinary
- Musculoskeletal;
- Neurological;
- Respiratory;
- Cardiovascular; and
- Gastrointestinal.

b. Observation and evaluation of behavior related to emotional status;

c. Specific examination for health effects of suspected or possible disease agents by competent medical personnel;

d. Comparison of date of onset of symptoms with occupational history;

e. Evaluation of results of any past biological or medical monitoring (blood, urine, other sample analysis) and previous physical examinations; and

f. Evaluation of laboratory tests: routine (complete blood count, blood chemistry profile, urinalysis) and specific tests for suspected disease agents (e.g., blood or urine tests for specific agents, chest or other X-rays, liver function tests, pulmonary function tests).

In addition the National Institute for Occupational Safety and Health (NIOSH) has prepared a Sentinal Health Event (Occupational) List (SHEO) which encompasses disease conditions potentially linked to the workplace. A Sentinal Health Event is defined by NIOSH as a disease, disability, or untimely death which is occupationally-related and whose occurrence may: 1) provide the impetus for epidemiologic or industrial hygiene studies; or 2) serve as a warning signal that materials substitution, engineering control, personal protection, or medical care may be required. The list includes only those conditions for which NIOSH found "objective documentation of an associated agent, industry, and occupation . . . in the scientific literature." NIOSH has indicated that the list will be expanded in the future.

Appendix C of this report contains a table of work-related illnesses based upon the NIOSH Sentinal Health Event List. The table is provided for information purposes only to assist employers in recognizing certain illnesses and diseases. The table lists illness conditions, the industry and/or

occupation where each condition is likely to occur, symptoms associated with each condition, the agent likely to cause the condition, and the appropriate illness column to be checked on the log. OSHA No. 200. *IT DOES NOT INCLUDE EVERY CONDITION, ILLNESS, OR DISEASE THAT MAY RESULT FROM AN EXPOSURE IN THE WORK ENVIRONMENT. FURTHER, IT SHOULD NOT BE INTERPRETED TO MEAN THAT A SPECIFIC CONDITION CAN ONLY BE CONTRACTED IN THE INDUSTRIES OR OCCUPATIONS LISTED. IT ALSO DOES NOT MEAN THAT EVERY CONDITION LISTED IS RECORDABLE IF EXPERIENCED BY EMPLOYEES IN THESE INDUSTRIES AND/OR OCCUPATIONS. FOR THE CASE TO BE OSHA RECORDABLE, EMPLOYERS MUST STILL ESTABLISH THAT THE CONDITION IS A RESULT OF AN EXPOSURE IN THEIR WORK ENVIRONMENT.*

2. Determining whether the illness is occupationally related.

The instructions on the back of the log define occupational illnesses as those "caused by environmental factors associated with employment". In some cases, such as contact dermatitis, the relationship between an illness and work-related exposure is easy to recognize. In other cases, where the occupational cause is not direct and apparent, it may be difficult to accurately determine whether an employee's illness is occupational in nature. In these situations it may help employers to ask the following questions:

- Has an illness condition clearly been established?
- Does it appear that the illness resulted from, or was aggravated by, suspected agents or other conditions in the work environment?
- Are these suspected agents present (or have they been present) in the work environment?
- Was the ill employee exposed to these agents in the work environment?
- Was the exposure to a sufficient degree and/or duration to result in the illness condition?
- Was the illness attributable to a non-occupational exposure?

Employers may want to check the "material data sheet" for those substances suspected of causing employee illnesses to verify the relationship between the exposure and the resulting symptoms.

E-1. Q. Should employers record only those occupational illnesses which require treatment beyond the initial day of onset of illness?

A. No. Any diagnosed occupational illness reported to the employer is recordable, whether or not medical treatment is given or lost workdays are involved.

E-2. Q. Do occupational illnesses have to be diagnosed by a physician to be recordable?

A. No. "Diagnosis" is commonly defined as the act or process of deciding the nature of a diseased condition by examination of the symptoms. Diagnosis may be by a physician, registered nurse, or a person who by training or experience is qualified to make such a determination.

E-3. Q. Does this mean that employers are capable of diagnosing occupational illnesses?

A. Yes. However, their ability to properly diagnose cases depends upon their training and experience and the nature of the particular illness in question. Employers, employees, and others may be able to detect various illnesses, such as skin diseases or disorders, without the benefit of specialized medical training. However, a case more difficult to diagnose, such as silicosis, would require evaluation by properly trained medical personnel.

E-4. Q. What is meant by an "abnormal condition or disorder"?

A. An "abnormal condition or disorder" is an atypical condition of the employee which may be of either a chemical, physical, biological, or psychological nature. These conditions are recordable when they result from exposure in the work environment.

E-5. Q. Are the illnesses listed in appendix C the only illnesses that need be recorded on the log, OSHA No. 200?

A. No. These are a listing of disease conditions of which NIOSH found objective documentation of association between occupation/industry/agent in the scientific literature. In addition to the Sentinel Health Event (Occupational) List, many other abnormal conditions or diseases may be OSHA recordable.

E-6. Q. Do employers record only those illnesses directly caused by work-related exposures, or is it sufficient for the work exposure to be a contributing factor to an illness or to aggravate a pre-existing illness condition?

A. Yes, it is sufficient for the exposure to be a contributing and/or aggravating factor to the illness.

E-7. Q. What are the reporting requirements for test results which indicate an elevated blood-lead level?

A. Employers are required to conduct surveillance and monitoring tests for employees working with hazardous substances, such as lead. However, test results showing elevated blood-lead

levels are not recordable in and of themselves. See question E-10 below.

On the other hand, employers are still required to record cases where the worker: (1) Has symptoms of lead poisoning, such as colic, nerve, or renal damage, anemia, and gum problems; or (2) receives medical treatment for lead poisoning or to lower blood-lead levels. Usually, elevated blood-lead levels above 50 micrograms per 100 grams of whole blood are accompanied by some of the recordable symptoms of lead poisoning mentioned above.

Employers may want to reference the OSHA lead standard 29 CFR 1910.1025 for additional information.

E-8. Q. The chest X-ray of an employee is found to have an abnormality due to a prolonged exposure at work. However, the abnormality does not impair his lung function or cause him to lose workdays. Is this a recordable occupational illness?

A. Yes. An occupational illness is defined as any abnormal condition or disorder, other than one resulting from an injury, caused by exposure to environmental factors associated with employment. Any such abnormality reported to the employer is recordable, whether or not functional impairment is present or lost workdays are involved.

E-9. Q. Is fibrosis the only asbestos-related disorder that must be recorded on the OSHA No. 200?

A. No. Asbestos-related disease encompasses not only fibrosis, but also various cancers of the lung, stomach, and pleural lining and asbestos-induced pleural abnormalities (e.g., pleural plaques and calcifications).

E-10. Q. What is the basis for the distinction between the recordability of asbestos-related disorders and the nonrecognition of elevated blood-lead levels for recordkeeping purposes?

A. Identifiable asbestos-related abnormalities constitute abnormal conditions or disorders of the affected employee. Elevated blood-lead levels are considered a precursor to the illness, and are recordable if accompanied by any other conditions which are indicative of lead poisoning. The overall biological effect—lead toxicity—constitutes the illness that is recordable. (See question E-7 for other recordable symptoms of lead poisoning.)

E-11. Q. Is hearing loss recordable? If so, how should it be recorded?

A. Hearing loss should be evaluated solely on the existing criteria for recordability contained in the Occupational Safety and Health Act and 29 CFR Part 1904. Once work-related hearing loss is established, it may be classified as either an injury or an

illness, depending upon the type of event or exposure which caused the loss. If the hearing loss resulted from or was aggravated by an instantaneous exposure, it is considered an injury, and is recordable only if it involves medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job. If the hearing loss resulted from or was aggravated by anything other than an instantaneous exposure it should be classified as an occupational illness. All job-related illnesses are recordable.

E-12. Q. Is this case recordable? An employee goes to a doctor who informs her that prescription glasses must be worn as a result of work-related eye deterioration caused by the nature of her job.

A. Assuming that work relationship could be established, this case would be recordable as an occupational illness since it involves the recognition of an abnormal condition or disorder. However, employers should distinguish work-related eye problems from those due to aging or heredity factors unrelated to the job.

E-13. Q. How should a massive heart attack be classified?

A. Work-related heart attacks are classified as illnesses because they normally do not result from work accidents or single instantaneous incidents in the work environment. When they occur, an entry should be made in column 7(g) of the log under "All other occupational illnesses".

E-14. Q. Must a heart attack occur in the work environment to be recordable?

A. Heart attacks must satisfy the same requirements for work relationship as any other type of illness before they are recordable on the OSHA No. 200. Under the OSHA system, this does not mean that heart attacks are recordable if they occur in the work environment, but rather that they must result from an exposure in the work environment. (See section C of this chapter for an analysis of work relationship.)

E-15. Q. How should a work-related illness, diagnosed as stress, be classified? Is this a disorder associated with repeated trauma?

A. "Disorders associated with repeated trauma," column 7(f) of the log, OSHA No. 200, involve conditions caused by repeated contact or repetitious movement. Cases involving work-related stress should be classified as "All other occupational illnesses" in column 7(g) of the log.

E-16. Q. Is high blood pressure recordable?

A. High blood pressure is an abnormal condition or disorder. Consequently, it is recordable if it can be attributed to

exposure in the work environment. Cases of high blood pressure should be classified as "All other occupational illnesses" in column 7(g) of the log.

E-17. Q. Does the difference in individual tolerances to specific substances affect decisions on recordability?

A. No. Variations in the characteristics of particular employees or their susceptibility to various illnesses should not affect decisions of recordability. If a recordable illness occurs, employers should enter it on the OSHA No. 200.

#### *F. Deciding if Work-Related Injuries Are Recordable*

Although the act requires that all work-related deaths and illnesses be recorded, it limits the recording of injuries to certain specific types of cases. Sections 8(c)(2) and 24(a) of the act refer to maintaining records for work injuries "... other than 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." Consequently, a work-related injury must involve at least 1 of these 4 conditions before it is deemed recordable. Minor injuries requiring only first aid treatment are not recordable.

1. *Medical treatment.* It is important to understand the distinction between medical treatment and first aid treatment since many work-related injuries are recordable only because medical treatment was given.

Part 1904.12(d) of the regulations and the instructions on the back of the log and summary, OSHA No. 200, define medical treatment as any treatment, other than first aid treatment, administered to injured employees. Essentially, medical treatment involves the provision of medical or surgical care for injuries that are not minor through the application of procedures or systematic therapeutic measures.

The act also specifically states that work-related injuries which involve only first aid treatment must *not* be recorded. Therefore, the definition of first aid treatment has important implications for evaluating potential medical treatment cases. First aid is commonly thought to mean emergency treatment of injuries before regular medical care is available. However, first aid treatment has a different meaning for OSHA recordkeeping purposes. Part 1904.12(e) of the regulations defines first aid treatment as:

any one-time treatment, and any followup visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care.

Such one-time treatment, and followup visit for the purpose of observation is considered first aid even though provided by a physician or registered professional personnel.

The distinction between a medical treatment and first aid depends not only on the treatment provided, but also on the severity of the injury being treated. First aid is: (1) Limited to *one-time treatment* and subsequent observation; and (2) involves treatment of only *minor injuries, not emergency treatment of serious injuries.* Injuries are *not* minor if:

(a) They can be treated *only* by a physician or licensed medical personnel;

(b) They impair bodily function (i.e., normal use of senses, limbs, etc.);

(c) They result in damage or harm to the physical structure of a nonsuperficial nature (e.g., hairline fractures); or

(d) They involve complications requiring follow up medical treatment.

Physicians or registered medical professionals, working under the standing orders of a physician, routinely treat minor injuries. Such treatment constitutes first aid. Also, some visits to a doctor do not involve treatment at all. For example, a visit to a doctor for an examination or other diagnostic procedure to determine whether the employee has an injury does not constitute medical treatment. Conversely, medical treatment can be provided to employees by someone other than a physician or registered medical personnel.

The following classifications list certain procedures as either medical treatment or first aid treatment. These criteria are also listed in the one-page Recordkeeping Summary provided in appendix F.

The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable.

- Treatment of INFECTION
- Application of ANTISEPTICS during second or subsequent visits to medical personnel
- Treatment of SECOND OR THIRD DEGREE BURN(S)
- Application of BUTTERFLY ADHESIVE DRESSING(S)
- Applications of SUTURES (stitches)
- Removal of FOREIGN BODIES EMBEDDED IN EYE
- Removal of FOREIGN BODIES from wound; if procedure is COMPLICATED because of depth of embedment, size, or location
- Use of PRESCRIPTION MEDICATIONS

- Use of hot or cold SOAKING THERAPY during second or subsequent visit to medical personnel
- Application of hot or cold COMPRESS(ES) during second or subsequent visit to medical personnel
- CUTTING AWAY DEAD SKIN (surgical debridement)
- Application of HEAT THERAPY during second or subsequent visit to medical personnel
- Use of WHIRLPOOL BATH THERAPY during second or subsequent visit to medical personnel
- POSITIVE X-RAY DIAGNOSIS (fractures, broken bones, etc.)
- ADMISSION TO A HOSPITAL or equivalent medical facility for treatment or prolonged observation.

The following are generally considered first aid treatment (e.g., one-time treatment and subsequent observation of minor injuries) and need not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job:

- Application of ANTISEPTICS during first visit to medical personnel
- Treatment of FIRST DEGREE BURN(S)
- Application of BANDAGE(S) during any visit to medical personnel
- Use of ELASTIC BANDAGE(S) during first visit to medical personnel
- Removal of FOREIGN BODIES NOT EMBEDDED IN EYE if only irrigation is required
- Removal of FOREIGN BODIES from wound, if procedure is UNCOMPLICATED, and is, for example, by tweezers or other simple technique
- Use of NONPRESCRIPTION MEDICATIONS
- SOAKING THERAPY ON INITIAL VISIT to medical personnel or removal of bandages by SOAKING
- Application of hot or cold COMPRESS(ES) during first visit to medical personnel
- Application of OINTMENTS to abrasions to prevent drying or cracking
- Application of HEAT THERAPY during first visit to medical personnel
- Use of WHIRLPOOL BATH THERAPY during the first visit to medical personnel
- NEGATIVE X-RAY DIAGNOSIS
- BRIEF OBSERVATION of injury during visit to medical personnel

The following procedure, by itself, is considered medical treatment:

- Administration of TETANUS SHOT(S) or BOOSTER(S). However, these shots are often given in conjunction with the more serious injuries; injuries

requiring tetanus shots may be recordable for other reasons.

2. *Loss of consciousness.* If an employee loses consciousness as the result of a work-related injury, the act requires that the case be recorded no matter what type of treatment was provided. The rationale behind this requirement is that loss of consciousness is generally associated with the more serious injuries.

3. *Transfer to another job.* Injuries requiring transfer of the employee to another job are also considered serious enough to be recordable regardless of the type of treatment provided. Transfers are seldom the sole criterion for recordability because injury cases are almost always recordable on other grounds, primarily medical treatment or restriction of work or motion.

4. *Restriction of work or motion.* Restriction of work or motion is the fourth criterion specified by the act for determining whether an injury is serious enough to be recorded. The decision that a case involves restricted work activity should be made solely on the rules set forth in Part 1904.12(f) of the *Code of Federal Regulations* and in the instructions to the Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200. The central concept established in these sections is that restricted work activity occurs when the employee, because of the impact of a job-related injury or illness, is physically or mentally unable to perform *all or any part* of his or her normal assignment during *all or any part* of the workday or shift. The emphasis is on the employee's *ability* to perform normal job duties. Restriction of work or motion may result in either a lost worktime injury or a nonlost worktime injury, depending upon whether the restriction extended beyond the date of injury. This distinction is discussed at length in chapter VI.

Restriction of work or motion sometimes is the sole reason for recording a case. For example, if an employee suffers a cut on a joint of the first finger and the wound requires only a small bandage, the bandage may prevent bending the finger. This case involves a work-related injury, but is it recordable? The employer can reasonably conclude that no medical treatment was involved nor was there any loss of consciousness or transfer to another job. The case would be recordable only if it involves restriction of work motion; that is if the motion that was limited affected the employee's ability to perform his or her normal job duties. It is important to differentiate that concept from limitation of motion in

the abstract. In this situation, the case would be recordable if it involved a typist who was unable to type, but probably not if it involved an executive.

F-1. Q. Are all first aid injury cases nonrecordable?

A. Medical treatment is only one criterion for determining whether or not injuries are recordable. Injuries which require only first aid treatment are recordable if they involve loss of consciousness, restriction of work or motion, or transfer to another job.

F-2. Q. Our plant does not have a nurse available on the second and third shifts. Injuries on these shifts are sent to the hospital. If this is the only time the injury is treated, does it have to be recorded?

A. If medical treatment is administered, the case is recordable. If only first aid treatment is administered, then the case is not recordable. (See the definitions in the preceding narrative section.) The *kind of treatment* which is, or should have been, provided is the determining factor, not the place or person providing the treatment.

F-3. Q. Can medical treatment be provided by anyone other than a physician or trained medical personnel?

A. The regulations have been interpreted to mean that medical treatment may be administered by medical or nonmedical personnel. The treatment is the main factor to consider in distinguishing medical treatment from first aid, not the person who is administering it.

In distinguishing between medical treatment and first aid, Congress intended to focus on the seriousness of the injury. Doctors or medical personnel often provide first aid treatment for minor injuries; nonmedical personnel often provide medical treatment for certain injuries that are relatively serious in nature.

F-4. Q. If an employee is treated in the medical department for an injury such as a cut, burn, etc., but does not need a doctor's care, does a report need to be made of the injury?

A. If the case comes under the definition of "medical treatment" rather than "first aid," a record would have to be maintained. On the other hand, first aid treatment would not be recorded, even if given by a doctor. Again, the key factor to be considered is the type of treatment which was, or should have been, provided, not the person administering it.

F-5. Q. Does the requirement for recording medical-treatment injuries encompass only those injuries where the treatment was actually provided to the individual?

A. This requirement focuses on whether the injury was serious enough that medical treatment was actually provided or should have been provided. Cases should be recorded where medical treatment was *clearly* required, but for one reason or another, was not actually provided.

F-6. Q. When are bruises experienced by employees considered recordable?

A. When they are serious enough to involve 1 of the 4 criteria for recording injuries—medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

F-7. Q. How are fractures classified? What about a hairline fracture that is given no treatment and does not interfere with the employee's work activities?

A. Injuries resulting in fractures should be recorded because they are not minor in nature and ordinarily require medical treatment or involve restriction of work or motion. This is in keeping with the mandate of the Occupational Safety and Health Act of 1970 to record all injuries that are not minor.

F-8. Q. Are injuries that result in chipped or broken teeth recordable?

A. These injuries would normally be recordable due to their relative severity and the fact that they ordinarily require medical treatment.

F-9. Q. What about situations where an employee damages a prosthetic device, such as an artificial arm or leg? Is this recordable?

A. Generally, situations such as this are recordable if they involve either some form of medical treatment or restriction of work or motion.

F-10. Q. If there is more than one followup visit to a doctor for minor cuts or burns, is such an injury recordable?

A. If the second visit is simply for observation or to change an adhesive or small bandage, the injury would not be recorded. It would be recorded, however, if any medical treatment was provided.

F-11. Q. What if an employee is injured and loses worktime in traveling to or from a doctor's office for a medical examination? Does this loss of worktime constitute restriction of work or motion, and make the case recordable for OSHA purposes?

A. Injuries should be evaluated on the extent of medical treatment required, not on the amount of time spent seeking treatment. If the examination revealed that no medical treatment was required, the case would not be recordable. Restriction of work or motion concerns the employee's ability to perform normal job duties; it does not include loss of worktime for travel to or from a doctor's office.

F-12. Q. If an employee has a minor scratch but the doctor gives him a tetanus shot anyway, does this constitute medical treatment and make it a recordable case?

A. Such tetanus shots should not be regarded as medical treatment. Consequently, the case would not be recordable unless other treatment was provided.

F-13. Q. Do rabies vaccinations constitute medical treatment?

A. Yes. Rabies vaccinations constitute medical treatment since they are considered absolutely necessary and involve a series of injections far more extensive than the concept of first aid contemplated in the act and defined in the regulations.

F-14. Q. Is treatment given by chiropractors considered medical treatment?

A. Yes. This is considered medical treatment since it involves considerably more extensive treatment than first aid as defined in Part 1904.12(e) of the regulations.

F-15. Q. Is it considered medical treatment when prescription medications are given solely as prevention measures for minor injuries or for patient comfort?

A. The use of prescription medications is considered medical treatment. This is because prescription medications are normally used in connection with the more serious injuries. The use of nonprescription medications for minor injuries or solely preventive purposes do not constitute medical treatment.

There may be a few situations where this distinction may seem inappropriate. However, the generalization is necessary to provide reasonable guidance while keeping the recording criteria as simple as possible.

F-16. Q. What about prescription drugs provided to employees solely for psychological care? Should this be considered medical treatment?

A. If the prescription medications are being provided in connection with job-related stress, the medical treatment issue would be irrelevant since the stress case would be considered an occupational illness. All occupational illnesses are recordable.

F-17. Q. Suppose a nonprescription medication is dispensed to an employee with a minor injury, who then suffers an adverse reaction. Is this recordable? If so, is it an injury or an illness?

A. This case should be considered an injury since the case determination must relate back to the original event. This is because the affected employee would not have suffered the adverse reaction to the medication *but for* the occupational injury. Initially, the case

was not recordable because the provision of a nonprescription medication does not constitute medical treatment. *THE CASE MAY NOW BE RECORDABLE.* To be recordable, the adverse reaction must have been serious enough to require additional medical treatment or involve loss of consciousness, restriction of work or motion, or transfer to another job.

#### G. Relationship of OSHA Recordkeeping Requirements to Those of State Workers' Compensation Systems

OSHA recordkeeping and reporting requirements differ from those established under various State workers' compensation laws. Differences exist in both the mechanics of the recordkeeping process and in the criteria used for evaluating the recordability of individual cases. Section 4(b)(4) of the act states:

Nothing in this Act shall be construed to supersede or in any manner affect any workmen's compensation law or to enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of or in the course of employment.

Consequently, recordkeeping determinations under the OSH Act should not affect the employer obligations under State workers' compensation systems. Also, workers' compensation criteria should not be substituted for OSHA definitions in determining whether or not a case should be recorded under the OSHA system. Although the OSHA system is fundamentally different from various compensation systems, qualifying workers' compensation first report forms may be substituted for the OSHA No. 101, the Supplementary Record of Occupational Injuries and Illnesses. To qualify for this purpose, the workers' compensation form must contain all of the items on the OSHA No. 101 or be supplemented to do so. This is permitted to eliminate duplicate recording whenever possible. Chapter III, section C of this report provides a detailed discussion of the requirements for potential substitutes for the supplementary record.

It should be stressed that allowance of the substitution of forms is in no way indicative of any comparability in the recordkeeping criteria between the two systems. In instances where State workers' compensation forms are being used in lieu of the OSHA No. 101, employers must still adhere to the

differences in recordkeeping definitions. There may be instances where the employer will have to prepare a form for an OSHA recordable case even though the State workers' compensation law does not require that a report be prepared or vice versa.

G-1. Q. Does a workers' compensation insurance carrier have any responsibility or liability under the OSH Act other than to its own employees?

A. No. Aside from recordkeeping obligations pertaining to its own employees, a workers' compensation insurance carrier has no responsibility for the OSHA recordkeeping of its clients.

G-2. Q. Is there any connection between OSHA records and reports and the reporting requirements of State workers' compensation acts?

A. No. The only relationship between the systems pertains to the forms used. To eliminate duplicate recordkeeping, most State workers' compensation agencies have revised their first report forms to make them acceptable as substitutes for the OSHA No. 101, the Supplementary Record of Occupational Injuries and Illnesses. See chapter II, section C for a discussion of the requirements for the supplementary record.

G-3. Q. What entries, if any, need to be made on the OSHA records in instances of employer-employee disputes involving contested cases under State workers' compensation systems?

A. Workers' compensation determinations have no direct bearing on the recordability of cases under OSHA. Some cases are covered by workers' compensation but are not OSHA-recordable; others are recordable under OSHA but are not covered by workers' compensation.

For example, many cases that do not involve lost worktime may be OSHA-recordable, but may not be recordable under State workers' compensation systems. Each case should be evaluated and recorded solely on the basis of OSHA recordkeeping criteria.

G-4. Q. Should employers wait to record cases on the OSHA forms if the cases are being contested under workers' compensation?

A. No. Employers are required to record cases on the OSHA forms no later than 6 working days after receipt of information that a recordable injury or illness has occurred. If a case is recordable under the OSHA system, an entry must be made on the OSHA records without any regard to the status of the case under workers' compensation.

G-5. Q. Won't recording a case on the OSHA records bias the outcome of contested workers' compensation cases?

A. No. Because of the significant differences between the two systems, recording injuries and illnesses on the OSHA forms should have no effect on cases litigated under workers' compensation. Section 4(b)(4) of the OSH Act provides that the provisions of the act will not affect workers' compensation liability.

#### Chapter VI. Evaluating of the Extent of Recordable Cases

Once the employer decides that a recordable injury or illness has occurred, the case must be evaluated to determine its extent or outcome. Part 1904.12(c) of the regulations provides the three categories of recordable cases: Fatalities, lost workday cases, and cases without lost workdays. Every recordable case must be placed in only one of these categories.

##### A. Fatalities

The Occupational Safety and Health Act of 1970 and part 1904 of the regulations require the recording of all work-related fatalities. Part 1904.12(c)(1) states that recordable occupational injuries and illnesses include fatalities, regardless of the time between the injury and the death, or the length of the illness.

A-1. Q. An employee has an occupational illness which keeps him away from work for 6 months. At the end of that time, he dies as a result of the illness. How should the case be recorded on the log?

A. Any entries in the lost workday illness columns 9 through 12 of the log should be lined out, and the date of death should be entered in column 8.

Injury-related fatalities that were initially recorded as lost worktime should be treated in a similar manner. Entries in the lost workday injury columns 2 through 5 should be lined out, and the date of death entered in column 7.

A-2. Q. Must an employee's death occur in the work environment for the case to be recorded as a work-related fatality?

A. No. Cases are recordable as work-related fatalities when the death results from an event or exposure that occurs in the work environment. The employee need not actually die in the work environment.

A-3. Q. Do employers have any recording or reporting obligations for fatalities other than making the appropriate entries on the OSHA No. 200?

A. Yes. Part 1904.8 of the regulations requires that employers report within 48 hours the occurrence of job-related fatalities to their OSHA area office. This subject is discussed in chapter VII.

A-4. Q. What constitutes death for OSHA recordkeeping purposes? What if a person suffers "brain death," but is maintained on life support systems?

A. For OSHA recordkeeping purposes, death occurs when the injured or ill employee's condition is such that a death certificate is issuable by the State or territory which has jurisdiction. In some States, a death certificate would be issued for cases involving "brain death," in others it would not.

A-5. Q. What is the appropriate date of death to be entered in these cases?

A. The date entered in column 1 or column 8 of the log should be the date of death entered on the death certificate.

##### B. Lost workday cases

Parts 1904.12(c)(2) and 1904.12(f) of the regulations provided the definition of lost workday cases. These cases are generally the most serious nonfatal injuries and illnesses. They occur when the injured or ill employee experiences either days away from work, days of restricted work activity, or both. In these situations, the injured or ill employee is affected to such an extent that: (1) Days must be taken off from the job for medical treatment or recuperation; or (2) the employee is unable to perform his or her normal job duties over a normal work shift, even though the employee may be able to continue working.

Injuries and illnesses are not considered lost workday cases unless they affect the employee *beyond* the day of injury or onset of illness. When counting the number of days away from work or days of restricted work activity, do not include: (1) The initial day of injury or onset of illness, or (2) any days on which the employee would not have worked even though able to work.

1. *Lost workday cases involving days away from work* are cases resulting in days the employees would have worked but could not because of the job-related injury or illness. The focus of these cases is on the employee's inability, because of injury or illness, to be present in the work environment during his or her normal work shift.

2. *Lost workday cases involving days of restricted work activity* are those cases where, because of injury or illness, (1) the employee was assigned to another job on a temporary basis, or (2) the employee worked at a permanent job less than full time, (3) the employee worked at his or her permanently assigned job but could not perform all the duties normally connected with it.

Restricted work activity occurs when the employee, because of the job-related injury or illness, is physically or mentally unable to perform *all or any part* of his or her normal assignment during *all or any part* of the normal workday or shift. The emphasis is on the employee's *inability* to perform normal job duties over a normal work shift.

B-1. Q. An employee is injured at the beginning of the normal work shift and misses the remainder of the workday. Is this a lost workday case?

A. This would not constitute a lost workday case unless the employee was unable to perform his or her normal work duties on a subsequent workday or work shift. Injuries and illnesses are not considered lost workday cases unless they affect the employee *beyond* the day of injury or onset of illness.

B-2. Q. Suppose an employee is injured on Thursday and is unable to return to work until the following Wednesday. How would the lost workdays be counted?

A. The count of lost workdays should not include the day of injury or onset of illness, or any days on which the employee would not have worked even though able to work. Therefore, assuming the employee normally worked Monday through Friday, this case would involve 3 lost workdays. Thursday would not be counted since it was the day of injury. Saturday and Sunday would not be counted because the employee does not normally work on the weekend. Friday, Monday, and Tuesday *would* be counted because they are normally scheduled workdays.

B-3. Q. If normal work schedules encompass overtime (6 days), are the overtime days counted as lost workdays?

A. Yes. If the employee would have worked the overtime days had he or she not been injured, then the days should be counted.

B-4. Q. How does the employer count lost workdays for employees who are off the job due to a work stoppage or strike?

A. Lost workdays include only those days in which the injured or ill employee would have worked but could not. Thus, no lost workdays are counted if he or she would not have worked because of a work stoppage.

B-5. Q. How is a lost workday case that carries over into the next year recorded? For instance, how should a case be recorded where an employee is injured in December 1984 and is still out on January 31, 1985?

A. Two important points are involved: (1) One case should not appear in the records for 2 different years; and (2) it is important not to lose the count of the

number of lost workdays, which is a measure of the severity of the case.

On the 1984 log, the employer should estimate the number of workdays the employee is expected to lose in 1985 and add them to the count of workdays lost in 1984. When the employee returns to work and is able to perform all the duties of his or regular job or the count of lost workdays is otherwise ended, the actual count of lost workdays (days away from work and any days of restricted activity) should be verified, and the entry on the 1984 log should be corrected as necessary.

B-6. Q. An employee is injured on Wednesday and, due to the injury, is unable to work on Thursday and Friday of that week. The plant is closed for the next 2 weeks and all employees are on vacation. The employee is still injured and would not have been able to work if the plant had been in operation. Should the paid vacation time be counted as lost workdays for this employee?

A. No. In this case, the lost workdays consist of the 2 days beyond the day of injury or onset of illness during which the employee would normally have worked but could not do so. The employee was not scheduled to work during the period that the plant closed down for vacation. Any workdays lost due to the injury after the 2-week vacation period ended should also be counted as lost workdays.

B-7. Q. An employee suffers a work-related injury which renders him temporarily unable to work. If the employee elects to reschedule his vacation for time off to recuperate, in lieu of using sick leave, should the days away from work still be counted as lost workday?

A. Yes. These days should be counted as lost workdays if the vacation was not scheduled prior to the injury. The substitution of vacation leave for sick leave does not alter the fact that the employee was unable to work as a result of the injury.

B-8. Q. When do lost workdays cease to accumulate for injured employees who have long-term medical restrictions (i.e., such as no lifting over 30 pounds) but have returned to work?

A. If such restrictions prevent them from performing any of their normally assigned duties, then each day that they cannot perform all of their regular duties should be counted as a day of restricted work activity. However, if long-term restrictions result in permanent assignments to modified jobs, the count of days of restricted work activity ceases once the transfer or modification is made permanent.

B-9. Q. Should occupational illnesses be recorded differently than injuries

when they result in termination or permanent transfer?

A. Yes. If workdays were lost, the case would be recorded as a lost workday illness case and identified as a termination or permanent transfer by placing an asterisk next to the check in the appropriate illness column. If no workdays were lost, the illness would still be identified with an asterisk and be recorded as an illness without lost workdays. Terminations and permanent transfers are identified only for occupational illnesses.

B-10. Q. How are lost workday cases affected by termination of employment?

A. Termination of employment may stop the count of lost workdays if unrelated to the employee's injury or illness. However, if a termination results from an employee's injury or illness, the case would come within the definition of a lost workday case. (Days away from work are those days the employee would have worked but could not because of the injury or illness. Days of restricted work activity occur when the injury or illness renders the employee unable to perform all or any part of his or her normal assignment during all or any part of the workday or shift.) If an employee's injury or illness results in his being terminated, the case should be recorded as a lost workday case and an estimate should be made of the total number of workdays that would have been lost had the employee not been terminated. This is necessary to provide an accurate measure of the severity of the case.

B-11. Q. How are lost workdays counted in cases where the injured or ill employee retires before resuming all of his or her normal duties?

A. These cases should be treated in the same manner as other termination cases. If the retirement was unrelated to the injury or illness, the count of lost workdays would normally stop upon the employee's scheduled retirement. If the retirement was a result of the injury or illness, the case should be recorded as a lost workday case and an estimate should be made of the total number of days that would have been lost had the employee not retired. This is necessary to provide an accurate measure of the severity of the case.

B-12. Q. How are lost workdays counted for cases that end in total disability?

A. Practical considerations govern the count of lost workdays in total disability cases. Lost workdays should be counted for these cases until a final determination is made that the injured or ill employee is totally disabled.

B-13. Q. An employee experiences a bona fide lost-time injury on a construction job. Before the employee is able to return to work, the project is completed and the construction firm moves on to another job. How is this recorded on the OSHA No. 2007?

A. The case is recorded and the count of lost workdays continues until the employee is able to resume his normal job duties. The firm's movement to another construction site does not affect the employer's obligation.

B-14. Q. How should a case be recorded when the injured employee does not report back to work even though the company doctor and/or his doctor has given him permission to do so?

A. The concept of lost worktime focuses on the employee's *ability* to perform all of his or her normal duties for all of the normal work shift. Therefore, employers need not record lost workdays when an injured employee is able to resume work, but simply refuses to do so.

B-15. Q. How are lost workdays recorded in situations where the injured employees do not return to work or contact their employer after the day of injury?

A. If the injury was work-related, then lost workdays should be estimated and counted.

B-16. Q. In some areas, State or local health laws require employees to take time off from work when injured or once they are exposed to toxic substances. When this occurs, should this be recorded as lost worktime for the purposes of OSHA recordkeeping?

A. Whether or not a case is recordable as involving days away from work or days of restricted work activity centers on the employee's *ability* to perform all of his or her normal job duties. In some of these situations, the employee's inability to work is a result of the injury or illness. These cases *should* be recorded as lost time cases either involving days away from work or days of restricted work activity. In others, the lost time may be due solely to adherence to State and local health codes. These cases would clearly *not be* recordable as involving lost worktime. Each of these cases should be evaluated separately on its own merits.

B-17. Q. Suppose that an employee experiences a minor injury—requiring first aid only—but the injury is such that the person cannot perform normal duties for 2 or 3 days. Is the case recordable? If so, how should the case be recorded?

A. Such a case would be recordable because it meets 1 of the 4 requirements for recording injuries: *Restriction of work or motion*. Once recorded, the case

should be classified as a lost workday case involving days of restricted work activity.

B-18. Q. Should time away from the job for visits to a doctor on days following the day of injury be recorded as lost worktime involving restricted work activity?

A. Restricted work activity occurs when the employee, because of a job-related injury or illness, is physically or mentally unable to perform *all or any part* of his or her normal assignment during *all or any part* of the normal workday or shift. Since the emphasis is on the employee's *ability* to perform, time off to obtain medical attention is not considered to be restricted work activity. If an employee is able to perform all normal work duties during all normal workdays or shifts following the day of injury or onset of illness, then absence from work for visits to doctors' offices or clinics to receive medical attention should *not* be recorded as a lost workday case involving restricted work activity.

The following hypothetical situations illustrate restricted work activity concepts. Assume that all cases are work related.

1. On Monday, an employee severely cuts his hand while on the job. He receives medical treatment on the date of injury. Tuesday morning, the employee goes to a doctor's office, is examined, and is released to return to work. He arrives at work 3 hours after his normal starting time and is able to complete the remainder of his shift. This case would be recorded as a nonfatal case without lost workdays. It would *not* be recorded as a restricted work activity case, even though the employee missed a portion of his normal work shift on Tuesday, because the employee's *ability* to perform his normal work duties on Tuesday was not impaired.

2. Assume another injury occurs with exactly the same facts as stated in number 1, except that the injury is such that the employee cannot perform *all* of his normal job functions on Tuesday. This case *would* be recorded as a lost time case involving restricted work activity. The employee's *inability* to perform at work was the key factor, not the time spent at the doctor's office.

3. Another injury occurs in the plant on Monday, with an employee severely straining her wrist. She receives medical treatment on the date of injury. Despite the injury, the employee can perform all her normal work duties on Monday. The employee reports to work on Tuesday, performs all her duties until her wrist begins to ache, then reports to the doctor's office in the afternoon where she is examined and sent home. This

case *would* be recorded as a lost workday case involving restricted work activity. The employee was able to perform all her duties, but was unable to complete a full workday due to the effect of the injury. Her inability to perform all her duties over the subsequent *normal work shift* constitutes restricted work activity.

4. An employee working in a remote location was involved in an accident and was sent by the employer to get medical attention. The doctor examined and treated the employee. The employee spent the entire day following the accident traveling to and from the doctor's office. At all times, the employee was able to perform all the duties of his job. This is *not* a lost workday case since the loss of worktime was a function of the location of the worksite, not of the injury.

5. Assume facts identical to those in number 2 where the employee was unable to perform all of his normal job duties. However, in this case the employer directed the employee to report to the plant clinic on the day following the injury. He did not record the case as a lost workday case because he had heard that "time away from work to receive medical attention does not have to be recorded as restricted work activity." This case *should* be recorded as a lost workday case involving restricted work activity. Although time spent receiving medical attention is not considered lost worktime, the determining factor is the employee's *inability to perform his normal duties*. Employers may not avoid recording restricted work activity cases by sending employees to a health unit or doctor's office. Again, the focus of the analysis should center on the effect of the injury or illness on the employee's *ability* to perform his *normal job duties* for a full work shift.

B-19. Q. Why must lost workdays be recorded for an injured worker on light duty, when the employer still gets a day's work from the employee?

A. The workdays that are counted are those on which the employee was unable to contribute a full day's work on all parts of his or her permanent job. The definition was chosen to be simple and uniform, and to preclude concealment of significant injuries or illnesses by temporary assignment to nonproductive jobs. To evaluate the seriousness of lost workdays, they are separated into two classes—days away from work and days of restricted work activity.

B-20. Q. How are partial lost workdays recorded?

A. Cases involving the loss of less than a full workday or shift (beyond the day of injury or onset of illness) should be recorded as lost workday cases involving restricted work activity. Restricted work activity cases occur when the employee, because of the impact of a job-related injury or illness, is physically or mentally unable to perform all or any part of his or her normal work assignment *during all or any or any part of the normal workday or shift.*

For OSHA recordkeeping purposes, each partial workday lost is counted as one full day of restricted work activity. Fractions are not used.

B-21. Q. Where are lost workdays recorded for employees who normally rotate among several different establishments? For example, if an employee is injured in establishment A and as a result cannot report to his next scheduled shift in establishment B, which establishment records the lost workdays?

A. All lost workdays resulting from the injury in establishment A should be entered on the log for establishment A since injuries, illnesses, and lost workdays must be reflected in the records of the establishment in which the exposure occurs.

#### C. Cases not involving lost workdays

These cases consist of the relatively less serious injuries and illnesses which satisfy the criteria for recordability listed in chapter V, but which do not result in death or require the affected employee to have days away from work or days of restricted work activity beyond the date of injury or onset of illness.

C-1. Q. If nonfatal cases without lost workdays are not considered to be serious injuries or illnesses, why record them at all?

A. Although generally not considered the most serious injuries and illnesses, recognition and elimination of these cases were considered important by Congress when it initially promulgated the Occupational Safety and Health Act of 1970. Identification of these frequently occurring cases still has important safety and health implications, and is often linked to the prevention of more serious injuries.

C-2. Q. Is it possible for an employee to experience restricted work activity and have the case recorded only as a nonfatal case without lost workdays?

A. Yes, if the restriction does not go beyond the day of injury or onset of illness.

### Chapter VII. Employer Obligations for Reporting Occupational Injuries and Illnesses

This chapter focuses on the requirements of Section 8(c)(2) of the Occupational Safety and Health Act of 1970 and Title 29, Part 1904, of the *Code of Federal Regulations* for employers to make reports of occupational injuries and illnesses. It does not include the reporting requirements of other standards or regulations of the Occupational Safety and Health Administration (OSHA) or of any other State or Federal agency.

#### A. The Annual Survey of Occupational Injuries and Illnesses

Section 8(c)(2) of the act requires employers to make periodic reports of deaths, injuries, and illnesses which have been recorded on the OSHA injury and illness records. This periodic reporting is accomplished through the Annual Survey of Occupational Injuries and Illnesses of the Bureau of Labor Statistics.

The annual survey provides measures of the occurrence and the extent of recordable occupational injuries and illnesses. Injuries and illnesses are reported as either fatalities, lost workday cases, or nonfatal cases without lost workdays. The survey produces national occupational injury and illness estimates at the 4-digit Standard Industrial Classification (SIC) level in most manufacturing industries and at the 2-digit SIC level in most nonmanufacturing industries. Estimates are produced at the 3-digit level for some high-risk nonmanufacturing industries such as construction. Equivalent data are provided for most States.

The measures produced by the system include incidence rates and numbers of occupational injuries and illnesses. Incidence rates relate the numbers of injuries, illnesses, or lost workdays to a common base of exposure. They show the equivalent number of injuries and illnesses or lost workdays per 100 full-time workers. This common base enables accurate interindustry comparisons, trend analyses over time, and comparisons among firms regardless of size.

Employer reporting obligations for the annual survey are provided in Part 1904.21 of the regulations:

Upon receipt of an Occupational Injuries and Illnesses Survey Form, the employer shall promptly complete the form in accordance with the instructions contained therein, and return it in accordance with the aforesaid instructions.

The survey is conducted on a sample basis, and firms required to submit reports of their injury and illness experience are contacted by BLS or a participating State agency. A firm not contacted by its State agency or BLS need not file a report of its injury and illness experience. Employers should note, however, that even if they are not selected to participate in the annual survey for a given year, they must still comply with the recordkeeping requirements listed in the preceding chapters of these guidelines as well as with the requirements for reporting fatalities and multiple hospitalization cases provided in the next section of this chapter.

Participants in the annual survey consist of two categories of employers: (1) Employers who maintain OSHA records on a regular basis; and (2) a small, rotating sample of employers who are regularly exempt from OSHA recordkeeping. The survey procedure is different for these two groups of employers.

1. *Participation of firms regularly maintaining OSHA records.* When employers regularly maintaining OSHA records are selected to participate in the Annual Survey of Occupational Injuries and Illnesses, they are mailed the survey questionnaire in February of the year following the reference calendar year of the survey. (A firm selected to participate in the 1984 Survey would be contacted in February of 1985.) The survey form, the Occupational Injuries and Illnesses Survey Questionnaire, OSHA No. 200-S, requests information about the establishment(s) included in the report and the injuries and illnesses experienced during the previous year. Information for the injury and illness portion of the report from usually can be copied directly from the totals on the log and summary, OSHA No. 200, which the employer should have completed and posted in the establishment by the time the questionnaire arrives. The survey form also requests summary information about the type of business activity and number of employees and hours worked at the reporting unit during the reference year.

2. *Participation of normally exempt small employers and employers in low-hazard industries.* A few regularly exempt employers (those with fewer than 11 employees in the previous calendar year and those in designated low-hazard industries) are also required to participate in the annual survey. Their participation is necessary for the production of injury and illness statistics that are comparable in coverage to the statistics published in years prior to the

exemptions. These employers are notified *prior* to the reference calendar year of the survey that they must maintain injury and illness records for the coming year. (A firm selected to participate in the 1984 Survey would be contacted in December 1983.) At the time of notification, they are supplied with the necessary forms and instructions. During the reference calendar year, prenotified employers make entries on the log, OSHA No. 200.

Participating, regularly exempt firms are not required to complete a Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101, for each log entry. Also, they are *not* required to post the summary of the OSHA No. 200 in February following the year for which they kept records.

A-1. Q. Why must the Department of Labor conduct a survey of occupational injuries and illnesses? Can't it utilize workers' compensation data or information already available from other sources?

A. National work injury and illness statistics cannot be produced from workers' compensation records because workers' compensation systems are not uniform among States and do not cover some OSHA recordable cases. Injury and illness statistics produced by the BLS annual survey are not obtainable from any other data source.

A-2. Q. After receiving the OSHA No. 200-S survey package, how long do employers have to complete and return the survey questionnaire?

A. Employers should complete and return the questionnaire within 3 weeks after they receive the survey package.

A-3. Q. Why does the Department of Labor request information concerning the number of employee hours worked?

A. Information on the number of hours worked is needed to produce injury and illness incidence rates which relate the data to a common base of exposure, and thus enable interindustry comparisons, trend analysis, or comparisons among firms regardless of size.

A-4. Q. If information on employee hours worked is not readily available from payroll or other time records, how can it be estimated?

A. The hours-worked figure should be obtained from payroll or other time records whenever possible, and should exclude paid nonworktime such as vacations, sick leave, holidays, etc. If hours worked are not maintained separately from hours paid, employers should record their best estimate of the hours actually worked. If actual hours worked are unobtainable for certain types of employees (such as those paid on commission, salary, by the mile, etc.), hours worked may be estimated on the

basis of scheduled hours, or on the basis of the average hours normally worked.

A-5. Q. Should the figure for hours worked include hours for situations where the employee's activities are deemed work related, even though the employee is not engaged in a specific job task or is outside a normal 8 hour work shift? For example, should hours worked include time for employees using on-premises exercise facilities or on travel status?

A. The figure for hours worked should reflect the actual hours of work-related exposure for all employees. If injuries and illnesses experienced during a particular activity are recordable, then the employee's time spent in the activity should be included in the hours estimate. Work-related exposures include most of the employers' activities on the employees' premises as well as situations off premises where the employees are engaged in job tasks or are there as a condition of employment.

Time spent using on-premises exercise facilities would be included in hours worked, because this is considered a work-related activity for OSHA recordkeeping purposes. (See chapter V, section C for a discussion of work relationship.)

For employees in travel status, the figure for hours worked should include all the employees' work-related activities and such necessary travel functions as eating, sleeping, and traveling. The figure for hours worked should *not* include hours spent on extraneous activities unrelated to the normal scope of the trip and solely for the employee's own personal use or enjoyment. (See question C-19 of chapter V for activities covered in travel status.)

A-6. Q. For the purposes of the Annual Survey of Occupational Injuries and Illnesses, how do employers report cases that are not yet resolved by the end of the calendar year?

A. Employers should report these cases based on their best estimate of the final case determination. The injury and illness portion of the OSHA No. 200-S survey form is completed by merely copying information from the summary lines of the log and summary, OSHA No. 200. In summarizing the log and summary, employers will have already made interim determinations on unresolved cases. (A sample survey form is provided in appendix B.)

A-7. Q. Will the information for a particular company reported on the OSHA No. 200-S survey form remain confidential?

A. Yes. Information for individual establishments and reporting units is kept strictly confidential.

A-8. Q. Are the regularly exempt employers who participate in the annual survey required to maintain their OSHA injury and illness records for 5 years like the participating employers regularly maintaining OSHA records?

A. No. Regularly exempt employers are not subject to the maintenance or retention requirements of Part 1904 of the regulations. However, these employers should keep their OSHA records for 3 months after they have completed the OSHA 200-S survey questionnaire since they may be needed for survey verification purposes.

#### *B. Reporting Fatalities and Multiple Hospitalizations*

All employers are required to report accidents resulting in one or more fatalities or the hospitalization of five or more employees by Part 1904.8 of the record-keeping regulations:

Within 48 hours after the occurrence of an employment accident which is fatal to one or more employees or which results in hospitalization of five or more employees, the employer of any employees so injured or killed shall report the accident either orally or in writing to the nearest office of the Area Director of the Occupational Safety and Health Administration, U.S. Department of Labor. The reporting may be by telephone or telegraph. The report shall relate the circumstances of the accident, the number of fatalities, and the extent of any injuries. The Area Director may require such additional reports in writing or otherwise as he deems necessary, concerning the accident.

Employers with questions on these reporting requirements should contact their nearest OSHA area office. Additional guidelines are available in the OSHA Field Operations Manual.

B-1. Q. Do all States have the same reporting requirements under Part 1904.8 of the regulations?

A. No. All States under Federal jurisdiction must comply with the requirements of Part 1904.8. However, States with approved State plans under Section 18(b) of the act may have more stringent reporting requirements. Employers in these States should contact their State agency for specific reporting requirements. Addresses and telephone numbers for States with approved plans are provided in appendix D of this report.

B-2. Q. Part 1904.8 of the regulations requires that a report be made of a fatality or a multiple hospitalization case. To whom is the report made?

A. The report is made to the nearest office of the Area Director of the Occupational Safety and Health Administration, U.S. Department of Labor, *unless* the State in which the accident occurred is administering an

approved State plan under Section 18(b) of the act. Those States designate a State agency to which the report must be made. (See appendix D for States with approved State Plans.)

**B-3. Q.** When are accidents reportable under Part 1904.8 of the regulation?

**A.** Part 1904.8 is quite specific: Immediate reports must be made of accidents which result in a fatality or the hospitalization of five or more employees.

**B-4 Q.** What information must be reported?

**A.** The report must contain three pieces of information: (1) Circumstances surrounding the accident, (2) number of fatalities, and (3) number of hospitalized injuries. If necessary, the OSHA Area Director may require additional information on the accident.

**B-5 Q.** What is the purpose of the special reporting requirements for fatalities and multiple hospitalization cases in Part 1904.8?

**A.** The 48-hour reporting requirement of Part 1904.8 provides OSHA with sufficient notice to conduct immediate investigations of the accident scene to determine the causes of cases resulting in death or multiple hospitalizations.

**B-6 Q.** How can fatalities resulting from heart attacks or similar causes be reported within 48 hours when in most cases the employer cannot determine in that period whether or not it is occupationally related?

**A:** Heart attacks will generally not be reported under Part 1904.8 since the application of this portion of the regulations is limited to "accidents." When in doubt of the occupational origin of a fatal accident, employers should report it. OSHA will not investigate if it is determined that the case was not occupational in origin.

**B-7 Q.** Must all fatalities be reported to OSHA in accordance with the requirements of Part 1904.8?

**A.** Yes. All work-related accidents which result in death or the hospitalization of 5 or more employees must be reported in conformance with the 48-hour reporting requirement of Part 1904.8. The 48-hour reporting requirement has been interpreted to mean that employers must make their report within 48 hours after the occurrence of the accident or fatality. After receiving information that a fatality or multiple hospitalization has occurred, OSHA will evaluate the case to determine whether or not an inspection is warranted.

### Chapter VIII. Access to OSHA Records and Penalties for Failure To Comply With Recordkeeping Obligations

The preceding chapters describe the recordkeeping and reporting requirements of the Occupational Safety and Health Act of 1970 and 29 CFR Part 1904. This chapter covers subjects related to insuring the integrity of the OSH recordkeeping process—access to OSHA records and penalties for recordkeeping violations.

#### A. Access to OSHA Records

Availability of the OSHA records for viewing, inspection, and copying is the focus of Part 1904.7 of the regulations:

(a) Each employer shall provide, upon request, records, provided for in sections 1904.2, 1904.4, and 1904.5 for inspection and copying by any representative of the Secretary of Labor for the purpose of carrying out the provisions of the Act, and by representatives of the Secretary of Health, Education, and Welfare during any investigation under section 20(b) of the Act or by any representative of a State accorded jurisdiction for occupational safety and health inspections or for statistical compilation under sections 18 and 24 of the act.

(b) (1) The log and summary of all recordable occupational injuries and illnesses (OSHA No. 200) (the log) provided for in section 1904.2 shall, upon request, be made available by the employer to any employee, former employee, and to their representatives for examination and copying in a reasonable manner and at reasonable times. The employee, former employee, and their representatives shall have access to the log for any establishment in which the employee is or has been employed.

(2) Nothing in this section shall be deemed to preclude employees and employee representatives from collectively bargaining to obtain access to information relating to occupational injuries and illnesses in addition to the information made available under this section.

(3) Access to the log provided under this section shall pertain to all logs retained under the requirements of section 1904.6.

This part of the regulations concerns only access to OSHA injury and illness records. It provides that all OSHA records, which are being kept for the 5-year retention period, be available for inspection and copying by authorized Federal and State government officials, Employees, former employees, and their representatives are provided access to only the log and summary, OSHA No. 200.

Government officials with access to the OSHA record include: Representatives of the Department of Labor including OSHA safety and health compliance officers and BLS representatives; representatives of the Department of Health, and Human

Services (formerly the Department of Health, Education and Welfare) while carrying out the Department's research responsibilities; and representatives of States accorded jurisdiction for inspections or statistical compilations. "Representatives" may include Department of Labor officials inspecting a workplace or gathering information, officials of the Department of Health and Human Services, or contractors working for the agencies mentioned above, depending on the provisions of the contract under which they work.

Employees access to the log is limited to the records of the establishment in which the employee currently works or formerly worked. All current logs and those being maintained for the 5-year retention period must be made available for inspection and copying by employees, former employees, and their representatives.

An employee representative can be a member of a union representing the employee, or any person designated by the employee or former employee.

Access to the log is to be provided to employees, former employees, and employee representatives in a reasonable manner and at a reasonable time. Redress for failure to comply with the access provisions of the regulations can be obtained through a complaint to OSHA.

**A-1. Q.** Which OSHA records are subject to the access provisions of Part 1904.7 of the regulations?

**A.** Government representatives have access to all the OSHA forms—the Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200; and the Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101.

Employees, former employees, and their representatives have access to only the log, and summary, OSHA No. 200.

**A-2. Q.** What is meant by the term "access" in Part 1904.7?

**A.** "Access" is the examination and copying of the relevant OSHA records at reasonable times and in a reasonable manner.

**A-3. Q.** Can employees gain access to any injury and illness records other than those specifically designated in Part 1904.7?

**A.** Yes. Employees can gain access to medical records through OSHA's standard on Access to Employee Exposure and Medical Records. For information on these provisions, refer directly to the standard or contact an OSHA area office. Also, employees can gain access to other injury and illness information through collective bargaining or other agreements made with employers. However, Part 1904.7

provides for access to only those records that are specified.

A-4. Q. Do the access provisions of the regulations allow employees to see the entire log, or only that portion containing an entry that specifically relates to them?

A. Employees or their representatives have access to the entire log and summary.

#### B. Penalties for Failure To Comply With Recordkeeping Obligations

Part 1904.9 of the regulations prescribes penalties for the falsification of OSHA records or the failure to keep the OSHA records or make OSHA reports. Part 1904.9(b) incorporates, by reference, Sections 9, 10, and 17 of the OSH Act pertaining to the issuance of citations, the procedures for enforcement, and the assessment of penalties. In doing so, it subjects employers committing recordkeeping and reporting violations to the same sanctions as employers violating other OSHA requirements such as safety and health standards and regulations. Part 1904.9 concerning falsification or failure to keep records or reports states:

(a) Section 17(g) of the Act provides that "Whoever knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to this Act shall, upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment, for not more than 6 months or both."

(b) Failure to maintain records or file reports required by this part, or in the details required by forms and instructions issued under this part, may result in the issuance of citations and assessment of penalties as provided for in sections 9, 10, and 17 of the Act.

The OSHA records are an important source of information for all groups and individuals interested in promoting job safety and health. In addition, OSHA relies upon the information in these records to direct its resources to those industries and establishments where they are most needed. Consequently, the agency intends to vigorously pursue recordkeeping and reporting violations to insure the continued integrity of the records and validity of the data produced.

B-1. Q. Does this mean that employers will be penalized under Part 1904.9(a) for every mistake they make in OSHA recordkeeping?

A. No. Part 1904.9(a) refers only to those who knowingly make false statements, representations, or certifications. However, employers notified of incorrect recordkeeping determinations by the Department of

Labor representatives are also subject to these provisions.

B-2. Q. Can employers be penalized for failing to maintain OSHA records?

A. Yes. Part 1904.9(b) provides that the failure to maintain records as required by the regulations may result in the assessment of penalties as provided in Sections 9, 10, and 17 of the act.

B-3. Q. Are employers subject to any penalty for failing to respond to the BLS survey questionnaire on occupational injuries and illnesses, OSHA No. 200-S?

A. Yes. Part 1904.9(b) provides that failure to file reports may result in the penalties provided in Sections 9, 10, and 17 of the act.

#### Appendix A. Glossary of Terms

**Annual summary.**—Consists of a copy of the occupational injury and illness totals for the year from the OSHA No. 200, and the following information: The calendar year covered; company name; establishment address; certification signature, title, and date.

**Annual survey.**—Each year, BLS conducts an annual survey of occupational injuries and illnesses to produce national statistics. The OSHA injury and illness records maintained by employers in their establishments serve as the basis for this survey.

**Bureau of Labor Statistics (BLS).**—The Bureau of Labor Statistics is the agency responsible for administering and maintaining the OSHA recordkeeping system, and for collecting, compiling, and analyzing work injury and illness statistics.

**Certification.**—The person who supervises the preparation of the Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200, certifies that it is true and complete by signing the last page of, or by appending a statement to that effect to, the annual summary.

**Cooperative program.**—A program jointly conducted by the States and the Federal Government to collect occupational injury and illness statistics.

**Employee.**—One who is employed in the business of his or her employer affecting commerce.

**Employee representative.**—Anyone designated by the employee for the purpose of gaining access to the employer's log of occupational injuries and illnesses.

**Employer.**—Any person engaged in a business affecting commerce who has employees; this does not include the United States Government or any State or political subdivision of a State.

**Establishment.**—A single physical location where business is conducted or where services or industrial operations

are performed; the place where the employees report for work, operate from, or from which they are paid.

**Federal Register.**—The official source of information and public notification on OSHA's proposed rulemaking, standards, regulations, and other official matters, including amendments, corrections, insertions or deletions.

**First aid.**—Any one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care. Such treatment and observation is considered first aid even though provided by a physician or registered professional personnel.

**First report of injury.**—A workers' compensation form which may qualify as a substitute for the supplementary record, OSHA No. 101.

**Incidence rate.**—The number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The common exposure base enables one to make accurate interindustry comparisons, trend analysis over time, or comparisons among firms regardless of size. This rate is calculated as:

$$\frac{N}{EH} \times 200,000$$

where:

N = number of injuries and illnesses or lost workdays

EH = total hours worked by all employees during calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

**Low-hazard industries.**—Selected industries in retail trade; finance, insurance, and real estate; and services which are regularly exempt from OSHA recordkeeping. To be included in this exemption, an industry must fall within and SIC not targeted for general schedule inspections and must have an average lost workday case injury rate for a designated 3-year measurement period at or below 75 percent of the private sector average rate.

**Log and summary (OSHA No. 200).**—The OSHA recordkeeping form used to list injuries and illnesses and to note the extent of each case.

**Lost workday cases.**—Cases which involve days away from work or days of restricted work activity, or both.

**Lost workdays.**—The number of workdays (consecutive or not), beyond the day of injury or onset of illness, the employee was away from work or limited to restricted work activity

because of an occupational injury or illness.

(1) *Lost workdays—away from work*

The number of workdays (consecutive or not) on which the employee would have worked but could not because of occupational injury or illness.

(2) *Lost workdays—restricted work activity*

The number of workdays (consecutive or not) on which, because of injury or illness: (1) The employee was assigned to another job on a temporary basis; or (2) the employee worked at a permanent job less than full time; or (3) the employee worked at a permanently assigned job but could not perform all duties normally connected with it.

The number of days away from work or days of restricted work activity does not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

**Medical treatment.**—Includes Treatment of injuries administered by physicians, registered professional personnel, or lay persons. Medical treatment does not include first aid treatment (one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

**Occupational illness.**—Any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact, and which can be included in the categories listed below. The following categories should be used by employers to classify recordable occupational illnesses on the log in the columns indicated:

Column 7a. Occupational skin diseases or disorders.

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome ulcers; chemical burns of inflammations; etc.

Column 7b. Dust disease of the lung (pneumoconioses).

Examples: Silicosis, asbestosis, coal worker's pneumoconiosis, byssinosis, and other pneumoconioses.

Column 7c. Respiratory conditions due to toxic agents.

Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to

chemicals, dusts, gases, or fumes; farmer's lung; etc.

Column 7d. Poisoning (systemic effects of toxic materials).

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics, and resins, etc.

Column 7e. Disorders due to physical agents (other than toxic materials).

Examples: Heatstroke, sunstroke, heat exhaustion, and other effects of environmental heat; freezing frostbite, and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of nonionizing radiation (welding flash, ultra-violet rays, microwaves, sunburn); etc.

Column 7f. Disorders associated with repeated trauma.

Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis; Raynaud's phenomena; and other conditions due to repeated motion vibration, or pressure.

Column 7g. All other occupational illnesses.

Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors, food poisoning, histoplasmosis, coccidioidomycosis, etc.

**Occupational injury.**—Any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from a single instantaneous exposure in the work environment.

**Note.**—Conditions resulting from bites, such as insect or snake bites, or from one-time exposure to chemicals are considered to be injuries.

**Occupational injuries and illnesses; extent and outcome.**—All occupational injuries or illnesses result in either:

- (1) Fatalities, regardless of the time between the injury and death, or the length of illness; or
- (2) Lost workday cases, other than fatalities, that result in lost workdays; or
- (3) Nonfatal cases without lost workdays.

**Occupational Safety and Health Administration (OSHA).**—OSHA is the Federal agency within the Department of Labor responsible for developing, implementing, and enforcing safety and health standards and regulations. OSHA works with employers and employees to foster effective safety and health

programs which reduce workplace hazards.

**Premises.**—Consist of the employer's total establishment; they include the primary work facility and other areas in the employer's domain such as company storage facilities, cafeterias, restrooms, and restricted company parking lots.

**Posting.**—The annual summary of occupational injuries and illnesses must be posted at each establishment by February 1 and remain in place until March 1 to provide employees with the record of their establishment's injury and illness experience for the previous calendar year.

**Recordable cases.**—All work-related deaths, and illnesses, and those work-related injuries which result in: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment beyond first aid.

**Recordkeeping system.**—Refers to the nationwide system for recording and reporting occupational injuries and illnesses mandated by the Occupational Safety and Health Act of 1970 and implemented by Title 29, Code of Federal Regulations, Part 1904. This system is the only source of reliable national statistics on job-related injuries and illnesses occurring in the private sector.

**Regularly exempt employers.**—Employers regularly exempt from OSHA recordkeeping include: (a) All employers with no more than 10 full- or part-time employees at any one time in the previous calendar year; and (b) all employers in retail trade; finance, insurance, and real estate; and services industries—i.e., SIC's 52-89 (except building materials and garden supplies, SIC 52; general merchandise and food stores, SIC's 53 and 54; hotels and other lodging places, SIC 70; repair services, SIC's 75 and 76; amusement and recreation services, SIC 79; and health services, SIC 80).

**Report form.**—Refers to survey form OSHA No. 200-S which is completed and returned by the surveyed reporting unit.

**Restriction of work or motion.**—Occurs when the employee, because of the result of a job-related injury or illness, is physically or mentally unable to perform *all* or *any part* of his or her normal assignment during *all* or *any part* of the workday or shift.

**Small employers.**—Employers with no more than 10 employees among all the establishments of their firm at any one time during the previous calendar year.

**Standard Industrial Classification (SIC).**—A classification system developed by the Office of Management and Budget, Executive Office of the

President, for use in the classification of establishments by type of activity in which engaged. Each establishment is assigned an industry code for its major activity which is determined by the product or services rendered.

Establishments may be classified in 2-, 3-, or 4-digit industries according to the degree of information available.

State (when mentioned alone).—Refers to a State of the United States, the District of Columbia, and U.S. territories and jurisdictions.

State agency.—State agency administering the OSHA recordkeeping and reporting system. Many States cooperate directly with BLS in administering the OSHA recordkeeping and reporting programs. Some States have their own safety and health laws which may impose different or additional obligations.

Supplementary Record (OSHA No. 101).—The form (or equivalent) on which additional information is recorded for each injury and illness entered on the log.

Title 29 of the Code of Federal Regulations. Part 1900-1999.—The parts of the *Code of Federal Regulations* which contain OSHA regulations.

Volunteers.—Workers who are not considered to be employees under the act when they serve of their own free will without compensation.

Workers' compensation systems.—State systems that provide medical benefits and/or indemnity compensation to victims of work-related injuries and illnesses.

Work environment.—Consists of the employer's premises and other locations where employees are engaged in work-related activities or are present as a

condition of their employment. The work environment includes not only physical locations, but also the equipment or materials used by the employee during the course of his or her work.

#### Appendix B. OSHA Recordkeeping Forms

1. The Log and Summary of Occupational Injuries and Illnesses, OSHA No. 200.
2. The Supplementary Record of Occupational Injuries and Illnesses, OSHA No. 101.
3. The Annual Occupational Injuries and Illnesses Survey Covering Calendar Year 1983, OSHA No. 200-S.

BILLING CODE 4510-24-M

Bureau of Labor Statistics  
Log and Summary of Occupational  
Injuries and Illnesses

NOTE: This form is required by Public Law 97-508 and must be kept in the files of the Bureau of Labor Statistics for 3 years. Failure to maintain and post in the files of the Bureau of Labor Statistics a copy of this form for each establishment may result in the establishment being placed on the list of establishments which are subject to special requirements on the other side of form 1015-001. See instructions on the other side of form 1015-001.

For Calendar Year 19...  
Form Approved  
O.G.E. No. 1320-0028

Date of Injury or Illness	Employee's Name	Occupation	Department	Description of Injury or Illness	Extent and Outcome of Injury		Extent and Outcome of Illness		Type, Extent of, and Outcome of Illness	Date
					Days Lost	Medical Expense	Days Lost	Medical Expense		
01	0				01					
PREVIOUS PAGE TOTALS					01					
TOTALS (Include all cases on this page)					01					

INJURIES

ILLNESSES

OSHA No. 202

Continuation of Annual Summary, Table B

Date

POST ONLY THIS PORTION OF THE LAST PAGE NO LATER THAN FEBRUARY 1.



## U.S. Department of Labor

Bureau of Labor Statistics  
Supplementary Record of  
Occupational Injuries and Illnesses

This form is required by Public Law 91-588 and must be filed in the establishment for 3 years. Form Approved  
Failure to maintain this report in the location of retention and assignment of jurisdiction. O.M.B. No. 1220-0028

Employer: \_\_\_\_\_ Case or File No. \_\_\_\_\_  
 1. Name: \_\_\_\_\_  
 2. Main address (list and street, city or town, State, and zip code): \_\_\_\_\_  
 3. Location, if different from mail address: \_\_\_\_\_  
 Injured or Ill Employee: \_\_\_\_\_  
 4. Name (first, middle, and last): \_\_\_\_\_ Social Security No. \_\_\_\_\_  
 5. Home address (list and street, city or town, State, and zip code): \_\_\_\_\_  
 6. Age: \_\_\_\_\_ Sex:  Male  Female  
 7. Sex:  Male  Female  
 8. Occupation (Enter regular job title, but the specific activity for which injury or illness occurred): \_\_\_\_\_  
 9. Department (Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury): \_\_\_\_\_

The Accident or Exposure to Occupational Illness:  
 10. Place of accident or exposure (list and street, city or town, State, and zip code): \_\_\_\_\_  
 11. Was injury or exposure to employee's premises? Yes  No   
 12. What was the employee doing when injured? (Be specific. If he was using tools or equipment or handling material, name them and job when he was doing with them.) \_\_\_\_\_

13. How did the accident occur? (Describe fully the activity which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any object or substance involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheets for additional pages.) \_\_\_\_\_

Occupational Injury or Occupational Illness:  
 14. Describe the injury or illness in detail and indicate the part of body affected (E.g., amputation of right index finger at second joint; fracture of ribs; lost working elements of left hand, etc.) \_\_\_\_\_  
 15. Name the agent or substance which caused the injury or illness. (If it is a chemical, the name of the chemical; if it is a physical agent, the name of the physical agent or the name of the object or substance which caused the injury or illness. If it is a biological agent, the name of the biological agent.) \_\_\_\_\_

16. Date of injury or illness: \_\_\_\_\_  
 17. Date employee first checked and \_\_\_\_\_  
 18. Name and address of physician: \_\_\_\_\_  
 19. Is hospitalized, name and address of hospital: \_\_\_\_\_

Check of report: \_\_\_\_\_  
 Prepared by: \_\_\_\_\_  
 OSHA No. 101 (Feb. 1981)

SUPPLEMENTARY RECORD OF OCCUPATIONAL  
INJURIES AND ILLNESSES

To supplement the Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200), each establishment must maintain a record of each recordable occupational injury or illness. Worker's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health and Human Services, and States exercising jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

- 1) About the employer—name, mail address, and location if different from mail address.
- 2) About the injured or ill employee—name, social security number, home address, age, sex, occupation, and department.
- 3) About the accident or exposure to occupational illness—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.
- 4) About the occupational injury or illness—description of the injury or illness, including part of body affected, name of the object or substance which directly injured the employee, and date of injury or diagnosis of illness.
- 5) Other—name and address of physician; if hospitalized, name and address of hospital; date of report, and name and position of person preparing the report.

SEE DEFINITIONS ON THE BACK OF OSHA FORM 200.

U.S. GOVERNMENT PRINTING OFFICE: 1981-201-1000

1983 OSHA No. 200-S

Annual Occupational Injuries and Illnesses Survey Covering Calendar Year 1983

U.S. Department of Labor

Bureau of Labor Statistics for the Occupational Safety and Health Administration

The information collected on this form will be used for statistical purposes only by the BLS, OSHA, and the cooperating State Agencies.

THIS REPORT IS MANDATORY UNDER PUBLIC LAW 91-596. FAILURE TO REPORT CAN RESULT IN THE ISSUANCE OF CITATIONS AND ASSESSMENT OF PENALTIES.

O.M.B. No. 1220-0045 Approval Exp. 12/31/84

St. Sch. No. Ck. Suf.

SIC   
EDIT

Complete this report whether or not there were recordable occupational injuries or illnesses.

Complete and return ONLY THIS FORM within 3 weeks

PLEASE READ THE ENCLOSED INSTRUCTIONS

<p><b>I. ANNUAL AVERAGE EMPLOYMENT IN 1983</b></p> <p>Enter the average number of employees who worked during calendar year 1983 in the establishment(s) covered by this report. Include all classes of employees: full-time, part-time, seasonal, temporary, etc. See the instructions for an example of an annual average employment calculation. (Round to the nearest whole number.)</p> <input type="text"/>	<p><b>II. TOTAL HOURS WORKED IN 1983</b></p> <p>Enter the total number of hours actually worked during 1983 by all employees covered by this report. DO NOT include any non-work time even though paid such as vacations, sick leave, etc. If employees worked low hours in 1983 due to lay offs, strikes, fires, etc., explain under Comments (section VII). (Round to the nearest whole number.)</p> <input type="text"/>	<p><b>III. NATURE OF BUSINESS IN 1983</b></p> <p>A. Check the box which best describes the general type of activity performed by the establishment(s) included in this report.</p> <p><input type="checkbox"/> Agriculture <input type="checkbox"/> Forestry <input type="checkbox"/> Fishing <input type="checkbox"/> Mining <input type="checkbox"/> Construction <input type="checkbox"/> Manufacturing <input type="checkbox"/> Transportation <input type="checkbox"/> Communication <input type="checkbox"/> Public Utilities <input type="checkbox"/> Wholesale Trade <input type="checkbox"/> Retail Trade <input type="checkbox"/> Finance <input type="checkbox"/> Insurance <input type="checkbox"/> Real Estate <input type="checkbox"/> Services <input type="checkbox"/> Public Administration</p>	<p>B. Enter in order of importance the principal products, lines of trade, services or other activities. For each entry also include the approximate percent of total 1983 annual value of production, sales or receipts.</p> <table border="1"> <tr><td><input type="text"/></td><td><input type="text"/></td></tr> <tr><td><input type="text"/></td><td><input type="text"/></td></tr> <tr><td><input type="text"/></td><td><input type="text"/></td></tr> <tr><td><input type="text"/></td><td><input type="text"/></td></tr> </table>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>C. If this report includes any establishment(s) which perform services for other units of your company, indicate the primary type of service or support provided. (Check as many as apply.)</p> <p><input type="checkbox"/> 1 Central administration <input type="checkbox"/> 2 Research, development and testing <input type="checkbox"/> 3 Storage (warehouse) <input type="checkbox"/> 4 Other (specify) <input type="text"/></p>	<p><b>IV. MONTH OF OSHA INSPECTION</b></p> <p>If the establishment(s) covered by this report had either a Federal or State OSHA compliance inspection during calendar year 1983, please enter the name of the month in which the first inspection occurred.</p> <p>(Leave this box blank.) <input type="text"/></p>	<p><b>V. RECORDABLE INJURIES AND ILLNESSES</b></p> <p>Did the establishment(s) have any recordable injuries or illnesses during calendar year 1983?</p> <p>1 <input type="checkbox"/> No (Please complete section VII) 2 <input type="checkbox"/> Yes (Please complete sections VI and VII)</p> <p>SEE REVERSE →</p>
<input type="text"/>	<input type="text"/>													
<input type="text"/>	<input type="text"/>													
<input type="text"/>	<input type="text"/>													
<input type="text"/>	<input type="text"/>													

**REPORT LOCATION AND IDENTIFICATION**

Complete this report for the establishment(s) covered by the description below

Please indicate any address changes below

RETURN REPORT TO:

For Information Call:

OSHA No. 200-S (Rev. April 1983)

**VI. OCCUPATIONAL INJURY AND ILLNESS SUMMARY (Covering Calendar Year 1983)**

- Complete this section by copying totals from the annual summary of your 1983 OSHA No. 200.
- Remember to reverse the carbon insert before completing this side.
- Leave section VI blank if there were no OSHA recordable injuries or illnesses during 1983.
- Note: First aid given when administered by a doctor or nurse is not recordable.
- Please check your figures to be certain that the sum of entries in columns (7a) + (7b) + (7c) + (7d) + (7e) + (7f) + (7g) = the sum of entries in columns (8) + (9) + (13).
- If you listed fatalities in columns (1) and/or (8), please give a brief description of the object or event which caused each fatality in the "Comments" section.

OCCUPATIONAL INJURY CASES						OCCUPATIONAL ILLNESS CASES												
INJURY RELATED FATALITIES** (DEATHS)	INJURIES WITH LOST WORKDAYS				INJURIES WITHOUT LOST WORKDAYS*	TYPE OF ILLNESS							ILLNESSES WITH LOST WORKDAYS	ILLNESSES WITHOUT LOST WORKDAYS*				
	Injury cases with days away from work and/or restricted workdays	Injury cases with days away from work	Total days away from work	Total days of restricted activity		Enter the number of checks from the appropriate columns of the log (OSHA No. 200).									Illness cases with days away from work and/or restricted workdays	Illness cases with days away from work	Total days away from work	Total days of restricted activity
Number of DEATHS in col. 1 of the log (OSHA No. 200)	Number of CHECKS in col. 2 of the log (OSHA No. 200)	Number of CHECKS in col. 3 of the log (OSHA No. 200)	Sum of the DAYS in col. 4 of the log (OSHA No. 200)	Sum of the DAYS in col. 5 of the log (OSHA No. 200)	Number of CHECKS in col. 6 of the log (OSHA No. 200)	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Number of DEATHS in col. 8 of the log (OSHA No. 200)	Number of CHECKS in col. 9 of the log (OSHA No. 200)	Number of CHECKS in col. 10 of the log (OSHA No. 200)	Sum of the DAYS in col. 11 of the log (OSHA No. 200)	Sum of the DAYS in col. 12 of the log (OSHA No. 200)	Number of CHECKS in col. 13 of the log (OSHA No. 200)
(1)	(2)	(3)	(4)	(5)	(6)	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(8)	(9)	(10)	(11)	(12)	(13)
DEATHS													DEATHS					

\* WITHOUT LOST WORKDAYS- CASES (WITH NO DAYS LOST) RESULTING IN EITHER: DIAGNOSIS OF OCCUPATIONAL ILLNESS, LOSS OF DISABILITY, RESTRICTION OF WORK OR MOTION, TRANSFER TO ANOTHER JOB, OR MEDICAL TREATMENT BEYOND FIRST AID.

**VII. REPORT PREPARED BY (Please type or print)**

NAME \_\_\_\_\_  
 TITLE \_\_\_\_\_  
 SIGNATURE \_\_\_\_\_  
 AREA CODE \_\_\_\_\_ PHONE \_\_\_\_\_  
 DATE \_\_\_\_\_

\*\* IF YOU LISTED FATALITIES IN COLUMNS (1) AND/OR (8), PLEASE GIVE A BRIEF DESCRIPTION OF THE OBJECT OR EVENT WHICH CAUSED EACH FATALITY IN THE "COMMENTS" SECTION BELOW.

COMMENTS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## SURVEY REPORTING REGULATIONS

Title 29, Part 1904.20-22 of the Code of Federal Regulations requires that each employer shall return the completed survey form, OSHA No. 200-5, within 3 weeks of receipt in accordance with the instructions shown below.

**INSTRUCTIONS FOR COMPLETING THE OSHA NO. 200-5 FORM  
1983 OCCUPATIONAL INJURIES AND ILLNESSES SURVEY  
(Covering Calendar Year 1983)**

**Change of Ownership**—When there has been a change of ownership during the report period, only the records of the current owner are to be entered in the report. Explain fully under Comments (Section VII), and include the date of the ownership change and the time period this report covers.

**Partial-Year Reporting**—For any establishment(s) which was not in existence for the entire report year, the report should cover the portion of the period during which the establishment(s) was in existence. Explain fully under Comments (Section VII), including the time period this report covers.

## ESTABLISHMENTS INCLUDED IN THE REPORT

This report should include only those establishments located in, or identified by, the Report Location and Identification designation which appears next to your mailing address. This designation may be a geographical area, usually a county or city, or it could be a brief description of your operation within a geographical area. If you have any questions concerning the coverage of this report, please contact the agency identified on the OSHA No. 200-5 report form.

## DEFINITION OF ESTABLISHMENT

An **ESTABLISHMENT** is defined as a single physical location where business is conducted or where services or industrial operations are performed. (For example, a factory, mill, store, hotel, restaurant, movie theatre, farm, ranch, bank, sales office, warehouse, or central administrative office.)

For firms engaged in activities such as construction, transportation, communication, or electric, gas and sanitary services, which may be physically dispersed, reports should cover the place to which employees normally report each day.

Reports for personnel who do not primarily report or work at a single establishment, such as traveling salespersons, technicians, engineers, etc., should cover the location from which they are paid or the base from which personnel operate to carry out their activities.

**NOTE:** If more than one establishment is included, information in Section III should reflect the combined activities of all such establishments. One code will be assigned which best indicates the nature of business of the group of establishments as a whole.

## SECTION IV. MONTH OF OSHA INSPECTION

Enter the name of the first month in 1983 during which your establishment had an OSHA compliance inspection. Include inspections under the Federal or State equivalents of the Occupational Safety and Health Act by Federal or State inspectors and other inspections which may result in penalties for violations of safety and health standards. Do not include inspections limited to elevators, boilers, fire safety or those which are consultative in nature.

## SECTION V. RECORDABLE INJURIES OR ILLNESSES

Check the appropriate box. If you checked "Yes," complete Sections VI and VII on the back of the form. If you checked "No," complete only Section VII.

## SECTION VI. OCCUPATIONAL INJURY AND ILLNESS SUMMARY

This section can be completed easily by copying the totals from the annual summary of your 1983 OSHA No. 200 form (Log and Summary of Occupational Injuries and Illnesses). Please note that if this report covers more than one establishment, the final totals on the "Log" for each must be added and the sums entered in Section VI.

Leave Section VI blank if the employees covered in this report experienced no recordable injuries or illnesses during 1983.

If there were recordable injuries or illnesses during the year, please review your OSHA No. 200 form for each establishment to be included in this report to make sure that all entries are correct and complete before completing Section VI. Each recordable case should be included on the "Log" in only one of the six main categories of injuries or illnesses:

1. INJURY—related deaths (Log column 1)
2. INJURIES with days away from work and/or restricted days (Log column 2)
3. INJURIES without lost workdays (Log column 3)
4. ILLNESS—related deaths (Log column 4)
5. ILLNESSES with days away from work and/or restricted days (Log column 5)
6. ILLNESSES without lost workdays (Log column 6)

## SECTION I. ANNUAL AVERAGE EMPLOYMENT IN 1983

Enter in Section I the **average** (not the total) number of full and part-time employees who worked during calendar year 1983 in the establishment(s) included in this report. If more than one establishment is included in this report, add together the annual average employment for each establishment and enter the sum. Include all classes of employees—seasonal, temporary, administrative, supervisory, clerical, professional, technical, sales, delivery, installation, construction and service personnel, as well as operators and related workers.

Annual Average employment should be computed by summing the employment from all pay periods during 1983 and then dividing that sum by the total number of such pay periods throughout the entire year, including periods with no employment. For example, if you had the following monthly employment—Jan. 10, Feb. 10, Mar. 10, Apr. 5, May 5, June 5, July 5, Aug. 0, Sept. 0, Oct. 0, Nov. 5, Dec. 5—you would sum the number of employees for each monthly pay period (in this case, 60) and then divide that total by 12 (the number of pay periods during the year) to derive an annual average employment of 5.

## SECTION II. TOTAL HOURS WORKED IN 1983

Enter in Section II the **total** number of hours actually worked by all classes of employees during 1983. Be sure to include **ONLY** time on duty. **DO NOT** include any non-work time even though paid, such as vacations, sick leave, holidays, etc. The hours worked figure should be obtained from payroll or other time records whenever possible. If hours worked are not maintained separately from hours paid, please enter your best estimate. If actual hours worked are not available for employees paid on commission, salary, by the mile, etc., hours worked may be estimated on the basis of scheduled hours or 8 hours per workday.

For example, if a group of 10 salaried employees worked an average of 8 hours per day, 5 days a week, for 50 weeks of the report period, the total hours worked for this group would be  $10 \times 8 \times 5 \times 50 = 20,000$  hours for the report period.

## SECTION III. NATURE OF BUSINESS IN 1983

In order to verify the nature of business code, we must have information about the specific economic activity carried on by the establishment(s) included in your report during calendar year 1983.

Complete Parts A, B and C as indicated in Section III on the OSHA No. 200-5 form. Complete Part C only if supporting services are provided to other establishments of your company. Leave Part C blank if a) supporting services are not the primary function of any establishment(s) included in this report or b) supporting services are provided but only on a contract or fee basis for the general public or for other business firms. (Instructions continued on page 2.)

Also review each case to ensure that the appropriate entries have been made for the other columns if applicable. For example, if the case is an Injury with Lost Workdays, be sure that the check for an injury involving days away from work (Log column 3) is entered if necessary. Also verify that the correct number of days away from work (Log column 4) and/or days of restricted work activity (Log column 5) are recorded. A similar review should be made for a case which is an Illness with Lost Workdays (including Log columns 10, 11 and 12). Please remember that if your employee's loss of workdays is still continuing at the time the annual summary for the year is completed, you should estimate the number of future workdays they will lose and add this estimate to the actual workdays already lost. Each partial day away from work, other than the day of the occurrence of the injury or onset of illness, should be entered as one full restricted workday.

Also, for each case which is an Illness, make sure that the appropriate column indicating Type of Illness (Log columns 7a-7g) is checked.

After completing your review of the individual case entries on the "Log," please make sure that the "Totals" line has been completed by summarizing Columns 1 through 12 according to the instructions on the back of the "Log" form. Then, copy these "Totals" onto Section VI of the OSHA No. 200-5 form. If you entered fatalities in columns 1) and/or 4), please include in the "Comments" section a brief description of the object or event which caused each fatality.

## FIRST AID

Finally, please remember that all injuries which, in your judgement, required only First Aid Treatment, even when administered by a doctor or nurse, should not be included in this report. First Aid Treatment is defined as one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care.

## SECTION VII. COMMENTS AND IDENTIFICATION

Please complete all parts including your area code and telephone number. Then return the OSHA No. 200-5 form in the pre-addressed envelope. **KEEP** your file copy.

Dear Employer:

The Occupational Safety and Health Act of 1970 requires the Secretary of Labor to collect, compile, and analyze statistics on occupational injuries and illnesses. This is accomplished through a joint Federal/State survey program with States that have received Federal grants for collecting and compiling statistics. Establishments are selected for this survey on a sample basis with varying probabilities depending upon size. Certain establishments may be included in each year's sample because of their importance to the statistics for their industry.

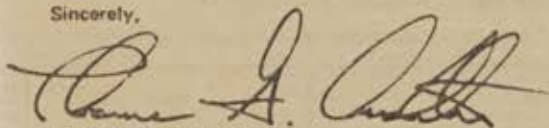
You have been selected to participate in the nationwide Occupational Injuries and Illnesses Survey for 1983. Under the Occupational Safety and Health Act, your report is mandatory.

The following items are enclosed for your use: (1) Instructions for completing the form; (2) The OSHA No. 200-S form and a copy for your files; and (3) An addressed return envelope. Please complete the OSHA No. 200-S form and return it within three weeks in the envelope provided.

If you have any questions about this survey, contact the survey collection agency indicated on the OSHA No. 200-S form.

Thank you for your cooperation with this important survey.

Sincerely,



THORNE G. AUCHTER  
Assistant Secretary for  
Occupational Safety and Health

### Appendix C.—Selected Illnesses Which May Result From Exposure in the Work Environment

The following table is included for information purposes only, to assist employers in recognizing certain occupational illnesses and diseases. It does not include every condition, illness, or disease that may result from an exposure in the work environment.

The table is based upon a Sentinel Health Event List (Occupational) (SHEO), initially prepared by the National Institute for Occupational Safety and Health (NIOSH), which encompassed 50 disease conditions linked to the workplace. A Sentinel Health Event is defined by NIOSH as a disease, disability, or untimely death which is occupationally related and

whose occurrence may: 1) provide the impetus for epidemiologic or industrial hygiene studies; or 2) serve as a warning signal that materials substitution, engineering control, personal protection, or medical care may be required. The list included only those conditions for which NIOSH found "objective documentation of an associated agent, industry, and occupation. . . . in the scientific literature." NIOSH has indicated that the list will be expanded in the future.

The following table lists illness conditions, the industry and/or occupation where each condition is likely to occur, symptoms associated with each condition, the agent likely to cause the condition, and the appropriate illness column to be checked on the log, OSHA No. 200.

Recording illnesses has historically been a problem for employers, especially chronic or long term latent illnesses. This table is furnished to assist employers in making accurate illness determinations. *The table should not be interpreted to mean that a specific condition can only be contracted in the industries or occupations listed. It also does not mean that every condition listed is recordable if experienced by employees in these industries and/or occupations.* For the case to be OSHA recordable, employers must still establish that the condition is a result of an exposure in their work environment. For guidelines for determining work relationship, see Chapter V, Section C.

Condition	Industry and/or occupation	Symptoms	Agent	Log column
Pulmonary tuberculosis	Physicians, medical personnel, medical laboratory workers.	Tuberculous lesion; chest pain; coughing; bloody and pus-like sputum; hectic fever; weight loss; or night sweats.	Mycobacterium tuberculosis	7c
Silico-tuberculosis	Quarrymen, sandblasters, silica, processors, mining, metal foundries, ceramic industry.	Decrease in maximum breathing capacity; massive fibrosis; pronounced, energetic or labored respiration with low oxygen content in arteries producing bluish skin and mucous membrane discolorations; bloodstained sputum; attacks of bronchopneumonia; malaise; disturbed sleep; anorexia; chest pains; or hoarseness.	S.O2, Mycobacterium tuberculosis	7b
Plague	Shepherds, farmers, ranchers, hunters, field geologists, medical laboratory workers.	Acutely inflamed and painful lymph nodes; pulmonary lesions; cough; chills; 103°-106° F temperature; rapid and thready pulse, hypertension; restlessness; delirium; confusion; incoordination; headache; vomiting; or diarrhea.	Yersinia pestis via bite of infected flea, wild rodents, or inhalation.	7g
Tularemia	Hunters, fur handlers, sheep industry workers, cooks, veterinarians, ranchers, veterinary pathologists, forestry workers, farmers, butchers, laboratory workers.	Ulcer at bite site followed by inflammation of regional lymph nodes; a nonspecific rash; headache; muscle pains; chills; nausea; vomiting and rapid rise in temperature to 103°-104° F with severe prostration; extreme weakness; and drenching sweats—all symptomatic of a typhoid-like state; bacteremia; and atypical pneumonia.	Francisella tularensis via bite of flies, fleas, ticks, and lice or handling infected animals.	7g
Anthrax (diagnosis often hinges upon determination of occupation).	Shepherds, farmers, butchers, handlers of imported hides or furs, veterinarians, veterinary pathologists, weavers.	<b>Cutaneous Form:</b> Red-brown papule skin eruption which enlarges with red patches of variable size and shape; pus-like pimples; and hardening of tissue. Progressive ulceration follows with blood and pus bursting from the pimples and dead tissue forming. Local lymph node enlargement is accompanied by general feeling of illness; muscle pain; headache; fever; nausea; and vomiting. <b>Pulmonary Form:</b> Symptoms are insidious, suggesting an influenza-like illness. Increased fever is followed in 1-3 days by severe respiratory distress with bluish-purple discoloration of mucous membranes and skin; shock; and coma.	Bacillus anthracis	7g
Brucellosis	Farmers, shepherds, veterinarians, laboratory workers, slaughterhouse workers.	Remittant undulatory evening fever for 1-5 weeks; headaches and back-of-neckaches; morning sweats with lowered fever; weakness and aching without localizing findings. Is repetitive with remissions over months or years. Cervical pain; constipation; occasional diarrhea; anorexia; weight loss; irritability; insomnia; mental depression; emotional instability. Enlarged spleen and lymph nodes may occur.	Brucella abortus, suis	7g
Tetanus	Farmers, ranchers	Lockjaw; spasms, primarily of masseter and neck muscles and secondarily of the back muscles; stiffness of the jaw; restlessness; irritability; constipation; stiff neck; difficulty in swallowing; stiff arms or legs; headache; fever; sore throat; chilliness; painful convulsions.	Clostridium tetani	7g
Rubella	Medical personnel, intensive care personnel.	Pale pink rash or measles-like eruptions following slight fever and inflammation of mucous membranes of head, nose, throat; sore throat; pains in limbs; cough; intense intolerance of light.	Rubella virus	7g
Hepatitis A (infectious)	Day care center staff, orphanage staff, mental retardation institution staff, medical personnel.	Anorexia; fever; liver enlargement and tenderness; generalized debilitation; drowsiness; nausea; headache; occasionally jaundice.	Hepatitis A virus	7g
Hepatitis B (serum)	Nurses and aides, anesthesiologists, orphanage and mental institution staff, medical laboratory personnel, general dentists, oral surgeons, physicians.	Flu-like feeling; weakness; drowsiness; anorexia; nausea; abdominal discomfort; fever; headache; definite jaundice.	Hepatitis B virus	7g
Non-A, non-B hepatitis (toxic)	As above for hepatitis A & B	Nausea; vomiting; jaundice; stupor; coma; toxic effects on kidney, brain, or bone marrow may be more conspicuous.	Unknown; suspected drugs and chemicals include: carbon tetrachloride, insecticides, industrial solvents, and various metallic compounds (arsenic, gold, mercury, iron).	7g

Condition	Industry and/or occupation	Symptoms	Agent	Log column
Rabies	Veterinarians, animal and game wardens, lab researchers, farmers, ranchers, trappers, cave explorers, delivery personnel.	Malaise or general feeling of illness or discomfort; depression of spirits; swelling of lymphatics around wound; choking; spasmodic catching of breath, succeeded by increasing spasms, especially of the muscles of respiration and swallowing, which are increased by attempts to drink water or even by sight of water. Also, fever; headache; mental derangement; nausea; vomiting; profuse secretion of a sticky saliva; and albumin in the urine. Usually fatal within 2-5 days.	Rabies virus	7g
Ornithosis	Psittacine bird (parrot and parakeet) breeders, pet shop staff, poultry producers, veterinarians, zoo employees, taxidermists, laboratory and hospital personnel.	Chills; headache; dry cough; feverish with slow pulse; lethargy; insomnia; abnormal fear of light; sore throat; nausea; vomiting; diarrhea; protein in urine; anorexia; abnormal white blood cell count; enlarged but non-tender liver; and commonly, inflammation of lungs. Severe cases include muscle pain with stiffness and spasms; delirium and stupor.	Chlamydia psittaci	7g
Hemangiosarcoma of the liver	Vinyl chloride polymerization industry, wineries (winemaker).	A malignant tumor composed of cancerous thin and flat scale-like cells forming vessel-like spaces in some instances.	Vinyl Chloride Monomer; arsenical pesticides	7g
Malignant neoplasm of nasal cavities	Woodworkers, cabinet and furniture makers, boot and shoe industry, radium chemists and processors, dial painters, chromium producers, processors, users, nickel-smelting and refining.	Malignant tumor; headache; pain; paralysis of the lateral rectus muscle of the eye.	Hardwood dusts; unknown; radium; chromates; nickel.	7g
Malignant neoplasm of larynx	Asbestos industries and utilizers.	Hoarseness; acute laryngitis; polyp of a vocal cord; dropped voice pitch which becomes monotone; voicelessness; difficult or labored breathing.	Asbestos	7g
Malignant neoplasm of trachea, bronchus, and lung	Asbestos industry and utilizers, topside coke oven workers, uranium fluor spar miners, chromium producers and processors, users, nickel smelters, processors, users, smelters, mustard gas formulators, ion exchange resin makers, chemists.	Chronic cough; localized wheeze; collapsed portion of lung with shrinkage of chest wall and diminution of chest movement and breath sounds; scanty and mucoid sputum unless an infection away from bronchial obstruction occurs; occasional spitting of blood or bloody sputum; severe, constant, nonpleuritic, unilateral pain; sometimes a remote metastasis, especially in the brain, occurs; advanced state-weight loss, anorexia, weakness, hoarseness, bone pain.	Asbestos; coke oven emissions; radon daughters; chromates; nickel; arsenic mustard gas; bis(chloromethyl) ether chloromethyl methyl ether.	7g
Mesothelioma (MN of peritoneum) (MN of pleura)	Asbestos industries and utilizers.	Primary tumor composed of cells similar to those forming lining of the peritoneum, pericardium, or pleura.	Asbestos	7g
Malignant neoplasm of bone	Dial painters, radium chemists, and processors.	Fracture may be first clue to bone cyst, pain swelling.	Radium	7g
Malignant neoplasm of scrotum	Automatic lathe operators, metalworkers; coke oven workers, petroleum refiners, tar distillers, chimney sweeps.	Scrotal mass progressively increasing in size; sometimes associated with pain; minor trauma; hemorrhaging may produce extreme local pain and tenderness.	Mineral/Cutting Oils; soots and tars, tar distillates.	7g
Malignant neoplasm of bladder	Rubber and dye workers.	Discharge of blood or pus-filled urine; pain or burning while urinating; colicky pain accompanying obstruction; frequent urination.	Benzidine, alpha and beta naphthylamine, auramine, magenta, aminobiphenyl, 4-Nitrophenyl.	7g
Malignant neoplasm of kidney, other, and unspecified urinary organs	Coke oven workers.	Pain; malignant mass or tumor of the connective tissues, muscles, urogenital system, vascular system, and epithelial lining of the oelom; discharge of bloody urine; fever; anorexia; nausea; vomiting; hypertension.	Coke oven emissions	7g
Lymphoid leukemia, acute	Rubber industry, radiologists.	Abrupt onset of fever with secondary infection of mouth, throat, or lungs; joint pains; thrombocytopenia (decrease in absolute number of platelets below normal) may cause minute rounded spots of hemorrhage on skin, mucous membrane, or organ, and discoloration of skin due to blood vessel rupture, plus bleeding from mouth, nose, kidneys, and bowel. Moderate enlargement of liver, spleen, and lymph nodes and progressive weakness and pallor.	Unknown; ionizing radiation	7g
Myeloid leukemia, acute	Occupations with exposure to benzene, radiologists.	Fatigue; weakness; anorexia; weight loss; moderately enlarged spleen causing epigastric stress or a heavy feeling; sternal tenderness reflects hypercellularity of the marrow; minor lymph node enlargement; thrombocytopenia (decrease in absolute number of blood platelets below normal) followed by hemostasis (arrest of a flow of blood or hemorrhage).	Benzene; ionizing radiation	7g
Erythroleukemia	Occupations with exposure to benzene.	Rare form of leukemia in which multiple hemorrhages, especially from the base of the tongue and gums occur; plus an uninterrupted fall of both the white and red blood cell count of the blood; fever; aplastic anemia.	Benzene	7g
Hemolytic Anemia, nonauto-immune	Whitewashing and leather industry, electrolytic processes, arsenical ore smelting, plastics industry, dye, celluloid, resin industry.	Weakness; vertigo; headache; tinnitus; spots before the eyes; easy fatigability; drowsiness; irritability; euphoria; psychotic behavior; occasionally amenorrhea (absence of menstruation); loss of libido; or low-grade fever; gastrointestinal complaints and congestive heart failure. Characterized by jaundice; enlargement of the spleen; and evidence of accelerated blood destruction. Hemolytic crises are accompanied by malaise, chills, and fever; aching in the extremities, back, and abdomen; and the presence of hemoglobin and methoglobin in the urine which is diminished in the amount excreted over 24 hrs. if the blood destruction is intravascular. In chronic hemolytic anemia, liver enlargement and pigment gallstones as well as chronic leg ulcers are often seen.	Copper sulfate; arsine; trimellitic anhydride; Naphthalene.	7d
Aplastic anemia	Explosives manufacturer, occupations with exposure to benzene, radiologists, radium chemists and dial painters.	Usually insidious, but can be explosive in development. Waxy pallor of skin and mucous membranes. Chronic cases show brown skin pigmentation. If decrease in absolute number of platelets is below normal (thrombocytopenia), blood may rupture into mucous membranes and skin. Hemorrhages into ocular fundi are frequent. Severe sore throat associated with sharp reduction in number of granulocytes (agranulocytic agranulocytosis) may occur. Spleen enlargement is absent.	TNT; Benzene; ionizing radiation	7d 7e

Condition	Industry and/or occupation	Symptoms	Agent	Log column
Agranulocytosis or neutropenia	Occupations with exposure to benzene, explosives and pesticide industries, pesticides, pigments, pharmaceuticals.	Acute disease characterized by marked leukopenia and neutropenia (below normal number of leukocytes and neutrophils per unit volume of peripheral blood) and with ulcerative lesions of the throat and other mucous membranes, of the gastrointestinal tract and of the skin. Two or three days of fatigue or overpowering weakness is followed by general ill feeling, chills, high fever, rapid weak pulse, sore throat, difficulty in swallowing, ulcers of the oral mucosa, and ulcerations of the pharyngeal and buccal mucosae. Prostration is extreme. Regional lymph disease but no enlargement of nodes, liver, or spleen. Fatal.	Benzene; phosphorus; inorganic arsenic.	7d
Methemoglobinemia (attacks usually develop some hours after employee has left plant and rarely during work.)	Explosives and dye industries.	The oxidized form of hemoglobin, in which the iron atom is trivalent, and which is not able to combine reversibly with oxygen. Formation of large amounts of methemoglobin prevents the normal function of hemoglobin, that of transporting oxygen in the body thus causing asphyxia of the tissues. When large amounts are present, the blood becomes chocolate-brown in color. The skin takes on a bluish-gray color varying in intensity from lilac to a deep leaden hue, and quite different from the bluish-purple color of cyanosis due to a lack of oxygen. This distinctive tint is most noticeable on the cheeks, ears, tip of the nose, and fingernails. Sensation of weakness in the knees and a staggering gait follow. If destruction of the red blood cells is severe, anemia occurs and there may also be injuries to the kidney and liver. Jaundice and enlargement of the spleen may occur.	Aromatic amino and nitro compounds (aniline, TNT, nitroglycerin)	7d
Toxic encephalitis (noninfectious)	Battery, smelter, and foundry workers, electrolytic chlorine production, battery makers, fungicide formulators.	Rapid onset of fever, depression; loss of consciousness or coma; seizures; meningeal symptoms and signs may be accompanied by cerebral disorder, including alterations of consciousness, personality change, convulsions, tremor, muscle weakness of one side of the body (hemiparesis), and cranial nerve abnormalities, progressing within a few days to coma and death.	Lead; inorganic and organic mercury	7d
Parkinson's Disease (secondary)	Manganese processing, battery makers, welders, internal combustion engine industries.	Listlessness and sleepiness by day but insomnia by night; muscular pains, including cramps in the calves; unsteady gait; weakness and stiffness of the limbs; involuntary movements of the arms, legs, trunk, jaw, and head which may be severe enough to shake the bed; occasionally uncontrollable laughter or crying; impulsive acts such as running, dancing, singing, and uncontrolled talking; or forced movements such as falling without being able to catch oneself. Also, absentmindedness; mental confusion; hallucinations; and attacks of aggressiveness; irritability and euphoria; handwriting is tremulous, letters and words cramped, and micrographia is common; speech disturbances include run-on words and sentences, monotone voice, loss of speech (aphonia); impaired swallowing; masklike face; excessive salivation and sweating.	Manganese; carbon monoxide	7g
Cerebellar ataxia	Chemical industry using toluene, electrolytic chlorine production, battery makers, fungicide formulators.	Unsteadiness in walking; arm tremors; pyramidal tract involvement or posterior column disorder may be present; the motor neurons or peripheral nerves may be affected, sometimes optic atrophy, retinitis pigmentosa, paralysis of the eye muscles (ophthalmoplegia), nerve deafness, or mental deterioration. Skeletal changes (scoliosis or spinal curvature and pedal or foot abnormalities) are common.	Toluene; organic mercury	7g
Inflammatory and toxic neuropathy.	Pesticides, pigments, pharmaceuticals, furniture refinishers, degreasing operations, plastic-coated-fabric workers, explosives industry, rayon manufacturing, plastics, hydraulics, coke industries, battery, smelter, and foundry workers, dentists, chloralkali workers, chloralkali plants, fungicide makers, battery makers, plastics industry, paper manufacturing.	Numbness, tingling, and burning of feet and hands, followed by muscular weakness. There may also be a decrease in touch, pain, and temperature sensation in the feet and hands, and tendon reflexes may be diminished or absent.	Arsenic and arsenic compounds, hexanic; methyl N-butyl ketone; TNT, CS <sub>2</sub> ; tri-o-cresyl phosphates; inorganic lead; inorganic mercury; organic mercury; acrylamide	7g
Cataract	Microwave and radar technicians; explosives industries; radiologists; blacksmiths, glass blowers, bakers; moth repellent formulators, fumigators; explosives, dyes, herbicide and pesticide industries.	Progressive, painless loss of vision unless the cataract swells and produces secondary glaucoma. Well-advanced cataracts appear as gray opacities in the lens. Small ones stand out as dark defects in the red reflex.	Microwaves; ionizing radiation; infrared radiation; Naphthalene, Dinitrophenol, dinitro-o-cresol	7e 7e 7e 7g 7g
Noise effects on inner ear	Any industry and/or occupation involving exposure to excessive noise.	Tinnitus—hissing, ringing, buzzing, humming, thumping, whistling, or roaring in the ear—may be constant or intermittent and often accompanied by hearing loss. Clicking, cracking, or ticking sounds or abnormal or pathological sounds, originating within the patient's body (by a muscle contraction, etc.) in region of the ear and audible to others as well as to the patient.	Excessive noise	7f
Raynaud's phenomenon (secondary)	Lumberjacks, chain sawyers, grinders, chippers, vinyl chloride polymerization industry.	Intermittent pallor and sometimes bluish-purple discoloration (cyanosis) of the skin precipitated by exposure to cold, without clinical evidence of blockage of the large peripheral vessels and with nutritional lesions (if present at all, limited to the skin). Blanching and numbing when exposed to chilling weather or emotional upsets with probable loss of muscular control and reduction of sensitivity to heat, cold, and pain are main symptoms. Cyanosis and pain are rare. Gangrene and serious complications are very rare if, indeed, they occur at all.	Whole body or segmental vibration; vinyl chloride monomer.	7f
Extrinsic allergic alveolitis	Farmer's lung, bagassosis, bird fancier's lung, suberosis, malt worker's lung, mushroom worker's lung, maple bark disease, cheese washer's lung, coffee worker's lung, fish-meal worker's lung, furrier's lung, sequoiosis, wood worker's lung, miller's lung.	Difficult or labored breathing (dyspnea); fever; and oxygen deficiency (hypoxia) during acute phase lasting several weeks. Cough with scanty, black, stringy, occasionally bloody sputum; bluish-purple discoloration of mucous membranes (cyanosis); patchy infiltrates in the lung can also occur.	Various agents (usually a fungus or mold and dusty substances).	7g

Condition	Industry and/or occupation	Symptoms	Agent	Log column
Extrinsic asthma or allergic asthma.	Jewelry, alloy and catalyst makers, polyurethane, adhesive, paint workers, alloy, catalyst, refinery workers, solderers, plastic, dye, insecticide makers, foam workers, latex makers, biologists, printing industry, nickel platers, bakers, plastics industry, woodworkers, furniture makers, detergent formulators.	Sudden onset after exposure to an allergen. Sense of tightness in the chest due to spasmodic contraction of the bronchi; difficult or labored breathing (dyspnea); wheezing. Symptoms may subside in one hour or less, continue for several hours, or persist as status asthmaticus for many days. End of attack is marked by pronounced coughing with expectoration of thick, tenacious sputum, immediately followed by a sensation of relief and "clearing" of the air passages. Physical signs consist of prolongation of expiration and the presence of sonorous and sibilant rales throughout the chest; normal but labored respiration; markedly distended chest; bluish-purple discoloration of skin and mucous membranes (cyanosis). Between attacks breathing may be quiet, but forced expiration will produce sonorous or sibilant rales. Frequency and severity of attacks may be greatly influenced by secondary factors (e.g. changes in temperature and humidity); by exposure to noxious fumes; by fatigue; by endocrine changes (puberty, menstruation, pregnancy, menopause); by emotional stress. Since these secondary factors may perpetuate attacks, attention should be directed to their control.	Platinum; isocyanates; chromium and cobalt; aluminum soldering flux; phthalic anhydride; formaldehyde; gum arabic; NiSO <sub>4</sub> ; flour; trimellitic anhydride; red cedar and other wood dusts; bacillus-derived Exoenzymes.	7e
Coalworkers pneumoconiosis.	Coal miners	Black sput increasing in quantity as disease advances, jet-black nodules and cavities of the lung; chest becomes barrel-shaped and there may be clubbing of the fingers; right heart failure or silico-tuberculosis may supervene to cause death; disease is visualized by X-ray as fine, discrete pinhead mottling or nodulation or dense conglomerate shadows resembling angel's wings; eventually large fibrotic masses develop and difficult or labored breathing with cough may ensue.	Coal dust	7b
Asbestosis.	Asbestos industries and utilizers.	Progressive difficult or labored breathing (dyspnea), non-productive cough (little or no sputum), unless pulmonary TB is present yielding bloodstained sputum; slight pain between shoulders, under shoulder blades, or sternum; visualized by X-ray as fine pulmonary fibrosis enmeshed with asbestos bodies giving a ground glass appearance; increased susceptibility to lung cancer; pleural plaques and calcifications are often present in the fibrous tissues and emphysema is extensive, but localized to lower and apical parts of the lungs.	Asbestos	7b
Silicosis.	Quarrymen, sandblasters, silica processors, mining, metal and ceramic industries.	Discrete nodulation in the absence of emphysema is usually asymptomatic. It is the massive conglomerate fibrosis resulting from the coalescence of nodules that yields symptoms, difficult or labored breathing (dyspnea) which is progressively deeper and faster; dry cough; malaise; disturbed sleep; anorexia; chest pain; hoarseness; bluish discoloration of skin and mucous membranes (cyanosis); and bloodstained sputum with bronchopneumonia and subsequent bronchiectasis developing. TB often develops. Fever is rare. Physical signs (and loud pulmonic valve component of S2 hear sound, decreased chest expansion and excursion of diaphragm, breath sounds) are few or absent. Right heart failure or pus-producing bronchopneumonia will result in death.	Silica	7b
Talcosis.	Talc processors.	Difficult or labored breathing (dyspnea), X-ray yields nodular shadows distributed over both lungs; nodules show whorling different from silicosis and contain fiber-like structures arranged singly and in clumps.	Talc	7b
Chronic beryllium disease of the lung.	Beryllium alloy workers; ceramic and cathode ray tube makers, nuclear reactor workers (onset may be 5 years after exposure)	Morbid condition of the lungs, more rarely of the skin (conjunctivitis and dermatitis), subcutaneous tissue, lymph nodes liver, and other structures, characterized by formation of granulomas (tumors). Chronic granulomatous pneumoconiosis with thickening of alveolar walls. An acute transient inflammation of respiratory tract (nasal passages and pharynx) yielding nosebleeds, bronchitis or pneumonitis. Symptoms of respiratory insufficiency with diffusion difficulty (weakness, anorexia, weight loss, malaise, dyspnea or difficult or labored breathing, hyperpnea or deeper and faster breathing, cyanosis or bluish discoloration of skin or mucous membranes, and cough) are most prominent and out of proportion to physical or X-ray signs. Resembles miliary TB or pulmonary sarcoidosis.	Beryllium	7b
Byssinosis (develops over 10-year period working with raw or waste cotton.)	Cotton industry workers	Periodic bronchoconstriction or Monday morning fever with wheezing and difficult or labored breathing upon return to work after 2-day absence. Later develops into severe airway obstruction and impaired elastic recoil due to chronic bronchitis, and emphysema. Patient has overdistended lungs but no characteristic X-ray pattern or recognizable lung fibrosis or infiltration are seen. Diagnosis is established by measuring the patient's ventilatory capacity before he starts work on Monday and again no more than 1 hour after his work shift.	Cotton, flax, hemp, cotton-synthetic dusts.	7b
Acute, bronchitis, pneumonitis, and pulmonary edema due to fumes and vapors.	Refrigeration, fertilizer, oil refining industries, alkali and bleach industries, silo fillers, arc welders, nitric acid industry, paper and refrigeration industry, oil refining, cadmium smelters, processors, plastics industry.	Acute inflammation of the tracheo bronchial tree. Symptoms are those of acute URI: Inflammation of the mucous membranes of the nose, usually marked by sneezing, nasal airway congestion, and discharge of watery mucous (coryza); malaise; chilliness; slight fever; back and muscle pain; sore throat. Dry nonproductive cough signals bronchitis, later yielding a glutinous and mucous with pus-filled sputum. Fever to 101 or 102 F occurs for 3-5 days. Persistent occasional sibilant or crackling pulmonary sounds may suggest complications. Pulmonary edema: asthmatic wheezing; difficulty breathing except in upright position (orthopnea); pallor; sweating, bluish discoloration of skin and mucous membranes (cyanosis); frothy or pinkish sputum.	Ammonia; chlorine; nitrogen oxides; sulfur dioxide; cadmium; trimellitic anhydride.	7c

Condition	Industry and/or occupation	Symptoms	Agent	Log column
Toxic hepatitis	Solvent users, dry cleaners, plastics industry, explosives and dye industries, fire and waterproofing additive formulators, plastics formulators, fumigators, gasoline, fire extinguisher formulators, disinfectant, fumigant, synthetic resin formulators.	Nausea; vomiting; jaundice; stupor; and coma may follow exposure. Toxic effects on kidney, brain, or bone marrow may be more conspicuous than the hepatic involvement.	Carbon tet- rachloride, chloroform, tetrachloroethane, trichloroethylene; phosphorus TNT; chloronaphthalenes; methylene-diamine; ethylene dibromide, cresol.	7d
Acute or chronic renal failure	Battery makers, plumbers, solderers, electrolytic processes, arsenical ore-smelting, battery makers, jewelers, dentists, fluorocarbon formulators, fire extinguisher makers, antifreeze manufacture.	Failure to void; lumbar pain and tenderness; and analysis of urinary volume and the character of the urinary sediment is extremely valuable in differential diagnosis of acute renal failure. In obstruction, urinary sediment is scanty, with only occasional red and white blood cells or hyaline and granular casts. Proteinuria is minimal or absent. In <i>prerenal failure</i> , occasional hyaline and granular casts are found and proteinuria is minimal. Urinary sp. gr. is usually >1.020 and urinary sodium concentration <15 m Eq/L. In <i>acute tubular necrosis</i> numerous renal epithelial cells, cell casts, and coarsely granular casts are present. Hb and RBC casts are seen occasionally. Proteinuria is minimal or moderate. Urinary sp. gr. is usually <1.018 and sodium concentration >20 m Eq/L. In <i>acute glomerulonephritis and collagen diseases</i> , hematuria and RBC casts are characteristic and protein excretion is usually moderate or heavy.	Inorganic lead, arsine, inorganic mercury, carbon tetrachloride, ethylene glycol.	7d
Infertility, male	Formulators, DBCP producers, formulators, and applicators.	Physical examination and semen analysis are necessary to diagnosis and should include work history.	Kapone; dibromochloropropane	7d
Contact and allergic dermatitis	Leather tanning, poultry dressing plants, fish packing, adhesives and sealants industry, boat building and repair.	Transient redness to severe swelling and blister (bullae) formation; itching and vesiculation are practically always present. Vesicles and bullae rupture, ooze, and crust, followed by scaling and some temporary thickening of skin. Secondary infection, excoriation (skin abrasions), and reaction to treatment may complicate and induce a chronic eczematous dermatitis.	Irritants (e.g. cutting oils, solvents, phenol acids, alkalis, detergents); allergens (e.g., nickel, chromates, formaldehyde, dyes, rubber products).	7a

Rutstein DD, Mullan RJ, Frazier TM, Halperin WE, Mellus JM, Sestito JP. Sentinel health events (occupational): a basis for physician recognition and public health surveillance. *Amer J Public Health* 1983; 73(9):1054-1062.

#### Appendix D. Participating State Agencies

Agencies preceded by an asterisk (\*) are those in which, as of January 1, 1978, a State safety and health plan under section 18(b) of the act was in operation. This agency may be contacted directly for specific information regarding regulations in the State.

Alabama Department of Labor, 600 Administrative Building, Montgomery, Alabama 36130, Phone: 205-261-3460

\*Alaska Department of Labor, Research and Analysis Section, Post Office Box 1149, Juneau, Alaska 99802, Phone: 907-465-4520

Territory of American Samoa, Department of Manpower Resources, Government of American Samoa, Pago Pago, American Samoa 96799, Phone: 633-5849

\*Industrial Commission of Arizona, Division of Administration/Research and Statistics Section, 1601 W. Jefferson St., Post Office Box 19070, Phoenix, Arizona 85005, Phone: 602-255-3739

Arkansas Department of Labor, OSH Statistics, Room 502, 1022 High St., Little Rock, Arkansas 72202, Phone: 501-371-2770

\*California Department of Industrial Relations, Labor Statistics and Research, Post Office Box 603, San Francisco, California 94901, Phone: 415-557-1466

\*Colorado Department of Labor and Employment, Division of Labor, 1313 Sherman St., Room 323, Denver, Colorado 80203, Phone: 303-866-3748

\*Connecticut Department of Labor, 200 Folly Brook Boulevard, Wethersfield, Connecticut 06109, Phone: 203-566-4380

Delaware Department of Labor, Division of Industrial Affairs, 820 N. French Street, 6th Floor, Wilmington, Delaware 19801, Phone: 302-571-2888

Florida Department of Labor and Employment Security, Division of Workers' Compensation, 2551 Executive Center Circle West, Tallahassee, Florida 32301-5014, Phone: 904-488-3044

Guam Department of Labor, Bureau of Labor Statistics, Post Office Box 23548, Guam Main Facility, Agana, Guam 96921, Phone: 477-9241

\*State of Hawaii, Department of Labor and Industrial Relations, Research and Statistics Office, Post Office Box 3680, Honolulu, Hawaii 96811, Phone: 808-548-7638

\*Indiana Division of Labor, Department of Statistics, State Office Building—Room 1013, 100 N. Senate Avenue, Indianapolis, Indiana 46204, Phone: 317-232-2665

\*Iowa Bureau of Labor, 307 East 7th Street, Des Moines, Iowa 50319, Phone: 515-281-5151

Kansas Department of Health and Environment, Division of Policy and Planning, Occupational Safety and Health, Topeka, Kansas 66620, Phone: 913-862-9360 Ext. 280

\*Kentucky Labor Cabinet, Occupational Safety and Health Program, U.S. 127 South Building, Frankfort, Kentucky 40601, Phone: 502-564-3100

Louisiana Department of Labor, Office of Employment Security—OSH, 1001 North 23rd and Fuqua, Baton Rouge, Louisiana 70804, Phone: 504-342-3126

Maine Department of Labor, Bureau of Labor Standards, Division of Research and Statistics, State Office Building, Augusta, Maine 04330, Phone: 207-289-3331

\*Maryland Department of Licensing and Regulation, Division of Labor and Industry, 501 St. Paul Pl., Baltimore, Maryland 21202, Phone: 301-659-4202

Massachusetts Department of Labor and Industries, Division of Industrial Safety, 100 Cambridge Street, Boston, Massachusetts 02202, Phone: 617-727-3593

\*Michigan Department of Labor, 7150 Harris Drive, Secondary Complex, Post Office Box 30015, Lansing, Michigan 48909, Phone: 517-322-1848

\*Minnesota Department of Labor and Industry MSD, 444 Lafayette Road, 5th Floor, Saint Paul, Minnesota 55101, Phone: 612-296-4893

Mississippi State Department of Health, Division of Public Health Statistics, Post Office Box 1700, Jackson, Mississippi 39205, Phone: 601-354-7233

Missouri Department of Labor and Industrial Relations, Division of Workers' Compensation, Post Office Box 58, Jefferson City, Missouri 65102, Phone: 314-751-4231

Montana Department of Labor and Industry, Workers' Compensation Division, 5 South Last Chance Gulch,

- Helena, Montana 59601, Phone: 406-444-6515
- Nebraska Workers' Compensation Court, State Capitol, 12th Floor, Lincoln, Nebraska 68509-4967, Phone: 402-471-3547
- \*Nevada Department of Industrial Relations, Division of Occupational Safety and Health, 1370 South Curry St., Carson City, Nevada 89710, Phone: 702-885-5240
- New Jersey Department of Labor and Industry, Division of Planning and Research, C N 056, Trenton, New Jersey 08625, Phone: 609-292-8997
- \*New Mexico Health and Environment Department, Environmental Improvement Division, Occupational Health and Safety, Post Office Box 968—Crown Building, Santa Fe, New Mexico 87504-0968, Phone: 505-827-5271 Ext. 230
- New York Department of Labor, Division of Research and Statistics, 2 World Trade Center, New York, New York 10047, Phone: 212-486-4661
- \*North Carolina Department of Labor, Division of Statistics, 4 West Edenton Street, Raleigh, North Carolina 27601, Phone: 919-733-4940
- Ohio Department of Industrial Relations, OSHA Survey Office, Post Office Box 12355, Columbus, Ohio 43212, Phone: 614-466-7520
- Oklahoma Department of Labor, Supplemental Data Division, 118 State Capitol Building, Oklahoma City, Oklahoma 73105, Phone: 405-521-2461
- \*Oregon Workers' Compensation Department, Research and Statistical Section, Labor and Industries Building, Salem, Oregon 97310, Phone: 503-378-8254
- Pennsylvania Department of Labor and Industry, Office of Employment Security, 7th and Forster Sts., Labor and Industry Building, Harrisburg, Pennsylvania 17121, Phone: 717-787-1918
- \*Puerto Rico Department of Labor and Human Resources, Bureau of Labor Statistics, 505 Munoz Rivera Avenue, San Juan, Puerto Rico 00918, Phone: 809-754-5339
- Rhode Island Department of Labor, Division of Workers' Compensation, 220 Elmwood Avenue, Providence, Rhode Island 02907, Phone: 401-277-2731
- \*South Carolina Department of Labor, Division of Technical Support, Post Office Box 11329, Columbia, South Carolina 29211, Phone: 803-758-8507
- \*Tennessee Department of Labor, Research and Statistics, 501 Union Building, 2nd Floor, Nashville, Tennessee 37219, Phone: 615-741-1748
- Texas Department of Health, Division of Occupational Safety, 1100 West 49th Street, Austin, Texas 78756, Phone: 512-458-7287
- \*Utah Industrial Commission, OSH Statistical Section, 160 East 300 South, Salt Lake City, Utah 84110-5800, Phone: 801-530-8827
- \*Vermont Department of Labor and Industry, State Office Building, Montpelier, Vermont 05602, Phone: 802-828-2765
- \*Virgin Islands Department of Labor, Post Office Box 818, St. Thomas, Virgin Islands 00801, Phone: 809-776-3700
- \*Virginia Department of Labor and Industry, Research and Statistics, 205 North 4th Street, Post Office Box 12064, Richmond, Virginia 23241, Phone: 804-786-2384
- \*State of Washington, Department of Labor and Industries, Division of Industrial Safety and Health, Post Office Box 2589, Olympia, Washington 98504, Phone: 206-753-4013
- West Virginia Department of Labor, Division of Labor Statistics, Room B437, Building Six, Capitol Complex, 1900 Washington Street East, Charleston, West Virginia 25305, Phone: 304-348-7890
- Wisconsin Department of Industry, Labor, and Human Relations, Workers' Compensation Division/Research Section, 201 E. Washington Avenue, Post Office Box 7901, Madison, Wisconsin 53707, Phone: 608-266-7850
- \*Wyoming Department of Labor and Statistics, Herschler Building, Cheyenne, Wyoming 82002, Phone: 307-777-6370

#### Appendix E. United States Department of Labor, Occupational Safety and Health Administration—Regional Offices

The list below gives addresses and telephone numbers for OSHA Regional Offices. Complete information on field locations may be obtained from any OSHA Regional Office.

- Region I: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont  
1 Dock Square Building, 4th Floor, 16-18 North Street, Boston, Massachusetts 02109, Phone: 617-223-6710
- Region II: New Jersey, New York, Puerto Rico, Virgin Islands  
1515 Broadway, Room 3445, New York, New York 10036, Phone: 212-944-3432
- Region III: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia  
Gateway Building, Suite 2100, 3535 Market Street, Philadelphia, Pennsylvania 19104, Phone: 215-596-1201

Region IV: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee  
1375 Peachtree Street, N.E., Suite 587, Atlanta, Georgia 30367, Phone: 404-881-3573

Region V: Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin  
230 South Dearborn Street, Room 3244, Chicago, Illinois 60604, Phone: 312-353-2220

Region VI: Arkansas, Louisiana, New Mexico, Oklahoma, Texas  
555 Griffin Square Building, Room 602, Dallas, Texas 75202, Phone: 214-767-4731

Region VII: Iowa, Kansas, Missouri, Nebraska  
911 Walnut Street, Room 406, Kansas City, Missouri 64106, Phone: 816-374-5861

Region VIII: Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming  
Federal Building, Room 1554, 1961 Stout Street, Denver, Colorado 80294, Phone: 303-837-3061

Region IX: Arizona, California, Hawaii, Nevada, American Samoa, Guam, Trust Territory of the Pacific Islands  
450 Golden Gate Avenue, Box 36017, San Francisco, California 94102, Phone: 415-556-7260

Region X: Alaska, Idaho, Oregon, Washington  
Federal Office Building, Room 6003, 909 First Avenue, Seattle, Washington 98174, Phone: 206-442-5930

#### Recordkeeping Summary

Basic recordkeeping concepts and guidelines are included with instructions on the back of form OSHA No. 200. The following summarizes the major recordkeeping concepts and provides additional information to aid in keeping records accurately.

#### General Concepts of Recordability

1. An injury or illness is considered work related if it results from an event of exposure in the work environment. The work environment is primarily composed of: (1) The employer's premises, and (2) other locations where employees are engaged in work-related activities or are present as a condition of their employment. *When an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed.* The employer's premises encompass the total establishment. This includes not only the primary facility, but also such areas as company storage facilities and company parking lots. In addition to physical locations, equipment or materials used in the

course of an employee's work are also considered part of the employee's work environment.

2. All work-related fatalities are recordable.

3. All recognized or diagnosed work-related illnesses are recordable.

4. All work-related injuries requiring medical treatment or involving loss of consciousness, restriction or work or motion, or transfer to another job are recordable.

#### Analysis of Injuries

*Recordable and nonrecordable injuries.* Each case is distinguished by the treatment provided; i.e., if the injury was such that *medical treatment* was provided or should have been provided, it is recordable; if only first aid was required, it is not recordable. *However, medical treatment is only one of several criteria for determining recordability.* Regardless of treatment, if the injury involved loss of consciousness, restriction of work or motion, transfer to another job, or termination of employment, the injury is recordable. (See chart 1 on p. 28.)

*Medical treatment.* The following procedures are generally considered medical treatment. Injuries for which this type of treatment was provided or should have been provided are almost always recordable if the injury is work related.

- Treatment of infection.
- Application of antiseptics during SECOND OR SUBSEQUENT VISITS to medical personnel.
- Treatment of second or third degree burn(s).
- Application of butterfly adhesive dressing(s).
- Application of sutures (stitches).
- Removal of foreign bodies embedded in eye.
- Removal of foreign bodies from wound; if procedure is complicated because of depth of embedment, size, or location.
- Use of prescription medications.
- Use of hot or cold soaking therapy during SECOND OR SUBSEQUENT VISIT to medical personnel.
- Application of hot or cold compress(es) during SECOND OR SUBSEQUENT VISIT to medical personnel.
- Cutting away dead skin (surgical debridement).
- Application of HEAT THERAPY during second or subsequent visit to medical personnel.
- Use of WHIRLPOOL BATH THERAPY during second or subsequent visit to medical personnel.
- Positive x-ray diagnosis.

—Admission TO HOSPITAL FOR OBSERVATION or equivalent medical facility for treatment or prolonged observation.

*First aid treatment.* The following procedures are generally considered first aid treatment (e.g., one-time treatment and subsequent observation of minor injuries) and need not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion or transfer to another job.

- Application of antiseptics during FIRST VISIT to medical personnel.
- Treatment of FIRST DEGREE burn(s).
- Application of bandage(s) during any visit to medical personnel.
- Use of elastic bandage(s) during first visit to medical personnel.
- Removal of foreign bodies not embedded in eye if only irrigation is required.
- Removal of foreign bodies from wound if procedure is UNCOMPLICATED, and is, for example, by tweezers or other simple technique.
- Use of nonprescription medications.
- Soaking therapy on initial visit to medical personnel or removal of bandages by soaking.
- Application of hot or cold compress(es) during FIRST VISIT to medical personnel.
- Application of ointments to abrasions to prevent drying or cracking.
- Application of HEAT THERAPY during first visit to medical personnel.
- Use of WHIRLPOOL BATH THERAPY during first visit to medical personnel.
- Negative X-ray diagnosis.
- Brief observation of injury during visit to medical personnel.

The following procedure, by itself, is not considered medical treatment: —Administration of tetanus shot(s) or booster(s). However, employers should note that these shots are often given in conjunction with the more serious injuries. Consequently, injuries requiring tetanus shots may be recordable for other reasons.

*Reminder: Work-related injuries requiring only first aid treatment and that do not involve any of the conditions in item 4 above, are not recordable.*

The following is a list of subjects that will constitute the index when this document is published in final form. The list has been included to allow for comment on the substantive issues listed. Page numbers have not been included because this version has been formatted for inclusion in the **Federal Register**. However, page numbers will appear in the final version of this document.

- Access to OSHA records
- Agriculture
- Annual Survey of Occupational Injuries and Illnesses:
- ANSI Z.16
- Asbestos
- Athletic events
- Bankruptcy
- Bureau of Labor Statistics, Authority over OSHA recordkeeping system
- Business, Definition of
  - Dissolution
  - Restructuring
- Centralized recordkeeping
- Certification
- Change of ownership
- Confidentiality
- Coverage of the OSH Act of 1970
  - Airplanes
  - Commerce, Establishments affecting
  - Employers of household workers
  - Employment
  - Farms
  - Geographic boundaries
  - Migrant labor camps
  - Mines
  - Nonprofit organizations
  - Private residences
  - Railroads
  - Religious establishments
  - Sheltered workshops
  - Ships
  - State and local government agencies
  - Workplace
- Decisionmaking authority
  - Legal liability of
  - Disagreement with
- Decision making criteria for recordability
- 18-B States
- Employees:
  - Airline personnel
  - Associated with fixed establishments
  - Associated with nonfixed establishments
- Charitable organizations, employees of
- Clergy
- Definition of
- Domestic workers
  - Farmers
  - Farmhands
  - Household workers
  - Independent contractors, Employees of
  - Migrant workers
  - Nonprofit organizations, Employees of
  - Public school employees
  - Railroad workers
  - Ranchhands
  - Secular employees of religious organizations
  - Sheltered workshop workers
  - Ship's crew
  - State and local government employees
  - Students
  - Teachers
  - Temporary help supply services
  - Travel status, Workers on
  - Volunteer workers
- Employers:
  - Charitable organizations
  - Definition of
  - Educational institutions
  - Employers required to maintain OSHA records
  - Exempted small employers, etc.
  - Farmers
  - Low hazard industries

Motor carriers	Occupational Safety and Health (OSHA) Standards	1975	
New owner	Office of Management and Budget (OMB)	Reporting of a fatality or multiple hospitalization	
Nonprofit organization	Penalties for recordkeeping violations	Restricted work activity	
Partners	Posting an annual summary	Retention of OSHA records	
Private sector	Premises	Seasonal employment	
Public sector	Leased	Sentinal Health Event (SHE)	
Railroads	Right-of-way	Small employers	
Ranchers	Preventability of injuries and illnesses	Standard Industrial Classification (SIC) Manual	
Self-employed	Recordable case	State plan-18(b)	
Small	Recordability:	Statistics, Availability of	
Stockholders	Adverse reaction	Summary, Annual	
Establishment:	Asbestos-related disorders	Supplementary record—OSHA No. 101:	
Definition of	Backaches	Equivalents to	
Discontinued, dissolved, reorganized	Back injuries	Instructions for completing	
Fixed	Bruises	Recordkeeping requirements	
Nonfixed	Burns	Survey, Annual	
Exemptions to recordkeeping requirements	Carpal tunnel syndrome	Survey form—OSHA No. 200S	
Geographic coverage	Chiropractor, Treatment by	Survey selection	
Low-hazard industries	Decisionmaking criteria for	Temporary employees	
Small employers	Discovery after termination of retirement	Termination of employment	
Survey selection	Disputed cases	Transfer to another job	
Farm labor	Dog bites	Travel status	
Fatalities	Exposures to harmful substances	Volunteer workers	
Federal Register	Eye deterioration	Warehouse facilities	
Firm	Fatalities	Work environment	
First aid treatment	Fault, Based on who was at	Work relationship:	
First report of injury or illness	Fibrosis	On premises	
Forms	First aid treatment	Off premises	
Government access	Follow-up visits to doctor	Travel status	
Hours worked	Fractures	Workers' compensation	
Illnesses	Hearing loss	Worksite	
Diagnosis	Heart attacks		
Recognition	Hernia		
Incident rates	High blood pressure		
Injuries	Horseplay		
Injuries vs. illnesses	Hospitalization for observation		
Interstate commerce	Hospitalization of 5 or more employees		
Location of records	Identifiable event		
Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200):	Injuries and illnesses occurring outside of normal work duties		
Certification	Injuries and illnesses occurring while off duty		
Equivalents to log and summary	Inoculations		
Instructions for completing log	Lead, Elevated blood-lead level		
Instructions for completing summary	Loss of consciousness		
Lining out entries	Lost worktime for travel to doctor's office		
Location exception for	Medical treatment		
Microfiche and magnetic tape	Nonprescription medications		
Posting requirements (summary)	Observation of injury		
Recording requirements (log)	Poison ivy		
Recording requirements (summary)	Pre-existing physical condition		
Lost workday cases	Prescription medications		
Disability	Preventive medicine		
Longterm medical restrictions	Preventive transfer		
Overtime	Prosthetic devices, Damage to		
Retirement	Rabies vaccinations		
State health laws	Recurrence of previous injury or illness		
Strike	Repeated trauma		
Substituting vacation time	Restriction of work or motion		
Work stoppage	Sentinal Health Event (SHE)		
Low-hazard industries	Stress, Work related		
Maintenance of OSHA records	Teeth, Chipped or broken		
Medical treatment	Tetanus shot		
Mine Safety and Health Act (MSHA)	Time limits on recording cases		
Multiple establishments	Transfer to another job		
Multiple hospitalizations	Vaccinations		
National Institute of Occupational Safety and Health (NIOSH)	Work relationship		
Nonfatal cases without lost workdays	X-ray		
Occupational Safety and Health (OSHA) Act of 1970	Records, Consolidation of		
Occupational Safety and Health Administration (OSHA):	Reference Year		
Compliance officers	Regulations (29 CFR)		
Relationship to recordkeeping system	1903		
Occupational Safety and Health (OSHA)	1904		
Review Commission	1952		
	1956		
		Reporting of a fatality or multiple hospitalization	
		Restricted work activity	
		Retention of OSHA records	
		Seasonal employment	
		Sentinal Health Event (SHE)	
		Small employers	
		Standard Industrial Classification (SIC) Manual	
		State plan-18(b)	
		Statistics, Availability of	
		Summary, Annual	
		Supplementary record—OSHA No. 101:	
		Equivalents to	
		Instructions for completing	
		Recordkeeping requirements	
		Survey, Annual	
		Survey form—OSHA No. 200S	
		Survey selection	
		Temporary employees	
		Termination of employment	
		Transfer to another job	
		Travel status	
		Volunteer workers	
		Warehouse facilities	
		Work environment	
		Work relationship:	
		On premises	
		Off premises	
		Travel status	
		Workers' compensation	
		Worksite	
		<b>ORDER FORM</b>	
		Address Label,	
		Type/Print	
		Name/Firm _____	
		Street Address _____	
		City, State, Zip Code _____	
			<i>Quantity</i>
		Recordkeeping pamphlet—Recordkeeping Requirements Under the Occupational Safety and Health Act of 1970..	_____
		OSHA No. 200 Forms.....	_____
		OSHA No. 101 Forms.....	_____
		Recordkeeping Guidelines for Occupational Injuries and Illnesses.....	_____
		Recordkeeping Guidelines for Occupational Injuries and Illnesses: Ready Reference.....	_____
		Please complete this form and mail it to the appropriate BLS regional office listed on the back cover of this report.	
		<b>United States Department of Labor</b>	
		<b>Bureau of Labor Statistics—Regional Offices</b>	
		Region I—Boston, John F. Kennedy Federal Building, Boston, Massachusetts 02203, Phone: (617) 223-4533	
		Connecticut	
		Maine	
		Massachusetts	
		New Hampshire	
		Rhode Island	
		Vermont	

Region II—New York, Suite 3400, 1515  
Broadway, New York, New York 10036,  
Phone: (212) 944-3121

New Jersey  
New York  
Puerto Rico  
Virgin Islands

Region III—Philadelphia, 3535 Market Street,  
Post Office Box 13309, Philadelphia,  
Pennsylvania 19101, Phone: (215) 596-  
1162

Delaware  
District of Columbia  
Maryland  
Pennsylvania  
Virginia  
West Virginia

Region IV—Atlanta, 7371 Peachtree Street,  
N.E., Suite 540, Atlanta, Georgia 30367,  
Phone: (404) 881-3660

Alabama  
Florida  
Georgia  
Kentucky  
Mississippi

North Carolina  
South Carolina  
Tennessee

Region V—Chicago, 9th Floor, Federal Office  
Building, 230 South Dearborn Street,  
Chicago, Illinois 60604, Phone: (312) 353-  
6911

Illinois  
Indiana  
Michigan  
Minnesota  
Ohio  
Wisconsin

Region VI—Dallas, 2nd Floor, 555 Griffin  
Square Building, Dallas, Texas 75202,  
Phone: (214) 767-6956

Arkansas  
Louisiana  
New Mexico  
Oklahoma  
Texas

Regions VII and VIII—Kansas City, 911  
Walnut Street, Kansas City, Missouri  
64108, Phone: (816) 374-2481

Colorado

Iowa  
Kansas  
Missouri  
Montana  
Nebraska  
North Dakota  
South Dakota  
Utah  
Wyoming

Regions IX and X—San Francisco, 450  
Golden Gate Avenue, Box 36017, San  
Francisco, California 94102, Phone: (415)  
556-8980

Alaska  
American Samoa  
Arizona  
California  
Guam  
Hawaii  
Idaho  
Nevada  
Oregon  
Washington

FR Doc. 85-16664 Filed 7-16-85; 8:45 am]

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# **federal register**

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Wednesday  
July 17, 1985

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## **Part IV**

### **Environmental Protection Agency**

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40 CFR Part 761

Polychlorinated Biphenyls in Electrical  
Transformers; Final Rule

**ENVIRONMENTAL PROTECTION  
AGENCY**
**40 CFR Part 761**
**[OPTS 62035D; TSH FRL 2835-6]**
**Polychlorinated Biphenyls in Electrical  
Transformers**
**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Final rule.

**SUMMARY:** This final rule amends portions of an existing EPA rule concerning the use of polychlorinated biphenyls (PCBs) by placing additional restrictions and conditions on the use of PCB Transformers (Electrical transformers containing 500 parts per million or greater PCBs). This rule: (1) Prohibits the use of higher secondary voltage (480 volts and above) network PCB Transformers in or near commercial buildings after October 1, 1990, (2) requires, by October 1, 1990, the installation of enhanced electrical protection on lower secondary voltage network PCB Transformers and higher secondary voltage radial PCB Transformers in use in or near commercial buildings, (3) prohibits further installation of PCB Transformers in or near commercial buildings after October 1, 1985, (4) requires the registration, by December 1, 1985, of all PCB Transformers with fire response personnel and building owners, (5) requires the marking, by December 1, 1985, of the exterior of all PCB Transformer locations, and (6) requires the removal, by December 1, 1985, of stored combustibles located near PCB Transformers.

EPA is also requiring that owners of PCB Transformers involved in fire-related incidents immediately notify the National Response Center, and, take measures as soon as practically and safely possible to contain any potential releases of PCBs or incomplete combustion products to water.

**DATES:** In accordance with 40 CFR 23.5 (50 FR 7271), this rule shall be promulgated for purposes of judicial review at 1 p.m. Eastern Daylight Time on July 24, 1985. These amendments shall be effective on August 16, 1985.

**FOR FURTHER INFORMATION CONTACT:** Edward A. Klein, Director, TSCA Assistance Office (TS-799), Office of Toxic Substances, Environmental Protection Agency, Rm. E-543, 401 M St., SW., Washington, D.C. 20460. Toll free: (800-424-9065). In Washington, D.C.: (554-1404). Outside the USA: (Operator 202-554-1404).

**SUPPLEMENTARY INFORMATION:** OMB Control Number: 2070-0073.

**I. Background**

Section 6(e) of the Toxic Substances Control Act (TSCA) generally prohibits the use of PCBs after January 1, 1978. The statute does, however, set forth two exceptions under which EPA may, by rule, allow a particular use of PCBs to continue. Under section 6(e)(2) of TSCA, EPA may allow PCBs to be used in a "totally enclosed manner." A "totally enclosed manner" is defined by TSCA to be "any manner which will ensure that any exposure of human beings or the environment to a polychlorinated biphenyl will be insignificant, as determined by the Administrator by rule." TSCA also allows EPA to authorize the use of PCBs in a manner other than a totally enclosed manner if the Agency finds that the use "will not present an unreasonable risk of injury to health or the environment."

EPA promulgated a rule, which was published in the *Federal Register* of May 31, 1979 (44 FR 31514), to implement section 6(e) (2) and (3) of TSCA. This rule is listed in the Code of Federal Regulations under 40 CFR Part 761. The rule, among other provisions, designated all intact, nonleaking capacitors, electromagnets, and transformers, other than railroad transformers, as "totally enclosed," thus permitting their use without specific authorizations or conditions. The Environmental Defense Fund (EDF) petitioned the U.S. Court of Appeals for the District of Columbia Circuit to review a number of provisions of the rule, including the portion of the rule that designated all intact and nonleaking capacitors, electromagnets, and transformers as "totally enclosed" (*Environmental Defense Fund, Inc. v. Environmental Protection Agency*, 636 F.2d 1267).

On October 30, 1980, the court, among other things, decided that there was insufficient evidence in the record to support the Agency's classification of transformers, capacitors, and electromagnets as totally enclosed. The court invalidated this portion of the rule, as well as other provisions, and remanded the rule to EPA for further action.

As a consequence of the October 1980 decision, EPA undertook a number of rulemaking actions. The rule relevant to the subject of today's final rule was published in the *Federal Register* of August 25, 1982 (47 FR 37342) (hereafter, PCB Electrical Use Rule). This rule amended the May 1979 rule by authorizing the continued use of PCB Transformers (electrical transformers

containing greater than 500 ppm PCBs) in facilities involved in handling of food or feed items until October 1, 1985, and by authorizing the use of all other categories of non-railroad electrical transformers containing or contaminated with PCBs for the remainder of their useful lives. In its August 1982 decision, EPA made a determination that authorizing the use of these transformers for the remainder of their useful lives did not present an unreasonable risk to public health or the environment for the following reasons:

1. EPA determined that if it did not authorize the use of PCBs in transformers, the costs to the public and United States industry would be billions of dollars, primarily as a result of the disruption of electrical service. EPA determined that the resulting reduction in risk would not outweigh these substantial costs.

2. EPA determined that the inspection and maintenance programs required under the rule reasonably reduced the exposure risks associated with the use of PCBs in PCB Transformers, and the servicing conditions prevented further PCB contamination of transformers.

3. EPA determined that releases of PCBs to the environment and exposure to humans and biological organisms from mineral oil transformers are minimal. EPA estimated that these transformers contain less than 0.15 percent of all the PCBs used in transformers and release less than one half of a percent of these PCBs on annual basis.

4. EPA determined that the costs associated with other risk reduction measures such as accelerated phase-out, reducing the PCB concentration in the dielectric fluid, or providing containment for transformers were not reasonable when compared to the potential reduction in release of PCBs achieved.

In evaluating the risks posed by the continued use of electrical transformers containing PCBs for the August 1982 PCB Electrical Use Rule, EPA considered exposures resulting from leaks and spills of PCB-containing dielectric fluid as constituting the principal route of release of PCBs to the environment from this equipment.

However, EPA has learned that fires involving transformers also can be responsible for the release of PCBs, and that PCBs released from transformers in fire situations can be volatilized and converted into materials which are orders of magnitude more toxic than PCBs. For example, on February 5, 1981, in the Binghamton State Office Building in Binghamton, New York, a PCB

Transformer was involved in a fire in the basement of the building. PCBs and oxidation products were distributed throughout the 18-story office building via two vertical ventilation shafts that ran the length of the building and opened into the transformer vault in the basement. Monitoring, completed after the fire, indicated that PCBs, polychlorinated dibenzofurans (PCDFs) (including the toxic congener 2,3,7,8-tetrachlorodibenzofuran (2,3,7,8-TCDF)), and polychlorinated dibenzodioxins (PCDDs) (including the toxic congener 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)) were distributed throughout the interior of the building. From laboratory studies, it appears that PCDFs are formed from both the oxidation of PCBs and the oxidation of chlorinated benzenes in combustion situations. PCDDs, however, appear to be formed only from the oxidation of chlorinated benzenes. (Tri- and Tetra-chlorinated benzenes often make up 30-35 percent of PCB askarel dielectric fluid, and can be present at low levels as contaminants in other fluids.)

At the time of promulgation of the August 25, 1982 PCB Electrical Use Rule, EPA believed that PCB Transformer fires were very rare, isolated events. Thus, although EPA made determinations that the use of electrical transformers containing PCBs did not pose unreasonable risks to public health or the environment, EPA did not directly consider the public health and environmental risks posed by fire-related events. EPA also did not evaluate the cost of implementing risk reduction measures to mitigate the risks posed by fires involving this equipment or factor into its economic assessment certain now-identified costs associated with the continued use of these transformers, principally, the very high costs of cleanup following more serious incidents. These costs reduce the benefits associated with the continued use of these transformers.

After the promulgation of the PCB Electrical Use Rule, additional information came to EPA's attention that indicated that PCB Transformer fires may occur more frequently than previously expected, and that transformer fire-related hazards are not restricted solely to transformers located inside buildings. On May 15, 1983, in the One Market Plaza complex in San Francisco, California, a PCB Transformer was involved in a smoky transformer vault fire. Monitoring completed after the fire indicated the presence of PCBs, PCDFs, and PCDDs, in soot from this fire. Although the vault housing the transformer was located

exterior to the building itself (in a sidewalk vault), unsealed conduits from the vault to the basement and outside air intake vents drew contaminated smoke into the building.

The San Francisco incident, and four more recent incidents, in the First National Bank Building in Chicago, Illinois, in September 1983; in Tulsa, Oklahoma, in December 1983 and May 1984; and in Miami, Florida, in May 1984, have prompted EPA to reassess its earlier position on the expected frequency of fire-related incidents involving transformers that contain PCBs.

EPA issued an Advance Notice of Proposed Rulemaking (ANPR), which was published in the *Federal Register* of March 23, 1984 (49 FR 11070), to solicit additional information on the risks posed by fires involving transformers containing PCBs, their frequency of occurrence, the costs of cleanup following these incidents, and the effectiveness and costs associated with regulatory control measures. At that time, EPA indicated that it would use the new information to reconsider the use authorization issued in the August 1982 PCB Electrical Use Rule for the continued use of most electrical transformers containing PCBs.

In the ANPR, EPA solicited comments on a wide range of potential regulatory control measures, including the phaseout of PCB Transformers, increased electrical protection, fire and smoke control technologies, and fire hazard inspection programs. EPA also solicited comments on the relative risks posed by PCB Transformer fires in commercial buildings such as office buildings, versus the risks posed by fires in industrial facilities and outdoor electrical substations. EPA suggested in the ANPR that the risks posed by PCB Transformer fires in commercial buildings may be greater than those posed by transformer fires in industrial facilities and outdoor electrical substations.

EPA received over 50 comments on the ANPR during the public comment period, which closed on May 22, 1984. EPA received information from a number of different sources, including the insurance industry, fire departments, building owners, industrial transformer users, and utilities. (The comments on the ANPR are summarized in: "PCB Transformer Fires: Comments on the Advance Notice of Proposed Rulemaking" (September 1984).) Several comments were received following the close of the comment period, and EPA reserved these comments for

consideration following the issuance of the Proposed Rules.

After considering the comments received in response to the ANPR, and after completing further analyses of available data, EPA issued a Proposed Rule, which was published in the *Federal Register* of October 11, 1984 (49 FR 39966), to address the risks posed by fires involving transformers that contain PCBs. The Proposed Rule presented EPA's determination that additional regulatory control measures were warranted on the use of PCB Transformers. At the same time, EPA reaffirmed its August 1982 determination that the indefinite use of PCB-Contaminated transformers does not present unreasonable risks to public health or the environment. EPA's determinations were based on analyses of the risks posed by fires involving electrical transformers containing PCBs, the benefits of PCBs and the availability of substitutes, and the costs and benefits of control measures designed to mitigate or eliminate the fire-associated risks posed by the equipment.

EPA received over 130 comments on the Proposed Rule during the public comment period, which closed on February 11, 1985. On January 14, 15, and 16, 1985, EPA held a public hearing in Washington, D.C., where 15 parties provided testimony on various provisions of the Proposed Rule.

EPA has considered all the comments received in response to the Proposed Rule (as well as the comments received after the close of the ANPR comment period), and has modified the rule where appropriate. Further, EPA has prepared a support document for this rulemaking which addresses all substantive comments on the Proposed Rule and includes EPA's responses to comments which did not result in the actual modification of the rule. This document, entitled: "Response to Comments on the PCB Transformer Fires Proposed Rule (July 1985)," is available by contacting the Toxic Substances Control Act Assistance Office (see **FOR FURTHER INFORMATION CONTACT**).

## II. Summary of the Final Rule

Under section 6(e)(2)(B) of TSCA, EPA can authorize a use of PCBs provided that the use "will not present an unreasonable risk of injury to health or the environment." EPA's August 1982 decision to allow the continued use of electrical transformers containing PCBs was based on the reported low frequency of leaks and spills of PCBs from this equipment compared to the high costs associated with replacing this equipment with substitute transformers

or requiring secondary containment to limit the spread of spilled materials.

EPA subsequently undertook an evaluation of the fire-related risks posed by the continued use of PCB Transformers, and the costs and benefits of measures designed to reduce those risks. On October 11, 1984, EPA issued a Proposed Rule which contained EPA's determination that PCB Transformer fires (fires involving transformers containing greater than 500 ppm PCBs), particularly fires which occur in or near buildings, do present risks to human health and the environment. EPA reached this determination after considering the extreme toxicity of materials which can be formed and released during fires involving this equipment, as well as the potential for human and environmental exposures to these compounds from a single incident, and the expected frequency of incidents over the remaining useful life of this equipment.

EPA further determined that the continued use of PCB Transformers without additional restrictions does present an unreasonable risk of injury to health and the environment. EPA reached this determination after considering the risks posed, the costs of cleanup following these incidents, the availability of adequate substitute materials, and the costs and benefits associated with risk reduction measures. EPA did, therefore, propose additional regulatory controls on the use of this equipment.

EPA proposed to require: (1) The immediate registration of all PCB Transformers with appropriate fire department jurisdictions, and the immediate registration with building owners of all PCB Transformers located in or near buildings, (2) the immediate marking of the exterior of the vault door, machinery room door, means of egress, or grate(s) accessing a PCB Transformers with PCB identification labels, (3) the immediate removal of stored combustibles from PCB Transformers locations, (4) the installation, by July 1, 1988, of additional electrical protective devices on PCB Transformers in or near buildings in high secondary voltage systems (480/277 volt systems), and (5) the isolation, by July 1, 1988, of all PCB Transformers in or near buildings from building ventilation systems, building ductwork, and openings in construction to reduce the widespread contamination of structures and the environment by smoke and soot in the event of a PCB Transformer fire. In addition, to facilitate monitoring compliance with the isolation requirements, EPA

proposed that PCB Transformer owners maintain records of their efforts in isolating transformers through the completion of PCB Smoke Spread Reduction Plans (PCB-SSRPs).

Finally, in the event of a PCB Transformer fire, EPA proposed to require PCB Transformer owners to take immediate measures to contain potential water discharges, and to report all PCB Transformer fire-related incidents to the National Response Center (NRC) prior to the initiation of cleanup efforts.

This final rule modifies and clarifies some of the requirements presented in the Proposed Rule as a result of information and comments provided to the Agency during public comment periods and at the public hearing. In developing the Proposed Rule, EPA evaluated the risks posed by PCB Transformer fires in or near buildings by using an office building setting to evaluate generically the nature of a potential for human and environmental exposures to PCBs and incomplete combustion products. EPA determined that additional control measures, principally the isolation of PCB Transformers from building ventilation equipment and ductwork, were necessary to reduce the risks posed by the continued use of this equipment.

During the public comment period for the Proposed Rule, EPA received extensive comments in three specific areas, and has modified the final rule accordingly. First, many comments received in response to the Proposed Rule suggested that EPA consider evaluating separately the fire-related risks posed by the continued use of PCB Transformers in industrial locations versus the fire-related risks posed by the use of PCB Transformers in or near buildings such as office buildings, stores, hospitals and schools (hereafter, all non-industrial, non-substation buildings will be referred to as "commercial buildings"). This final rule adopts this suggestion and addresses the use of PCB Transformers in or near industrial buildings separately from the use of PCB Transformers in or near commercial buildings.

Second, many comments on the Proposed Rule discussed the probability of PCB Transformer failures and fires, and suggested that certain types of PCB Transformer installations, network installations with higher secondary voltages (secondary voltages of 480 volts and above, including 480/277 volt secondaries), may be particularly likely to be involved in fire-related incidents. These comments suggest that if EPA were to pursue additional restrictions on the use of PCB Transformers, these

installations should be the subject of more stringent control measures. In response to these comments, this final rule considers factors such as the relative probabilities of failures and fires in different types of PCB Transformer installations and places more stringent controls on those transformers which EPA believes pose higher risks of failures and fires.

Finally, in response to comments on the Proposed Rule, in this final rule, EPA has increased its emphasis of the prevention of PCB Transformer fires through increased electrical protection, and decreased its emphasis on the use of isolation measures to minimize the spread of already formed and/or released contaminants.

This final rule prohibits:

1. The continued use of higher secondary voltage network PCB Transformers (network PCB Transformers with secondary voltages at or above 480 volts, including 480/277 volt systems) in or near commercial buildings beyond October 1, 1990.
2. The further installation of PCB Transformers (which have been placed into storage for reuse) in or near commercial buildings.

This final rule also requires:

1. The installation, by October 1, 1990, of enhanced electrical protection on lower secondary voltage network PCB Transformers and on higher secondary voltage radial PCB Transformers (radial PCB Transformers with secondary voltages at or above 480 volts, including 480/277 volt systems) used in or near commercial buildings.
2. The registration, by December 1, 1985, of all PCB Transformers with fire departments or fire brigades with primary response function, and the registration, by December 1, 1985, of all PCB Transformers located in or near buildings with building owners.
3. The marking, by December 1, 1985, of the exterior of all PCB Transformer locations (excluding grates and manhole covers).
4. The removal, by December 1, 1985, of combustible materials stored within a PCB Transformer enclosure, within 5 meters of a PCB Transformer enclosure, or within 5 meters of an unenclosed PCB Transformer.

This rule also requires the immediate notification of the National Response Center in the event of a PCB Transformer fire-related incident; and, that PCB Transformer owners take measures as soon as practically and safely possible to contain any potential water releases associated with a PCB Transformer fire-related incident. These measures include, but are not limited to,

the blocking of floor drains, the containment of water runoff, and the control and treatment of cleanup water prior to discharge.

Fire events involving the rupture of PCB Transformers can lead to contamination of sewers, sewage treatment systems, sewage sludges and bodies of water. Liquid PCBs and incomplete combustion products such as dioxins or furans may be conveyed through drains into storm or sanitary sewer systems. This process is facilitated when water is used in firefighting operations or is present as a result of the rupture of water pipes. Disruption of sewage treatment processes can also be caused, and eventually contaminants may be discharged into receiving waters poorly treated or not treated at all.

Contamination of receiving waters presents a risk of long lasting adverse effects on aquatic life and bottom sediment, as well as threats to public health through contamination of drinking water supplies and direct public contact with contaminated water.

The cost of cleaning up contaminated sewer systems and associated treatment facilities may be very high. Sludge contaminated with PCBs, dioxins and furans may be required to be handled and disposed of as hazardous waste under the Resource Conservation and Recovery Act (RCRA) and pursuant to the PCB regulations under the Toxic Substances Control Act (TSCA). Clean up of water bodies and bottom sediments, if possible, would also be very expensive. Data indicating water and sewer treatment system contamination following the Binghamton fire confirm that water treatment facility sludge can become contaminated with PCBs as a result of releases during PCB Transformer fires.

For these reasons, it is important that sewer systems and treatment plant operators have as much notice as possible of a PCB Transformer fire event. The sooner this information is available, the sooner action can be taken to isolate or contain contaminants (if possible), to limit their spread and to assure proper handling.

Fire departments are required to be notified pursuant to § 761.30(a)(1)(vi) of this regulation as to the location of PCB Transformers. Fire departments generally maintain good information for response to emergencies and have plans and a coordinating capacity for dealing with fires involving hazardous materials. EPA therefore strongly urges fire departments, on a voluntary basis, to contact storm and sanitary sewer system and treatment plant operators in the areas served by the fire department,

once the information required to be submitted to the fire departments under § 761.30(a)(1)(vi) is available. EPA also urges the fire department to work with sewer system and treatment plant operators to develop contingency plans for handling contamination entering the sewers as a result of PCB Transformer fire events.

EPA also urges owners of PCB Transformers and owners of buildings in which those transformers are located to plan ahead for a fire event. Building owners, working with other parties, should plan their best course of action to prevent or limit release of PCBs and other contaminants in the event of a fire. These plans should give special consideration to the location of individual PCB Transformers, the location of drains near these transformers, and methods for closing the drains in the event of a PCB Transformer fire.

To support this voluntary cooperative effort, EPA will develop guidance for use by owners and operators of sanitary sewer systems and treatment facilities, pointing out the availability at local fire departments of information on the location of transformers and the potential impact of the release of PCBs and other contaminants into the sewer system in the event of a fire. EPA will also evaluate the possible roles of organizations such as the Water Pollution Control Federation, the Association of State and Interstate Water Pollution Control Authorities, the American Public Works Association, and the National Fire Protection Association in distributing information, and may request their cooperation in this effort.

For purposes of this rule, commercial building is defined as a non-industrial (non-substation) building which is typically accessible to both members of the general public and employees. Commercial buildings include: (1) Public assembly properties, (2) educational properties, (3) institutional properties, (4) residential properties, (5) stores, (6) office buildings, and (7) transportation centers (i.e., airport terminal buildings, subway stations, bus stations, and train stations). For purposes of this rule, "in or near" a commercial building is defined as: (1) Within the interior of a commercial building, (2) on the roof of a commercial building or attached to the exterior wall of a commercial building, (3) in the parking area of a commercial building, or (4) located within 30 meters of a commercial building.

An industrial building is defined as a building directly used in manufacturing or technically productive enterprises. Industrial buildings are not generally or

typically accessible to other than workers. Industrial buildings include buildings used directly in the production of power, the manufacture of products, the mining of raw materials, and the storage of textiles, petroleum products, wood and paper products, chemicals or plastics, and metals.

EPA has determined that requiring the removal of particularly high risk PCB Transformers from use and adding conditions and restrictions on the use of the remaining PCB Transformers (including enhanced electrical protection, registration, and labeling) will significantly reduce the fire-related risks posed by the use of PCB Transformers. EPA has determined that the continued use of PCBs in PCB Transformers which comply with the conditions and requirements described above do not present unreasonable risks to public health or the environment. Further, after considering the risks posed by fires involving transformers containing less than 500 ppm PCBs, and the costs of regulatory control measures, EPA is reaffirming its August 1982 determination that the continued use of PCB-Contaminated transformers and non-PCB transformers (transformers containing 50-500 ppm PCBs, and less than 50 ppm PCBs respectively) do not present unreasonable risks to public health and the environment.

The enhanced electrical protection requirements for higher secondary voltage radial PCB Transformers consist of the installation of protection against transformer failures from sustained low current faults. EPA has determined that the enhanced protection of these PCB Transformers is necessary to reduce the fire-related risks posed by the continued use of these transformers in commercial locations. This protection will reduce the frequency of PCB Transformer fires in these types of transformers by allowing for rapid deenergization in the event of a sustained low current fault.

While EPA is aware of at least five basic types of radial installations (simple radial systems, expanded radial systems, primary selective systems, primary loop systems, and secondary selective systems), existing data do not indicate that the probability of low current fault-related failures would be significantly different among these five types of radial installations. Thus, EPA has required enhanced electrical protection on all commercial higher secondary voltage radial PCB Transformers.

EPA recognizes, however, that additional experience and further research into the causes of PCB Transformer failures and fires may

result in the development of data by industry which would indicate that there are significant differences in the probabilities of fault-related failures among the different types of radial systems. If these data are developed, they should be submitted to EPA for consideration. Based on the timely submission of new information, that is, within 2 years of the date of promulgation of this final rule, EPA may choose to revisit this particular requirement.

The remainder of this preamble describes the basis for the determinations reached in this final rule.

### III. Use Authorizations Under Section 6(e)

In order to authorize a use of PCBs under section 6(e)(2)(B) of TSCA, EPA must find that such use "will not present an unreasonable risk of injury to health or the environment." To determine whether a risk is unreasonable, EPA must balance the probability that harm will occur from the use against the benefits to society of allowing the continued use. In completing this assessment for the use of PCB containing electrical transformers, EPA has considered the following factors for each of four categories of electrical transformers containing PCBs (PCB Transformers located in or near commercial buildings, PCB Transformers located in or near industrial facilities, PCB Transformers located outdoors (away from commercial buildings), and PCB Contaminated transformers):

1. The effects of PCBs and their incomplete combustion products on human health and the environment.
2. The magnitude of human and environmental exposure to PCBs and their incomplete combustion products.
3. The benefits of using PCBs and the availability of substitutes.
4. The economic impact resulting from the rule upon the national economy, small business, technological innovation, the environment, and public health.

These are the same types of considerations listed in section 6(c) of TSCA, which describes factors EPA must consider in deciding whether a chemical presents an unreasonable risk under section 6(a) of TSCA.

The remaining units of this preamble will discuss these key factors in the unreasonable risk determinations made in this rule, and the basis for EPA's determination to allow the continued use of PCB-containing transformers with certain additional conditions and restrictions.

### IV. Transformer Fire-Related Risks

#### A. Toxicity of PCBs and Incomplete Combustion Products

In earlier rulemakings, EPA has already concluded that, based upon available information persons exposed to PCBs can develop chloracne; and, that based on animal data, there is a potential for reproductive effects and developmental toxicity as well as oncogenicity in humans exposed to PCBs. While fires involving PCB-containing transformers have resulted in the release of large quantities of PCBs, these incidents have also resulted in the formation of toxic products of incomplete combustion.

Many other compounds of potential toxicological significance, including PCDFs, PCDDs, and polychlorinated biphenylenes, were measured in soot samples following fires involving PCB Transformers. However, the bulk of toxicity testing of PCDF and PCDD congeners has been completed on what are anticipated to be the most toxic species, the 2,3,7,8 substituted PCDFs and PCDDs. EPA has evaluated the risks posed by PCB Transformer fires through an evaluation of: (1) The toxicities of PCBs, 2,3,7,8-TCDF, and 2,3,7,8-TCDD; (2) the toxicities and potential toxicities of other PCDF and PCDD congeners; and (3) the potential for exposure to these materials as a result of a fire.

While the majority of toxicological testing has been completed on PCBs, 2,3,7,8-TCDF and 2,3,7,8-TCDD, this does not mean that human and environmental exposures to other congeners of PCDFs and PCDDs as well as polychlorinated biphenylenes pose little risk of toxic effects. For example, limited testing of 1,2,3,7,8-pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD), 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD), and 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) suggest that these congeners are qualitatively similar in their toxic action to 2,3,7,8-TCDD for observed effects. However, they are less toxic for the observed effects than the 2,3,7,8-TCDD congener. EPA expects that similar structure-activity relationships would exist between 2,3,7,8-TCDF and 1,2,3,7,8-PeCDF, 1,2,3,7,8,9-HxCDF, and 1,2,3,6,7,8-HxCDF. However, EPA also believes that reducing exposures to the extremely toxic congeners, 2,3,7,8-TCDD and 2,3,7,8-TCDF, will also reduce exposures to these other compounds of potential toxicological significance.

According to EPA's February 1984 Ambient Water Quality Criteria (AWQC) for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), 2,3,7,8-TCDD is one of the most toxic substances known

to man. It exhibits delayed biological response in many species and is highly lethal, at low doses, to aquatic organisms, birds, and mammals. It has been shown to be acrogenic, fetotoxic, teratogenic, mutagenic (limited evidence), carcinogenic, and adversely affects the immune response in mammals.

The AWQC lists the acute LD50 for 2,3,7,8-TCDD for several species. The oral LD50 values range from 0.6 microgram per kilogram (kg) body weight (bw) for guinea pigs to 5,051 micrograms per kilogram body weight for hamsters. The AWQC presents the acceptable daily intake (ADI) value for a 70 kg man as  $2.2 \times 10^{-7}$  micromoles 2,3,7,8-TCDD per day. This ADI is based on the lowest-observed-adverse-effect levels (LOAEL) in rats, and has been calculated in accordance with the National Academy of Science's guidelines for calculating an ADI based on a LOAEL.

Although the ADI value presented above is very low, it still may not be sufficiently protective of human health. This ADI level does not take into account the demonstrated carcinogenic effects of 2,3,7,8-TCDD in laboratory animals. The AWQC concludes that 2,3,7,8-TCDD is an animal carcinogen and that the epidemiological findings are consistent with the conclusions drawn from animal studies that 2,3,7,8-TCDD is a probable human carcinogen.

The carcinogenic potency of 2,3,7,8-TCDD using the linearized multistage model has been estimated relative to 53 other chemicals which EPA's Cancer Assessment Group (CAG) has evaluated as suspect carcinogens. This relative potency index is  $5 \times 10^7$  per millimole (mmol) per kg per day (137 per ug per kg per day), making 2,3,7,8-TCDD the most potent carcinogen that the CAG has evaluated. CAG ranks 2,3,7,8-TCDD as a 2-A carcinogen, which means that there are sufficient laboratory animal data indicating its carcinogenicity as well as suggestive human evidence.

The limited data on other PCDD congeners indicate that they are qualitatively similar in their toxic action to 2,3,7,8-TCDD when comparisons are made in a single species. This is illustrated in mice, where 2,3,7,8-TCDD has an LD50 value of 0.88 micromoles (umol) per kg and 1,2,3,7,8-peCDD; 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD have LD50 values of 0.94, 3.19, and 3.67 umol/kg, respectively.

Toxicological testing of PCDFs, specifically, 2,3,7,8-TCDF, has been more limited than testing of 2,3,7,8-TCDD. The acute oral LD50 in the guinea pig is reported to be 5

micrograms per kg bw (as compared with the acute oral LD50 for 2,3,7,8-TCDD in this species which is reported to be 0.6 microgram per kg bw). Subchronic testing of 2,3,7,8-TCDF in rhesus macaques indicated that this compound is extraordinarily toxic. Based upon EPA's review of this study, the No Observed Effect Level (NOEL) for 2,3,7,8-TCDF is expected to be below 5.0 parts per billion (ppb). The author of this study concluded that continued daily oral intake of small amounts of 2,3,7,8-TCDF gave monkeys a disease which is clinically and morphologically similar to acute or chronic ingestion of 2,3,7,8-TCDD. The clinical course is marked chiefly by weight loss, swelling of the eyelids, dryness and granularity of the skin, hair loss and reduced physical activity. For most of the observed biological effects, the potency of the two compounds are within an order of magnitude of each other, with 2,3,7,8-TCDF being somewhat less toxic than 2,3,7,8-TCDD. Some scientists have estimated that in laboratory animals, 2,3,7,8-TCDF is 2 to 33 percent less toxic than 2,3,7,8-TCDD, depending upon the particular endpoint in question. Further, the toxicity of 2,3,7,8-TCDF in rhesus macaques has been estimated to be about 20 times that of 3,4,4',5'-tetrachlorobiphenyl and 1,000 times more toxic than PCB Aroclor 1248.

Based on its assessment of available literature on the toxicity of 2,3,7,8-TCDF and the structural similarity of 2,3,7,8-TCDF to 2,3,7,8-TCDD, EPA has concluded that it is prudent to assume that exposures to 2,3,7,8-TCDF would pose risks of similar toxic effects as exposures to 2,3,7,8-TCDD. Further, based on structure-activity relationships and limited in-vitro studies, EPA assumes that other PCDF congeners, particularly 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, and 1,2,3,7,8,9-HxCDF may also pose risks of similar toxic effects as exposures to 2,3,7,8-TCDF (and 2,3,7,8-TCDD).

Following the Binghamton fire, several researchers completed toxicological testing of soot samples in guinea pigs. Based on these studies, using Binghamton State Office Building (BSOB) soot, EPA has concluded that exposures to soot from PCB Transformer fires have the potential to produce toxicity in the thymus, the hematopoietic system, the salivary gland duct epithelium and, possibly, the liver.

It is worth noting that thymic atrophy, bone marrow depletion, and diminished body weight gain, all effects of the subchronic administration of the BSOB soot, have been routinely demonstrated

in acute studies in guinea pigs using PCDFs and PCDDs. In addition, the group of guinea pigs dosed with 231.1 ppm BSOB soot (in feed) in the subchronic study exhibited symptoms characteristic of acute exposure to 2,3,7,8-TCDD and 2,3,7,8-TCDF, which include skeletal muscle degeneration, fatty changes in hepatocytes, and degeneration of gastrointestinal tract epithelium.

One paper stated that the oral LD50 of the BSOB soot in guinea pigs is 410 milligrams per kilogram body weight, which would classify this material as very toxic.

For more in-depth analyses of the toxicities of PCBs, PCDFs, and PCDDs see documents 2, 3, 4, 5, 6, 8, and 13 in Unit X.B.

#### *B. The Formation of Oxidation Products From PCBs*

There is direct evidence of the formation of PCDFs and PCDDs from heating and burning commercial mixtures of PCBs and diluents from: (1) Chemical analyses of materials at the sites where fires were known to involve transformers that contained PCBs and chlorinated benzenes, and (2) laboratory experiments published in chemical and other literature. PCBs, PCDFs, and PCDDs were found in some soot specimens from both the Binghamton and San Francisco fires. Data submitted to EPA following the issuance of the Proposed Rule indicate that PCDFs and PCDDs were also measured in samples taken following the Miami and Chicago fires.

Laboratory studies provide the best available information on the conversion of pure PCBs to PCDFs. In these studies, a number of different PCB congeners and mixtures of congeners have been heated and the resulting materials analyzed for PCDFs and PCDDs. A specific PCB compound reacts to form a limited number of PCDFs. The formation of PCDFs involves intramolecular elimination of three kinds of diatomic molecules, with or without some rearrangement of chlorine atoms on the phenyl rings in the product dibenzofuran. From the products obtained in the PCB reactions, the diatomic molecules, hydrogen, hydrogen chloride, and chlorine, are formed from hydrogen and chlorine atoms in ortho positions on each of the two phenyl rings in the original polychlorinated biphenyl molecule. The optimum temperature range for the published laboratory experiments was 600 °C. Yields of PCDFs have been reported in the literature to be as high as 10 percent (calculated on the amount of PCB decomposed) for reaction temperatures

from 550 °C to 600 °C, but drop off to tenths of a percent at temperatures below 500 °C and above 650 °C.

EPA-sponsored studies of the formation of PCDFs and PCDDs indicate that the optimum conditions for the formation of PCDFs from (neat) PCBs are 675 °C for 0.8 second or longer, with 8 percent excess oxygen. Under these conditions, a 3 percent conversion efficiency (PCBs to PCDFs) was observed for askarel fluid. Under the same conditions, PCDFs were also formed from PCBs present at concentrations of 5, 50, and 500 ppm in mineral oil and silicone oil. The EPA study of the formation of PCDFs and PCDDs from PCB-containing mineral oil and silicone oil indicates a 4 percent conversion efficiency of PCBs to PCDFs when PCBs are present in these materials at concentrations of 5, 50, and 500 ppm. Statistical analysis showed a linear relationship between the amount of PCB present and the amount of PCDFs formed.

PCB dielectric fluid may also contain chlorinated benzenes as diluents or contaminants, as a result of past servicing activities. Laboratory experiments in the published literature have shown the formation of PCDDs in addition to PCDFs from the pyrolysis of mixtures of chlorobenzenes. Amounts of PCDFs ranged as high as several tenths of a percent for mixtures of trichlorobenzenes. Tetrachlorobenzene and pentachlorobenzene mixtures formed amounts of PCDFs and PCDDs which were two orders of magnitude smaller than the amounts of these compounds formed by trichlorobenzene. These reactions are bimolecular and the experimental concentrations of chlorobenzenes were high.

EPA-sponsored studies of the incomplete combustion of chlorinated benzenes indicate that PCDFs, and to a lesser extent PCDDs, are formed from the incomplete combustion of trichlorobenzene dielectric fluid containing no detectable PCBs. EPA also studied the incomplete combustion of tetrachloroethylene (perchloroethylene) and high temperature hydrocarbons (both of which are potential PCB substitutes) to determine whether PCDFs and PCDDs would be formed from these materials in fire situations. EPA's preliminary study indicates that PCDFs and PCDDs are formed from the incomplete combustion of tetrachloroethylene fluid. The two high temperature hydrocarbon fluids did not produce PCDFs or PCDDs under the experimental conditions.

The presence of low concentrations of chlorobenzenes as contaminants in

dielectric fluids that also contain PCBs are not expected to lead to substantial increases in the amounts of PCDFs formed from burning or heating the PCBs, but, may result in the formation of some PCDDs. EPA believes that the PCDD levels found in the Binghamton soot samples resulted from the pyrolysis or incomplete combustion of chlorobenzenes. The low level PCDDs found following the San Francisco fire could have been associated with the presence of chlorobenzenes in that fluid as well.

For further discussions of the formation of incomplete combustion products from PCBs and other potential substitute fluids, see the EPA-sponsored studies completed by the Midwest Research Institute, documents 10 and 11 in Unit X.R.

The description and characterization of the chemical reactions occurring in a fire in which aroclors (or any other commercial mixtures of many PCB compounds) are burned are far more complex than the laboratory experiments. However, EPA believes that reactions observed in the laboratory should also occur in fire situations where the reactants and reactions conditions are similar to laboratory reaction conditions. Data from actual PCB Transformer fires confirm the relatively high rates of conversion of PCBs to PCDFs in actual PCB Transformer fires.

PCDFs and PCDDs have also been detected following high temperature incineration. High temperatures incineration is required by EPA regulations to dispose of PCBs in oil. However, the levels of PCDFs and PCDDs measured following high temperature incineration have been substantially less than those measured following the above described laboratory experiments. This is because of high temperature incineration requires a 1200 °C temperature, a 2-second residence time, and sufficient oxygen to sustain complete combustion. As explained above, laboratory experiments indicate that the reaction temperature for the formation of PCDFs is optimized at around 600 °C. It is probable that yields of PCDFs from PCBs are reduced at higher temperatures because of increased destruction efficiency and ease of combustion.

### C. Causes of PCB Transformer Fire-Related Failures

PCB Transformer fire-related incidents can occur from many causes, including overloading, overheating, electrical faults (overcurrent conditions or low current faults either in the transformer itself or external to the

transformer in associated electrical equipment), and fires near transformers, involving building components or stored materials. PCB Transformer fires can also occur as a result of mechanical failures which can lead to electrical faults, and then, to fires. Of the well-documented PCB Transformer fires, many have reportedly occurred as a result of electrical faults, which led to transformer failures and fires. Electrical faults are of two basic categories: faults characterized by high current or excessive current flow (high current faults), and faults characterized by low current flow (low current faults).

Electrical faults can occur in transformers themselves or in associated electrical equipment. Faults in associated electrical equipment are of equal concern to faults inside transformers, first, because these faults can ultimately cause transformer failure, and second, because most faults occur external to the transformers themselves, in associated electrical equipment. Thus, as a general rule, the more associated electrical equipment present, the higher the probability of a fault occurring. Further, electrical faults are more likely to be self-sustained rather than self-extinguishing when voltages are higher.

1. *Mechanisms of failure—*a. *Excessive current flow.* The first failure mechanism is excessive current flow of the transformer. This is termed an overcurrent condition or simply, "overcurrent". Prolonged overcurrent conditions can lead to fires inside a transformer. If the overcurrent condition is due to a fault in the transformer itself, then there is a high energy arc in the transformer's insulating fluid. Failure to extinguish quickly high current arcs in a transformer will result in rapid transformer failure, involving the rupture of the transformer casing and loss of dielectric fluid. If the overcurrent condition is due to a fault in the associated electrical equipment, then there is high energy fault in the associated electrical equipment. Faults are more likely to occur externally, in associated electrical equipment, than in the transformer itself. However a high current fault in associated electrical equipment can draw excessive current from the transformer, heat the solid insulation, increase the discharge activity in the transformer and cause transformer failure (rupture and release of dielectric fluid).

According to comments on the Proposed Rule, electrical faults which occur on the load side or secondary side of a transformer (in the low voltage winding, low voltage leads, or in other associated switchgear and equipment) are more likely to be self-sustaining

rather than self-extinguishing when the secondary or load side voltage is higher. That is, self-sustained high current faults in the secondary (the low voltage side) are more likely in higher voltage secondaries (i.e., 480 volt secondaries) than in lower voltage secondaries (i.e., 208 volt secondaries).

Current-limiting fuses or energy-limiting devices and overcurrent protective relays are the types of electrical protective devices which can be used to quickly extinguish high current arcs inside the transformer casing, as well as high current faults which occur external to the transformer in associated electrical equipment. PCB Transformer fires which occur as a result of overcurrent conditions occur when overcurrent electrical protective devices (fuses and/or circuit breakers) are not present; when overcurrent protection is not set sensitive enough to deenergize the transformer before high temperatures or pressures are reached; and when overcurrent protection simply fails to operate when called upon.

b. *Low current faults.* The second failure mechanism is the widely recognized (in written comments on the Proposed Rule and in testimony at the public hearing) possibility that low current faults may occur in a transformer itself, or external to a transformer, in its associated electrical equipment, and not activate conventional overcurrent protective devices (the fuses and circuit breakers discussed earlier). For a low current fault in a transformer to release sufficient energy to lead to tank rupture, the fault must first produce a pressure rise in the transformer tank. In contrast to the short time involved from the occurrence of a sustained high energy (high current) arc to the rupture of a transformer, low current faults may take some time to release sufficient energy to cause tank rupture.

Low current faults can also occur external to a transformer, in associated electrical equipment such as network protectors (circuit breakers which are typically installed on the secondary side of network transformers) and network collector buswork. Sustained or prolonged low current faults external to a transformer can ultimately involve the transformer itself, causing rupture and release of PCBs.

As was the case for high current faults, comments on the Proposed Rule indicate that when the secondary voltage of a transformer is higher, low current faults which occur in the secondary (in the low voltage winding, low voltage leads, or associated equipment) have a greater likelihood of

being self-sustained rather than self-extinguishing. That is, low current faults in 480 volt secondaries have a greater likelihood of being sustained than low current faults in 208 volt secondaries.

Protecting against sustained low current arcing faults in a transformer involves the use of appropriate sensors and disconnect equipment. The sensors are designed to detect a pressure rise in the transformer tank and/or a temperature rise in the lower voltage transformer winding. Protection against sustained low current arcing faults in external associated electrical equipment (which can ultimately involve the transformer) involves placing heat or ultraviolet sensors in this equipment. When the sensors detect an abnormal condition, (i.e., a rise in pressure or temperature) the transformer is rapidly deenergized, either automatically or manually (following the receipt of an audio or visual signal at a control center).

2. *Protection currently provided against common mechanisms of fault-related failures.* Comments submitted in response to the Proposed Rule and testimony supplied at the public hearing indicate that PCB Transformers are currently equipped with electrical protection to reduce the frequency of transformer failure; but, that the level and type of electrical protection provided varies depending upon the nature of the transformer installation. Certain transformers and installations are better protected against fault-related failures than other types of transformers and installations. For purposes of this section, it is sufficient to divide the applications into two types.

The first application includes all arrangements in which the PCB Transformer can be energized only from the primary winding. These transformers are termed radial PCB Transformers. (There are, however, five basic types of radial installations, simple radial systems, expanded radial systems, primary selective systems, primary loop systems, and secondary selective systems.)

The second application includes those arrangements in which the PCB Transformer can be energized from either the primary winding or the secondary winding. The secondary winding is the winding from which energy flows during normal operation. In these systems, the primary winding can be energized from the secondary winding under abnormal conditions. These transformers are termed network PCB Transformers. There are two basic types of network installations, grid networks and spot networks.

Functionally, there are two types of electrical protection devices. One type interrupts the flow of current by vaporizing a segment of the conductor if the current exceeds a predetermined level. Fuses and distribution cutouts operate in this manner. The second type of electrical protection device operates by opening a switch. A circuit breaker opens a switch in response to a temperature rise in the device due to the current flowing in the circuit. A ground fault interrupter opens switch contacts in response to an unbalanced current flow. A network protector opens switch contacts in response to a reversal of the current flow.

"Non electrical" protection devices are also available. Devices such as pressure sensors open (or close) relay contacts to switches when the pressure (or rate of rise of pressure) exceeds a predetermined level. Temperature sensors and fluid level sensors operate in a similar manner.

a. *Radial PCB Transformers.*

According to comments submitted in response to the Proposed Rule, radial PCB Transformers are typically equipped with overcurrent protection (on the high voltage side) in the form of either a current-limiting fuse or circuit breaker, and, often, with fuses and/or circuit breakers on the low voltage side or the load side. The overcurrent protection on the primary is set at a predetermined level to clear high current faults on the primary and is typically set sensitive enough to clear downstream high current faults in the secondary as well. These fuses/circuit breakers are set to operate quickly enough to avoid transformer failure in the event of high current faults in the primary or secondary.

Radial transformers are not, however, typically protected against low current arcing faults; these faults do not activate conventional overcurrent protective devices. Low current arcing faults can occur in areas such as the secondary winding and low voltage leads of radial transformers and can progress unseen by existing overcurrent protection, leading to transformer failure. Radial transformers with higher secondary voltages are more likely to experience a low current arcing fault on the secondary which is self-sustained than radial transformers with lower secondary voltages.

According to comments on the Proposed Rule, many radial PCB Transformers used in industrial applications are equipped with temperature and pressure relays and circuit breakers on-site which can be manually operated to actuate

transformer deenergization in the event of a sustained fault. However, if on-site control of a radial transformer is not possible (through the use of a manually operable circuit breaker), which is more likely the case in commercial installations, deenergization would involve contacting the utility substation to deenergize the substation primary feeder. Comments on the Proposed Rule indicate that this is a difficult thing for a utility to do, because deenergizing the primary feeder results in the deenergization of all transformers served from that primary feeder. This results in the loss of electric power to many buildings served by this same primary feeder.

b. *Network PCB Transformers.*

According to comments on the Proposed Rule, network transformers are typically equipped with the least sensitive overcurrent protection of all utility distribution transformers. While radial transformers are typically equipped with overcurrent protection on the primary (which is set sensitive enough to clear high current faults on the primary as well as downstream high current faults in the secondary), network transformers are not typically equipped with current-limiting or energy-limiting devices on the primary circuit. Electrical protection for high current faults on the primary (in the primary feeder, the high voltage leads, and switchgear) is typically provided by relays to a primary feeder circuit breaker at the utility substation. The relays to the primary feeder breaker cannot detect downstream sustained high current faults in the secondary.

Further, while the relays to the substation primary feeder breaker on network transformers will operate for sustained high current faults in the primary (allowing for deenergization), deenergization may not occur quickly enough to avoid switchgear and/or transformer rupture. Thus, switchgear rupture and transformer failure can occur in network transformers from high current faults on the primary.

Unlike radial transformers, network transformers are equipped with network protectors, which are circuit breakers located on the secondary side of network transformers. The network protector is set to operate when it senses a reverse power flow. Thus, it operates to prevent power being fed back into the transformer in the event that the primary feeder breaker has been activated. The network protector operates in a coordinated fashion with the substation breaker relays to isolate a faulted network transformer. By isolating the faulted network transformer, service continues to be

supplied to the load by other transformers in the network.

According to comments on the Proposed Rule, current-limiting fuses are used in the secondary of higher secondary voltage network transformers (in the services and in the network protector). These fuses operate when high current faults occur downstream from these areas. However, the presence of these fuses does not mean that the entire secondary is protected against high current faults. There is a zone in the secondary in network transformers which is currently "unprotected," where high current faults can occur and not be seen by the relays to the primary feeder breaker or by these fuses in the services and the network protector. High current faults in this area can result in transformer failures and fires. Network transformers with higher secondary voltages are more likely to experience high current faults in the secondary which are self-sustaining, than network transformers with lower secondary voltages.

Like radial transformers, network transformers are not typically protected against low current arcing faults. Further, in network transformers, there is typically more associated electrical equipment where these faults can occur. Low current arcing faults in network transformers can occur in the network protector and (for spot network transformers) in the network collector bus as well as in the secondary winding and low voltage leads. Again, these faults are more likely to be self-sustaining rather than self-clearing when the secondary voltage is higher.

Unlike industrial transformers, commercial transformers, particularly network transformers are not typically equipped with primary circuit breakers on site. The deenergization of a commercial network transformer after failure from a sustained (undetected) low current or high current fault would typically require the manual opening of the utility substation primary feeder breaker, after the utility has been contacted about a malfunction in the equipment. As indicated earlier, utilities are generally hesitant to open primary feeder breakers because of their desire for continuity of service to their customers.

3. *Conclusions.* Comments on the Proposed Rule suggest that there are ways in which both radial and network PCB Transformer installations could be better protected to minimize the likelihood of fault-related failures and fires. Several comments on the Proposed Rule discussed the role of high current faults in PCB Transformer failures and fires, the level of protection currently

provided against these faults in different types of transformer installations, and ways in which PCB Transformers could be better protected to minimize the chance of failure from these types of faults. Network PCB Transformers are currently the least well-protected against high current faults of all distribution class PCB Transformers in use. According to comments submitted in response to the Proposed Rule, the Tulsa PCB Transformer fire was associated with this type of fault in the high voltage switchgear of a 208/120 volt network PCB Transformer.

Many comments on the Proposed Rule, however, focused on sustained low current arcing faults in PCB Transformers as the culprit in the number of documented PCB Transformer fires. These comments discussed the level of protection currently provided against these faults in PCB Transformer installations and ways in which PCB Transformers could be better protected to avoid low current fault-associated failures and fires. The San Francisco fire, the Chicago fire, and the Miami fire have been associated with these types of faults in 480/277 volt network PCB Transformers.

Simply stated, sustained low current arcing faults can occur in PCB Transformers and associated electrical equipment, and with existing levels of conventional protection, progress undetected and unseen, resulting in transformer failure and fire. According to comments submitted in response to the Proposed Rule, low current arcing faults can occur in the secondaries of all types of transformer installations, radial transformers, lower secondary voltage network transformers, and higher secondary voltage network transformers. They are, however, more likely to occur in installations with more, as opposed to less, associated electrical equipment and are more likely to be sustained in transformer secondaries when the secondary voltage is higher. This is because faults are more likely to "restrike" or be sustained at higher voltages than be self-extinguishing or self-clearing.

All types of PCB Transformers typically lack the sensors (pressure and/or temperature sensors) necessary for the early detection of low current arcing faults. Further, many commercial PCB Transformers are typically unequipped with on-site primary circuit breakers to actuate transformer deenergization. This means that low current arcing faults can progress unseen in these transformers, and that these transformers cannot be easily deenergized, even after transformer rupture has occurred.

Deenergization of commercial PCB Transformers (when disconnect equipment is not present on site) typically requires the opening of the primary feeder breaker at the electric utility substation, which is often miles away from a transformer installation. According to testimony at the public hearing, the opening of a primary feeder breaker at an electrical substation is a very difficult thing for a utility to do, because opening the primary feeder breaker for a malfunction in a single PCB Transformer will also result in other (well-functioning) transformers in the distribution system being deenergized.

#### *D. Potential for Exposure*

Toxicity and exposure are the two basic components of risk. In Unit IV.A, EPA addressed the toxicity of PCBs, PCDFs, and PCDDs. The following summarizes EPA's evaluation of the potential for human and environmental exposures to PCBs, PCDFs, and PCDDs from transformer fires.

As discussed in Unit IV.C, high current faults and low current faults in electrical transformers and/or associated equipment, as well as the ignition of combustible or flammable materials in a transformer location, can all lead to the rupturing of a transformer, the volatilization of PCBs, and the formation of incomplete combustion products. Sustained high temperatures in the area of a ruptured transformer increase the potential for the formation of toxic products of incomplete combustion, including PCDFs, 2,3,7,8-TCDF, PCDDs, and 2,3,7,8-TCDD. These high temperatures can either occur as a result of the initial malfunction or as a result of prolonged arcing associated with an inability to deenergize the transformer completely. Smoke and soot from a high temperature fire involving a PCB Transformer can contain high concentrations of volatilized PCBs and oxidation products.

The most extensive monitoring data on PCB, 2,3,7,8-TCDF and 2,3,7,8-TCDD levels in buildings following PCB-Transformer fires were obtained from the Binghamton State Office Building site. A composite soot sample from this fire indicated the presence of 7,200 ppm PCBs, 231 ppm 2,3,7,8-TCDF, and 2.9 ppm 2,3,7,8-TCDD. For a full description of PCB, PCDF, and PCDD levels measured following transformer fires, see the quantitative exposure assessment completed for this final rule, support document 1 in Unit X.B.

EPA believes that the levels of PCBs and oxidation products measured in soot samples following the Binghamton

fire are values which are representative of situations in which combustion conditions are conducive to the formation and/or release of PCBs and oxidation products. Therefore, in this rule, EPA has used these values to estimate human and environmental exposures to PCBs, PCDFs, and PCDDs from PCB Transformer fires and fires involving PCB Contaminated transformers.

In the Proposed Rule, EPA evaluated the likelihood and nature of human and environmental exposures from transformer fires in or near buildings by analyzing likely exposures from a PCB Transformer fire in or near an office building. A number of comments received in response to the Proposed Rule suggested that EPA evaluate separately the expected exposures from transformer fires in or near industrial facilities and the costs of control measures for these transformers. Comments suggested that the use of PCB Transformers in industrial facilities pose lower fire-related risks than the use of PCB Transformers in commercial buildings and that the costs of the proposed transformer isolation requirement would be substantially greater for industrial facilities than for commercial buildings.

EPA agrees that industrial facilities should be evaluated separately from commercial buildings. Accordingly, EPA has evaluated the potential for human and environmental exposures for the following categories of PCB Transformer fires: (1) A PCB Transformer fire in or near a commercial building (both before the implementation of risk reduction measures and after the implementation of risk reduction measures); (2) a PCB Transformer fire in an industrial facility; (3) a PCB Transformer fire in an outdoor electrical substation; and (4) a PCB Contaminated transformer fire in or near a commercial building.

The first step in evaluating the potential for human exposures to PCBs and oxidation products is to determine the populations that are likely to experience these exposures. EPA has identified six populations that may be at risk of exposure to PCBs and oxidation products in the event of a fire involving a transformer containing PCBs. These are: (1) Persons present in a building or possibly in an adjacent building at the time of a fire in or near a building; (2) firemen and other emergency response personnel responding to a fire; (3) onlookers present during the extinguishing of a fire and members of the general public in the vicinity of the fire; (4) persons involved in sampling and cleanup operations following the

fire; (5) persons returning to the building following cleanup; and, (6) persons exposed to equipment, automobiles, etc. that may have been contaminated during or after the fire. Human exposures to PCBs and oxidation products from transformer fires would be expected to occur principally through the inhalation and dermal routes.

1. *PCB Transformer fires in or near commercial buildings*—a. *Nature of installations and operation.* PCB Transformers serving commercial buildings are typically located in basements, in machinery rooms on the first few floors of buildings, or in sidewalk or underground vaults adjacent to buildings. Commercial PCB Transformers may also be located on roof-tops or near buildings in outside locations such as parking areas or loading docks. Electrical transformers used in or near commercial buildings are most typically located in areas which are not easily accessible or visible to building occupants. Based on the results of the Equitable Life Assurance survey of commercial transformer locations, EPA estimates that 69 percent of commercial transformers located on lower floors of buildings are vaulted, and that transformers located on interior upper floors are generally located in separate mechanical rooms. The majority of transformers located exterior to commercial buildings are also vaulted. According to utility representatives, in many cases, more than one PCB Transformer is located in a vault. Typically, two to four PCB Transformers are located within a single vault.

While commercial buildings may have janitorial crews on duty for building maintenance, electrical equipment operations are not typically closely supervised or monitored by trained electrical engineers or technicians. Maintenance and testing of these transformers would, in general, be expected to be less than that provided for utility substation equipment or industrial transformers. Further, disconnect equipment (i.e., circuit breakers) is generally not present in commercial installations, and there is typically no one present on site who is trained in disconnecting the equipment, even if such equipment were provided.

Comments on the Proposed Rule and EPA's analysis of available information indicates that there are approximately 77,568 PCB Transformers used in or near commercial buildings. Of these 77,568 PCB Transformers, EPA estimates that approximately 29 percent are network PCB Transformers and 71 percent are radial PCB Transformers. Further, of the

estimated 7,600 480 volt network PCB Transformers in use (those transformers with a particularly high probability of fault-failure), EPA believes that over 97 percent of these transformers are used in or near commercial buildings.

b. *Frequency of PCB Transformer fires.* In the Proposed Rule, EPA estimated that 0.003 to 0.004 percent of nonsubstation PCB Transformers are involved in "serious" PCB Transformer fires (PCB Transformer fires involving smoke spread into buildings) each year. Within the category of "serious" fires are fires with moderate smoke distribution and fires with extensive smoke distribution. EPA used data from the National Fire Incident Reporting System (NFIRS) for 1982 on the frequency of structure-related transformer fires, data from the NFIRS on the frequency of structure-related transformer fires with smoke spread beyond the room of origin of the fire, limited data from the NFIRS on the make, model, and year of transformers involved in these fires, and data supplied by various sources in response to the ANPR to develop this estimate. While EPA received several comments on this estimate (some indicating that EPA had severely underestimated the frequency of occurrence and other indicating that EPA had significantly overestimated the frequency of occurrence), little additional quantitative data were submitted to support modifying EPA's estimate of the frequency of occurrence of serious PCB Transformer fires. Thus, EPA believes that its estimate of 50 serious PCB Transformer fires over the remaining useful life of PCB Transformers is a reasonable estimate of the future frequency of serious PCB Transformer fires.

Since many comments on the Proposed Rule suggested that EPA evaluate separately the risks posed by PCB Transformers in or near industrial facilities, EPA has developed estimates of the frequency of PCB Transformer fires in industrial facilities and in commercial buildings.

As discussed in Unit IV.C, EPA believes that the probability of PCB Transformer fault-related failure varies depending upon the type of PCB Transformer installation (and includes such considerations as the amount of associated electrical equipment present, the secondary voltage of the transformers, and the current level of protection provided against sustained high current faults and sustained low current faults). Based on this analysis, and available empirical data on installation types in documented PCB

Transformer fires, EPA has developed estimates of the relative probabilities of failure for different types of PCB Transformer installations (high and low secondary voltage network transformers versus high and low secondary voltage radial transformers). EPA has used these estimates and available data on the distribution of these installation types in commercial locations and industrial locations to estimate the frequency of serious PCB Transformer fires both in commercial buildings and in industrial facilities.

EPA believes that 480 volt network PCB Transformers would have a particularly high probability of failure; that lower secondary voltage network PCB Transformers and 480 volt radial PCB Transformers would have a lower probability of failure (compared to 480 volt network transformers); and that lower secondary voltage radial PCB Transformers would have the lowest probability of fault-related failures.

EPA estimates that 44 of the 50 structure-related serious PCB Transformer fires which will occur over the remaining useful life of PCB Transformers will occur in or near commercial buildings. This estimate is supported by electrical engineering theory concerning the mechanisms of PCB Transformer fault-related failures and the likelihood of failures in different types of installations as well as by available empirical data. The PCB Transformer fires in Binghamton, San Francisco, Chicago, Miami, and Tulsa all occurred in or near commercial buildings; specifically, in office buildings.

Further, the San Francisco fire, the Chicago fire, and the Miami fire all reportedly occurred in 480 volt network PCB Transformers. Three other fire-related incidents in commercial buildings in the Boston area also reportedly involved 480 volt network PCB Transformers. A total of 6 out of 10 known PCB Transformer fires have occurred in higher secondary voltage network PCB Transformers (in 480 volt network installations). This is particularly dramatic when one considers that there are only an estimated 7,600 480 volt network PCB Transformers in use.

*c. Exposure assessment.* EPA has evaluated likely exposures from a serious PCB Transformer fire in or near a commercial building by using reasonable yet environmentally conservative assumptions. EPA assumes that a PCB Transformer fire in a commercial building would involve sustained high temperatures in the transformer location, the rupture of the transformer casing, the release of PCBs,

the volatilization of PCBs, and the widespread distribution of PCBs and oxidation products throughout the interior of a densely populated building (i.e., an office building), into the ambient air, and into waterways. EPA assumes that smoke and soot containing PCBs and oxidation products are spread throughout a large office building during peak use hours, that emergency response personnel are unaware that certain precautions should be taken to minimize exposures, and, that reoccupancy occurs only after the removal of visible traces of soot by cleanup crews.

EPA assumes that a PCB Transformer fire in or near a commercial building would involve the rupture of the transformer and sustained high temperatures in the transformer location for up to 4 hours. EPA has assumed this because transformers located in or near commercial buildings are more likely to be located in inaccessible, low visibility areas, where malfunctions would not be readily identified. Further, EPA has assumed that the transformer will not be deenergized automatically and that the transformer will not have the capability to be deenergized manually from an on-site location. EPA made these assumptions because many PCB Transformers located in or near commercial buildings are network transformers, which are currently less well-protected electrically, and, are less likely to be able to be deenergized manually from an on-site location.

EPA's assessment of the potential for human exposures to PCBs and oxidation products from a PCB Transformer fire in a commercial building serves as the baseline for subsequent assessments of the expected effectiveness of fire hazard risk reduction measures in these locations. This assessment is also used in assessing likely human exposures from PCB Transformer fires in industrial settings and in outdoor locations (away from commercial and residential areas), and for estimating likely human exposures from PCB-contaminated transformer fires in or near commercial buildings.

A PCB Transformer fire which occurs in or near a commercial building during a period of peak use may expose hundreds to thousands of building occupants to smoke and soot from the fire during the evacuation of the building. The potential for exposures of large numbers of building occupants to this smoke and soot is increased if the transformer involved in a fire is located near building ventilation equipment and ductwork. EPA estimates that evacuation times will be on the order of 6 to 8 minutes, and, that during these 6

to 8 minutes, building occupants will be exposed to smoke and soot, primarily through inhalation.

Emergency response personnel, unaware that the smoke and soot from the fire may contain PCBs and toxic products of incomplete combustion, may be exposed to these materials through inhalation, and may incur some dermal exposure to facial areas. EPA estimates that 30 to 60 emergency response personnel may be exposed for up to 4 hours during the extinguishing of a PCB Transformer fire. Dermal and inhalation exposures of firefighters and other emergency response personnel may continue during the completion of equipment maintenance procedures and during the cleaning of personal clothing and firefighting equipment after the fire.

EPA has developed quantitative estimates of exposures by cleanup crews, firefighters, building occupants, and members of the general public to PCBs, PCDFs, and PCDDs. EPA developed these estimates primarily to evaluate relative exposures among these populations for different types of PCB Transformer fires and not to define in an absolute sense expected human exposures. In developing quantitative exposure estimates, EPA must make assumptions about parameters such as the concentration of PCBs, PCDFs, and PCDDs present in soot, the amount of soot generated, the distribution of soot in the interior of a building, the duration of exposure, the frequency of exposure, and the expected routes of exposure. As would be expected, the assumptions selected for use in quantitative exposure assessments can strongly influence the final exposure estimates. Recognizing this, EPA tends to routinely adopt more environmentally conservative assumptions for the different parameters of the exposure assessment.

EPA's quantitative estimates of potential firefighter exposures (assuming that respiratory protection is not worn during a PCB Transformer fire of 4 hours duration, as well as other assumptions detailed in support document 1 in Unit X.B.) in terms of estimated lifetime average daily doses (LADD) is 8,006 picograms per kilogram per day (pg/kg/day) PCBs, 98 pg/kg/day 2,3,7,8-TCDF, 56 pg/kg/day other TCDFs, 319 pg/kg/day other PCDFs, 5.1 pg/kg/day 2,3,7,8-TCDD, 0.98 pg/kg/day other TCDDs, and 45 pg/kg/day other PCDDs.

Building occupants also may incur additional exposures (above those which may occur during building evacuation), if these parties remain nearby, as onlookers during the extinguishing of the fire. Further, there is an increased potential for these

additional exposures when emergency response personnel (the principal authority figures at the scene of a fire) are unaware of the nature of risks posed by exposures to smoke and soot from these fires.

The rupture of a PCB Transformer and the release of potentially hundreds of gallons of PCBs (and potentially PCDFs and PCDDs) into floor drains in transformer locations could result in the contamination of waterways. Further, if water is used to extinguish the fire, or if water pipes rupture due to high temperatures caused by the fire, water runoff could ultimately result in contamination of surface waters and drinking water. Members of the general public, in addition to fish and wildlife, in the vicinity of a PCB Transformer fire may be exposed to PCBs and oxidation products through the ingestion of residues. While comments on the ANPR suggest that water is not frequently used in extinguishing an electrical transformer fire, EPA believes that there is a potential for contamination of water from the rupture of the transformer, burst water pipes, the extinguishing of ignited materials in the area (other than electrical equipment) and from cleanup efforts.

The presence of a floor drain leading to a storm sewer in a transformer location provides a readily accessible pathway for the contamination of surface waters, and potentially, drinking water supplies. Water contaminated with soot containing PCBs, PCDFs, and PCDDs can enter these drains as a result of firefighting operations, burst water pipes, and cleanup operations. Very large amounts of water can be used in the cleanup process. For example, during the first year of cleanup at the Binghamton site, over 160,000 gallons of water were used, treated by charcoal filtration and secondary treatment, and discharged to surface waters. The nearest drinking water intake downstream is 45 miles away and serves 16,500 persons.

Atmospheric transport of PCBs and oxidation products in an urban area could also be responsible for exposing many members of the general population who live or work in the vicinity of a fire. In the Binghamton, New York incident, 2,585 people lived within 3 to 4 kilometers of the building. While inhalation exposures by the general public as a direct result of a PCB Transformer fire would be unlikely to occur for an extended period of time, soot fallout from a PCB Transformer fire may contaminate surface soil and surface water, in addition to outdoor furniture, automobiles, and other types

of materials which are commonly stored outside. Contamination of surface soil and surface water may result in exposures to fish and wildlife as well. Thus, dermal, inhalation, and even oral exposures to the general population in the vicinity of a fire may occur on a continuing basis long after the initial incident.

Exposures at the site of a fire to soot containing PCBs and oxidation products may also continue long after the extinguishing of the fire. Cleanup crews, dispatched to the scene by a building owner who is unaware of the nature of risks posed by a PCB Transformer fire, may not be initially equipped with respiratory protection or protective clothing. Inhalation and dermal exposures would be expected to occur as these crews work to remove soot from surfaces inside the building. Soot particles are likely to become airborne as a result of cleanup efforts, and would be expected to be inhaled by workers. In addition, because of the strenuous nature of cleanup work, these workers would be expected to have a high respiration rate, further increasing exposures to PCBs and oxidation products through inhalation.

EPA's quantitative estimates of potential exposures to cleanup crews (assuming a 4-hour fire, the lack of protective clothing, and the superficial cleanup of a building, as well as other assumptions detailed in support document 1 in Unit X.B.) is 13,784 pg/kg/day PCBs, 34 pg/kg/day 2,3,7,8-TCDF, 19.9 pg/kg/day other TCDFs, 109 pg/kg/day other PCDFs, 1.8 pg/kg/day 2,3,7,8-TCDD, 0.33 pg/kg/day other TCDDs, and 15.7 pg/kg/day other PCDDs.

Even if respiratory protection and protective clothing are utilized by cleanup crews, EPA expects that some level of exposure to these materials may occur both dermally and through inhalation because of the expected prolonged period of exposure. Cleanup crews may work long hours for extended periods of time. For example, in the Binghamton incident, 40 to 70 workers were involved in cleanup operations for 7 hours a day for over 250 days.

Finally, depending upon the level of knowledge of the building owner, emergency response personnel, the utility, and local public health authorities about the nature of risks posed by PCB Transformer fires, building occupants may be allowed to return prematurely to a building following the removal of only visible traces of soot. Exposures may occur to faces, hands, and lower arms for 8 hours a day over the course of 250 working

days in a year. EPA also expects that inhalation exposures would occur as a result of the circulation of airborne contaminants by the building's ventilation system. Further, these exposures may continue for an indefinite period of time because these materials are expected to be quite persistent, and resistant to degradation. Residual concentrations may remain on interior building surfaces for several years. EPA's quantitative estimates of potential building occupant exposures (assuming that the fire burns for 4 hours, that the building is occupied at the time of the fire, and that reoccupancy occurs following cleanup to visible traces of soot in the buildings, as well as other assumptions detailed in support document 1 in Unit X.B.) is 39,593 pg/kg/day PCBs, 65 pg/kg/day 2,3,7,8-TCDF, 65 pg/kg/day other TCDFs, 277 pg/kg/day other PCDFs, 1.2 pg/kg/day 2,3,7,8-TCDD, 0.76 pg/kg/day other TCDDs, and 35 pg/kg/day other PCDDs.

EPA has prepared additional quantitative estimates of potential human exposures to PCBs, PCDFs, 2,3,7,8-TCDF, PCDDs, and 2,3,7,8-TCDD from a reasonable worst-case PCB Transformer fire in a commercial building. These estimates are presented in support document 1 in Unit X.B.

2. *PCB Transformer fires in or near commercial buildings with risk reduction measures in place.* In order to evaluate the effectiveness of risk reduction measures in reducing exposures to PCBs and oxidation products, EPA has assessed expected exposures to these materials from a PCB Transformer fire in a commercial building, assuming the implementation of certain risk reduction measures.

In the Proposed Rule, EPA evaluated the expected exposures associated with a PCB Transformer fire in or near a commercial building with certain risk reduction measures in place. The risk reduction measures addressed in the Proposed Rule were transformer isolation from building ventilation equipment and ductwork, the control of potential water releases, the reporting of the fire to the National Response Center, the registration of the transformer with the responding fire department and the building owner, and the labeling of the exterior of the transformer location. EPA assumed that most PCB Transformers could be deenergized within 15 minutes of failure (without the installation of additional protection), and, for those transformers that EPA believed could not be deenergized completely, EPA proposed requiring additional electrical protection on the secondary side of the transformers.

Thus, in evaluating the effectiveness of transformer isolation, registration, labeling, and reporting of PCB Transformer fires, EPA assumed that all but a subset of PCB Transformers could be easily deenergized within 15 minutes of failure. For that subset, EPA required increased electrical protection on the secondary side of the transformers.

Comments on the Proposed Rule, however, indicate that: (1) Many PCB Transformers in commercial buildings are not capable of being easily deenergized after failures; (2) PCB Transformers in commercial buildings could be equipped with enhanced electrical protection which would reduce the probability of transformer failures from electrical faults; and, (3) while the proposed additional electrical protective measures (for a subset of the PCB Transformer population) would have avoided some failures in this equipment, failures in these transformers from other common mechanisms of failure could still occur.

Many comments on the Proposed Rule suggested that EPA increase its emphasis on the reduction of risk through the prevention of PCB Transformer fault-related failures and decrease its emphasis on the use of isolation measures to reduce structure and environmental contamination. These comments indicate that while transformer isolation can reduce exposures in the event of a PCB Transformer fire (by reducing widespread structure and environmental contamination), if a transformer cannot be easily deenergized after failure occurs, then substantial quantities of smoke and soot can be generated. The longer a transformer remains energized, the less likely it is that isolation will be an effective risk reduction measure.

EPA agrees that measures designed to prevent PCB Transformer failures are preferred over measures designed to contain and control already released and/or formed incomplete combustion products. Further, EPA's evaluation of mechanisms of transformer failure, commercial installation characteristics and operations, and the current levels of electrical protection in commercial PCB Transformer installations indicates that many of these PCB Transformers could be better protected electrically to reduce the frequency of fault-related failures and fires. Thus, in this final rule, EPA has focused on increased electrical protection rather than transformer isolation as the preferred measure for reducing the frequency of serious PCB Transformer fires.

Since electrical protective devices are subject to malfunction, EPA has also

assessed expected exposures to PCBs and oxidation products in the event that transformer failure occurs despite the presence of increased electrical protection; but, has assumed that measures are taken to control water releases; that the incident is reported to the National Response Center; and, that the transformer is registered with both the responding fire department and the building owner. In addition, EPA assumes that the exterior of the transformer location is marked with PCB identification labels.

*a. Frequency of serious PCB Transformer fires with risk reduction measures in place.* EPA has used data from transformer and electrical equipment reliability studies to evaluate the probability of electrical protective device malfunction; and thereby, to estimate the effectiveness of electrical protection in avoiding serious PCB Transformer fires. For purposes of this rule, EPA defines electrical protective device malfunction as the failure of a device to operate when called upon to operate. It is difficult to develop a precise estimate of the expected rate of failure of specific combinations of electrical protective devices such as those which appear in this final rule. However, based upon available information on the failure rate of circuit breakers, current-limiting fuses, and heat and fluid level sensors, EPA expects the failure rate to be low, below 3 percent. Further, according to data on the failure modes of circuit breakers, only 9 percent of circuit breaker failures are failures to operate when called upon to open. The majority of circuit breaker failures are characterized by the operation of a circuit breaker when it should not have operated or opened. That is, circuit breaker failure typically involves deenergization without cause rather than failure to deenergize when called upon to open.

EPA has assumed that enhanced electrical protective systems will function to avoid between 97 and 99 percent of the serious PCB Transformer fires (about 43 fires) which would be expected to occur in commercial buildings over the remaining useful life of this equipment (this assumes that electrical protection can be implemented immediately). Electrical protection for commercial transformers phased in over a 5-year period is expected to avoid about 36 serious PCB Transformer fires. EPA expects that one to two serious PCB Transformer fires will occur over the remaining useful life of this equipment as a result of the failure of the enhanced electrical protective systems to operate.

*b. Exposure assessment.* The potential for the volatilization of large amounts of PCBs, and the formation of products of incomplete combustion from PCB Transformer fires is reduced if efforts are made to control combustion conditions in the transformer location. EPA believes that the removal of stored combustibles from a PCB Transformer location will reduce the likelihood of a fire occurring external to a PCB Transformer resulting in transformer failure. More importantly, the installation of enhanced electrical protection on commercial PCB Transformers is expected to reduce substantially the frequency of PCB Transformer fault-related failures in this equipment.

Comparing the circumstances surrounding well-documented PCB Transformer fires indicates that the sooner a faulted transformer is deenergized, the less likely it is that significant quantities of PCDFs and PCDDs will be formed. Experience from actual incidents indicates that EPA is correct in its belief that there are practical means available for successfully controlling combustion conditions in PCB Transformer locations. Certain measures, once implemented, would reduce the likelihood of fault-related failures and sustained high temperatures. These measures are expected to reduce significantly the fire-related risks posed by the continued use of these transformers.

Analyses of the levels of electrical protection currently provided for many commercial PCB Transformer locations indicate that these PCB Transformers could be better protected electrically to reduce the frequency of transformer failures from electrical faults. Comments on the Proposed Rule suggest that many of the well-documented PCB Transformer fires could have been avoided if transformer failure had been avoided through the use of enhanced electrical protection, such as current-limiting devices, sensors, and disconnect equipment.

Enhanced electrical protection, that is, the installation of overcurrent protection on transformers which lack such protection, and sensors and disconnect equipment to avoid sustained low current faults will reduce the likelihood of PCB Transformer fault-related failures. These systems are intended to actuate complete deenergization of transformers when abnormal conditions are sensed. While abnormal conditions are expected to be typically caused by sustained high and low current faults, the low current fault protection system

in particular would also function to avoid sustained high temperatures and changes in internal pressure from other causes as well. Finally, the final rule requires the removal of stored combustibles near PCB Transformers to reduce the likelihood of a PCB Transformer fire occurring from an external source of combustion.

If transformer failure and fire occurs despite the presence of the required electrical protection system and the removal of stored combustibles, the nature and magnitude exposures to PCBs and oxidation products by building occupants, firefighters, cleanup crews, and members of the general population could be equivalent to that described above, in Unit IV.C.1.c. However, the presence of disconnect equipment on site (which can be manually operated) for many PCB Transformers will provide for more rapid deenergization than is currently the case.

Registration, labeling, containment of potential water releases, and notification of the National Response Center would also be expected to reduce exposures to these populations in the event that transformer failure occurred despite the presence of increased electrical protection. Advance knowledge on the part of fire departments and building owners about the contents of a transformer and the notification of EPA in the event of a fire would be expected to reduce exposures to building occupants, in addition to reducing exposures to firefighters and other emergency response personnel. EPA expects that firefighters, aware of the nature of risks posed by a transformer fire, would be more likely to wear respiratory protection and protective clothing and would be more protective of bystanders and onlookers. Building owners who are aware that a transformer fire involves a PCB Transformer would be less likely to dispatch unprotected cleanup crews to the site, and would be less likely to allow building occupants to return unprotected to an involved building.

If PCB Transformer owners take measures as soon as practically and safely possible to contain any spilled PCBs and or PCDFs/PCDDs (released as a result of a fire-related incident) and water potentially contaminated with PCBs, PCDFs, and PCDDs, EPA expects that potential releases to waterways will be substantially reduced. The blocking of floor drains in a transformer location as soon as practically and safely possible, and the containment of all water associated with the incident (including cleanup water) should reduce

the potential for the release of PCBs and untreated water into surface waters. Finally, by requiring the reporting of all PCB Transformer fire-related incidents to the National Response Center (NRC), EPA will be able to monitor cleanup efforts and the treatment and discharge of water, to insure that safe levels are not exceeded.

**3. Industrial PCB Transformer fires—**  
**a. Nature of installations and operations.** PCB Transformers used in industrial applications may be located indoors or outdoors, depending upon variables such as the service being supplied by the unit, the size of the unit, and the geographic location of the facility. According to comments submitted in response to the Proposed Rule, many (but not all) industrial transformers are located in production areas, near motors, machinery, and other equipment. These transformers are typically unvaulted and readily visible to facility workers during the routine conduct of their work. This is in contrast to the typical commercial PCB Transformer installation, which is generally inaccessible and less visible to employees.

Comments on the Proposed Rule indicate that in many industrial facilities, the performance of transformers is monitored during production shifts by engineers, electricians, or other similarly trained personnel. Further, comments indicate that industrial transformer owners reportedly utilize visual inspections, monitoring, and electrical testing of transformer function on a routine basis. Electrical equipment failure and fire in an industrial facility means loss of production time, which can have severe economic impacts. Thus, industrial transformer owners have this incentive to provide for transformer maintenance and testing on a routine basis to avoid fault-related failures and for providing disconnect equipment on site to provide for rapid deenergization in the event of a fault-related failure.

EPA's analysis indicates that there are approximately 26,700 PCB Transformers used in or near industrial facilities. Of these 26,700 PCB Transformers, EPA estimates that 98 percent are radial PCB Transformers, and that 2 percent are network PCB Transformers. Of the estimated 7,600 480 volt network PCB Transformers in use, EPA estimates that only 3 percent (or 179 PCB Transformers) are used in or near industrial facilities.

**b. Frequency of PCB Transformer fires.** EPA estimates that 6 out of the expected 50 serious PCB Transformer fires which will occur over the

remaining useful life of PCB Transformers will occur in or near industrial facilities. Four of these fires are expected to occur after October 1, 1990. This estimate was derived by considering available information on the number and type of PCB Transformers used in or near industrial facilities and available information on the probability of PCB Transformer fault-related failure for each type of transformer installation.

EPA has very little data on PCB Transformer fires which have actually occurred in industrial facilities. Limited data were submitted by the American Paper Institute (API) regarding two PCB Transformer fire-related incidents in forest industry facilities. According to the results of an API survey, during an 8.5 year period, between January 1976 and March 1984, there were two PCB Transformer fires (which involved smoke spread into buildings) out of an estimated 3,509 PCB Transformers used by the surveyed companies. API indicates that none of these incidents approached "Binghamton" proportions, and could be classified as moderate incidents on the spectrum of PCB Transformers fires.

**c. Exposure assessment.** EPA has little data on the circumstances surrounding actual PCB Transformer fires in industrial facilities. However, EPA has used environmentally conservative yet reasonable assumptions in evaluating likely human and environmental exposures from a PCB Transformer fire in a typical industrial facility. EPA recognizes that PCB Transformer fires may occur in atypical industrial facilities, where the exposures may be somewhat greater than those described here. However, based on comments on the Proposed Rule, EPA believes that there are fundamental differences between the potential for human exposures to PCBs, PCDFs and PCDDs from the use of PCB Transformers in industrial facilities versus their use in commercial buildings.

EPA assumes that a PCB Transformer fire in an industrial facility would involve an indoor PCB Transformer, sustained high temperatures in the transformer location, the rupture of the transformer, the release of PCBs, the volatilization of PCBs, and the distribution of PCBs and oxidation products into the interior of an industrial facility, into the ambient air, and into waterways. EPA assumes that smoke and soot containing PCBs and oxidation products are spread throughout the interior of an industrial facility during peak use hours, worker evacuation occurs during the early stages of the fire, an on-site fire brigade makes the initial

response, and, that reoccupancy of the facility by workers occurs after the removal of visible traces of soot.

EPA assumes that a PCB Transformer fire in an industrial facility will involve the rupture of the transformer and sustained high temperatures in the transformer location for up to 0.5 hour (in contrast to a 4-hour burn time assumed for commercial buildings). EPA has assumed this reduced burn time because comments on the Proposed Rule and available data indicate that transformers used in or near industrial facilities are more likely to be located in higher visibility areas, where malfunctions would be more rapidly identified. This is in contrast to the typical commercial PCB Transformer installation, which is not readily accessible or visible to employees. Further, EPA has assumed that once a malfunction has been identified, the transformer can be more easily deenergized in industrial facilities by on-site trained personnel. EPA made this assumption because comments indicate that industrial use PCB Transformers are typically equipped with primary disconnect equipment on site. Further, comments indicate that many industrial facilities employ electrical engineers or technicians during duty hours to monitor electrical equipment operations. This too is in contrast to the typical commercial installation, which is not equipped with primary disconnect equipment on site. Further, commercial PCB Transformer operations are not typically monitored.

An industrial PCB Transformer fire which occurs during a period of peak use may expose hundreds of workers to smoke and soot from the fire during the evacuation of the facility. However, EPA expects that worker evacuation times may be quicker than those assumed for commercial buildings. First, industrial facilities are not typically high-rise buildings. Second, there are typically fewer people to be evacuated. Finally, industrial workers would be expected to be more educated about the potential risks posed by any type of fire in an industrial location, and about proper evacuation procedures. EPA has assumed that exposures by workers to residual levels of PCBs and oxidation products would, however, continue following reoccupancy. EPA's estimate of potential exposures to industrial workers (assuming a 0.5 hour burn time and cleanup to visible traces of soot, as well as other assumptions detailed in support document 1 in Unit X.B.) is 2,888 pg/kg/day PCBs, 6.7 pg/kg/day 2,3,7,8-TCDF, 3.8 pg/kg/day other TCDFs, 22 pg/kg/day other PCDFs, 0.36 pg/kg/day

2,3,7,8-TCDD, 0.06 pg/kg/day other TCDDs, and 3.1 pg/kg/day other PCDDs.

Many industrial facilities have fire brigades on site to handle initial emergency response situations. According to comments on the Proposed Rule, these fire brigades are typically well-trained and well-equipped to handle industrial accidents and fires, including PCB Transformer fires. A PCB Transformer located in an industrial facility would likely be less confined than in a commercial building, and, therefore, would provide easier access to firefighters than a commercial location. Firefighting time may be reduced by the accessibility of the transformer, the capability to deenergize the equipment on site, and the level of site-specific training of industrial fire brigades.

EPA assumes that a 10-man fire brigade would respond to a PCB Transformer fire in an industrial facility, and that brigade members would be more likely to wear appropriate protective clothing and respirators. (Other assumptions are detailed in support document 1 in Unit X.B.) EPA's estimate of potential exposures to these firefighters is 45 pg/kg/day PCBs, 0.11 pg/kg/day 2,3,7,8-TCDF, 0.068 pg/kg/day other TCDFs, 0.37 pg/kg/day other PCDFs, 0.006 pg/kg/day 2,3,7,8-TCDD, 0.001 pg/kg/day other TCDDs, and 0.05 pg/kg/day other PCDDs. Additional exposures following the fire may, however, occur during the cleanup of turnout gear and firefighting equipment. EPA expects that industrial fire brigade personnel would take appropriate precautions to limit further exposures.

If water is used to extinguish the fire, or if water pipes rupture due to high temperatures, water runoff could ultimately result in contamination of surface waters and drinking water supplies. Industrial facilities typically have many floor drains, which are readily accessible pathways for the release of PCBs and oxidation products to waterways.

Atmospheric transport of PCBs and oxidation products in a metropolitan area could also be responsible for exposing many people who live or work in the vicinity of an industrial plant to PCBs and oxidation products. Higher ventilation rates in industrial facilities may lead to more rapid distribution of PCBs and oxidation products into the ambient air than would be the case for a fire in a commercial building. However, the shorter burn time for the fire would decrease the total amount of PCBs volatilized and incomplete combustion products formed and released.

Cleanup following an industrial PCB Transformer fire could be as time-consuming as an indoor commercial PCB Transformer fire. The cleaning and decontamination of valuable machinery and equipment would be very time-consuming. The cleanup of the structure itself may be less involved than for a high-rise office building. Industrial facilities are more open and building surfaces are generally more accessible to cleaning and decontamination. In addition, higher ventilation rates in industrial facilities would encourage the distribution of smoke and soot into the ambient air outside the facility. Further, the ability to deenergize the transformer from an on-site location would reduce both the amount of PCBs volatilized and the amount of incomplete combustion products formed and released.

In facilities which operate around the clock (24 hours per day operations), electrical equipment operations would be expected to be monitored during the entire operating time. However, smaller industrial facilities may operate only 8 hours per day, leaving electrical equipment operations unmonitored for 16 hours per day.

A PCB Transformer fire in an industrial facility after normal hours of operation could, therefore, burn longer than the assumed 0.5 hour. Electrical equipment operations are not typically monitored by operating personnel during off-shift hours. While occasional security patrols would inspect the area, a PCB Transformer fire could progress in much the same manner as a PCB Transformer fire in a commercial building. Deenergization of the transformer, even when on-site disconnect equipment is available, would take longer in these cases, because personnel trained in disconnecting the equipment would most likely not be on site during off-shift hours.

An industrial PCB Transformer fire during off-hours would be more likely to expose volunteer and municipal salaried firefighters than fires during normal operating hours, when company fire brigades would have primary responsibility for initial emergency response. Exposures to members of the general population in the vicinity of the fire would be expected to be higher for fires during off-hours, as would exposures to cleanup crews. Exposures to workers, however, would only be expected to occur following reoccupancy of the building, from contact with residual materials on building surfaces and in the air.

4. Outdoor fires involving PCB Transformers—a. Nature of

*installations and operations.* PCB Transformers which are used in outdoor applications may be located on the tops of utility poles, pad-mounted in urban, metropolitan, and rural areas, or in electric utility substations. The operation of these transformers is not typically monitored by on-site personnel. Electric utility substation PCB Transformers are typically fenced off to restrict access to authorized personnel, and their operation may be monitored by personnel in control rooms at utility transmission stations and/or generating stations.

EPA estimates that there are about 17,000 PCB Transformers used in outdoor applications. EPA expects that the majority of these transformers are in radial installations.

*b. Frequency of PCB Transformer fires.* Based on estimates of the frequency of "serious" PCB Transformer fires in radial transformer installations, and the estimated number of PCB Transformers located in outdoor electrical substations, EPA estimates that outdoor PCB Transformer fires with smoke generation will occur at a frequency of about 0.0014 percent per year, or about 3 incidents over the remaining useful life of this equipment.

*c. Exposure assessment.* Fires involving PCB Transformers located in outdoor locations, away from commercial buildings, are expected to result in lower human exposures to PCBs and oxidation products in fire situations than transformer fires in or near buildings. First, because combustion conditions in an outdoor PCB Transformer fire are not expected to be as conducive to the volatilization of spilled PCBs and the formation of large quantities of PCDFs, 2,3,7,8-TCDF, PCDDs, or 2,3,7,8-TCDD as would be the case with transformers located in machinery rooms or vaults. Generally, combustible materials are not present near outdoor PCB Transformers and some of the heat generated from arcing or fires would be expected to dissipate in the environment.

Further, outdoor utility substations in particular are generally fenced to restrict access to authorized personnel only, thus limiting the number of people at immediate risk of exposure in the event of a fire. In contrast to the smoke and soot produced from transformer fires in or near buildings, any smoke or soot produced in an outdoor transformer fire, away from commercial buildings, is expected to be more widely dispersed in the environment. EPA has developed a model for the release of PCBs and the formation of PCDFs and/or PCDDs from an outdoor PCB Transformer fire. EPA has estimated the expected exposures

from releases to air from an outdoor fire and has found that exposures decrease with increasing distance, and that at a distance of 200 meters from a fire, inhalation exposures from a typical fire would be expected to be relatively low.

While there is a potential that emergency response personnel and cleanup crews responding to such fires may be exposed to some PCDFs, 2,3,7,8-TCDF, PCDDs, and 2,3,7,8-TCDD, exposures to PCBs would be more likely to occur. Firefighting equipment and protective clothing may become contaminated with PCBs, and may result in exposures to firefighters during equipment cleanup and maintenance.

*Fires involving outdoor PCB Transformers near commercial buildings (i.e., within 30 meters of commercial buildings) could result in more people being exposed to higher levels of PCBs and any oxidation products produced. For this reason, EPA has included outdoor PCB Transformers located within 30 meters of commercial buildings within the definition of PCB Transformers located in or near commercial buildings.*

*5. Fires involving transformers containing less than 500 ppm PCBs—a. Nature of installations and operations.* EPA estimates that there are over 20 million mineral oil transformers in the electric utility industry and about 5 million in all other applications. These mineral oil transformers may contain low levels of PCBs (less than 500 ppm PCBs) as a result of contamination from past servicing activities. EPA estimates that approximately 18 million of these mineral oil transformers are used in nonsubstation applications, in or near commercial buildings, industrial facilities and outdoors on utility poles. These transformers are installed in both radial and network configurations.

*b. Exposure assessment.* PCB Transformers typically contain 65 percent PCBs, or about 1,300 times the maximum amount of PCBs present in PCB Contaminated transformers (and 13,000 times the amount of PCBs present in transformers containing 50 ppm PCBs). EPA has assessed the potential for exposures to PCBs, PCDFs, 2,3,7,8-TCDF, PCDDs, 2,3,7,8-TCDD from fires involving PCB-Contaminated equipment by assuming that the transformer present in the Binghamton State Office Building was a PCB-Contaminated transformer, and, by assuming reasonable worst-case values for other parameters. Based on the results of EPA's study of the incomplete combustion of PCB-Contaminated transformer fluids, EPA has assumed that the formation of PCDFs and PCDDs in a PCB-Contaminated transformer

would be linearly related to the amount of PCBs present in the transformer. Given this situation, PCB, PCDF, 2,3,7,8-TCDF, PCDD, and 2,3,7,8-TCDD levels in the soot from such a fire would be expected to be reduced by a factor of 1,300, compared to levels actually measured in Binghamton. Similarly, human exposures to these materials are assumed to be reduced by the same factor.

*6. Conclusions—Risks posed by fires involving transformers that contain PCBs.* Toxicity and exposure are the two basic components of risk. In earlier units of this preamble, EPA evaluated the toxicity of PCBs, PCDFs, 2,3,7,8-TCDF, PCDDs, and 2,3,7,8-TCDD and presented assessments of the potential for human exposure to these materials from transformer fires. EPA concluded that both 2,3,7,8-TCDD and PCBs are probable human carcinogens, based upon studies in laboratory animals. Further, since 2,3,7,8-TCDF is structurally and chemically similar to 2,3,7,8-TCDD, EPA has concluded that it is prudent to assume that an oncogenic potential exists in 2,3,7,8-TCDF and perhaps in other PCDD and PCDF congeners as well.

EPA has determined that relatively large quantities of these compounds can be formed and released during a PCB Transformer fire, particularly a fire which occurs in or near a commercial building. Sustained high temperatures in these transformer locations are more likely than in industrial or outdoor locations because of the nature of commercial PCB Transformer installations. Many commercial transformers are network transformers (which are the least well protected distribution (transformers)). Further, malfunctions in commercial PCB Transformers are more likely to progress into more serious incidents because these transformers are typically located in low visibility areas, and because these locations typically lack on-site electrical technicians and necessary disconnect equipment to insure complete deenergization in the event of a sustained fault or failure.

Finally, there are many routes through which commercial building occupants, emergency response personnel, cleanup crews, onlookers, and the general public can be exposed to these materials, once generated. Building evacuation times for large commercial buildings can be relatively long, reoccupancy may occur before adequate cleanup has been completed, emergency response personnel may lack necessary protective equipment, cleanup crews may be dispatched without proper protection,

onlookers may be unaware of the risks posed, and members of the general population in the vicinity of the fire may incur inhalation exposures and dermal exposures during the fire, and for extended periods after the fire from contamination of waterways, drinking water supplies and outdoor materials with PCBs, PCDFs, and PCDDs.

EPA has concluded that fires involving PCB Transformers in or near commercial buildings can pose significant risks of human and environmental exposures to PCBs and oxidation products. EPA believes that 44 of the estimated 50 structure-related serious incidents over the remaining useful life of PCB Transformers will occur in or near these buildings. Further, based on its analysis of the relative probabilities of PCB Transformer failures and fires, EPA has concluded that many of these fires will involve 480 volt network PCB Transformers.

Given that a single serious PCB Transformer fire in or near a commercial building can potentially expose thousands of people to PCBs and oxidation products in soot in air, water, or on surfaces, EPA has concluded that PCB Transformer fires in or near commercial buildings can pose significant risks to human health and the environment. However, EPA also believes that reducing the potential for the release of PCBs and the potential for the formation and release of PCB oxidation products from PCB Transformers substantially reduce the fire-related risks posed by the continued use of this equipment.

EPA has determined that sustained high temperatures in industrial PCB Transformer locations and in outdoor substation PCB Transformers are less likely than for commercial PCB Transformers because of the nature of these installations. Many of these transformers are radial transformers (which are typically better protected against sustained faults and failures than network transformers). Further, malfunctions in industrial PCB Transformers which go undetected by existing electrical protection are less likely to progress into more serious incidents because of the location of these transformers in higher visibility areas, and because industrial facilities reportedly have on-site electrical engineers and technicians and necessary disconnect equipment to provide for complete deenergization. Finally, the suggested higher frequency of maintenance, inspection, and testing of industrial transformers and utility substation transformers would further

decrease the likelihood of fire-related failures in this equipment.

EPA estimates that up to 6 out of the expected 50 serious PCB Transformer fires over the remaining useful life of PCB Transformers will occur in or near industrial facilities, and that less than 3 PCB Transformer fires with smoke distribution will occur in outdoor PCB Transformer locations.

While exposures to workers, emergency response personnel, cleanup crews and the general population may occur from an industrial PCB Transformer fire, the magnitude of exposure associated with a PCB Transformer fire in a typical industrial facility would be anticipated to be greatly reduced (when compared to a commercial PCB Transformer fire) as a result of several factors. First, EPA expects that the duration of industrial PCB Transformer fire-related incidents would be significantly less than the duration of commercial PCB Transformer fires, because of the presence of trained personnel and disconnect equipment on site. The reduced duration would reduce exposures to all populations potentially at risk of exposures. Second, there are generally fewer workers present in industrial facilities than in commercial buildings, and worker evacuation times would be expected to be less for industrial facilities than for commercial buildings. This is because of the single-story nature of many industrial facilities, and the expected increased level of education of industrial workers about workplace hazards. Third, according to comments on the Proposed Rule, industrial facilities often utilize well-trained, well-equipped fire brigades for initial emergency response, rather than local volunteer or salaried municipal firefighters. Emergency response personnel as a group, then, would be expected to incur lower exposures in responding to industrial PCB Transformer fires than would be the case for commercial PCB Transformer fires.

A comparison of estimated exposures from a commercial PCB Transformer fire to an industrial PCB Transformer fire indicates that exposures by building occupants to PCRs, 2,3,7,8-TCDF, other TCDFs, other PCDFs, 2,3,7,8-TCDD, other TCDDs, and other PCDDs could be as much as an order of magnitude higher for commercial building fires than for industrial building fires.

EPA recognizes that exposures from PCB Transformer fires in atypical industrial facilities could be higher than described earlier. However, EPA's estimate of the frequency of industrial

PCB Transformer fires is 6 fires over the remaining useful life of industrial PCB Transformers. Even if EPA were to assume that all 6 of these fires resulted in individual exposures of the same order of magnitude suggested for commercial PCB Transformer fires, there are fewer people at risk of these exposures in industrial locations when compared to commercial buildings.

One could consider the overall fire-related risk posed by the continued use of PCB Transformers and compare the different frequencies of occurrence of fires in commercial buildings versus industrial facilities (assuming as a worst-case, that the risks posed by commercial PCB Transformer fires and industrial PCB Transformer fires are equivalent). This analysis indicates that 88 percent of the fire-related risk posed by the continued use of PCB Transformers (in locations in or near buildings) are associated with their use in or near commercial buildings and 12 percent of the total risks are associated with their use in industrial locations.

EPA has further determined that outdoor PCB Transformer fires, (away from commercial buildings) and fires involving PCB-Contaminated transformers pose lower risks than PCB Transformer fires in or near commercial buildings. While EPA expects that outdoor PCB Transformer fires may result in the release of PCBs, EPA expects that outdoor PCB Transformer fires would be less likely to result in the volatilization of large amounts of PCBs and less likely to lead to the formation and release of large amounts of PCDFs and PCDDs. Further, PCBs and oxidation products released from outdoor PCB Transformer fires would be expected to be more widely dispersed in the environment. Although PCBs may be released and oxidation products may be formed during the PCB-Contaminated transformer fires, the amounts of these materials formed and released are expected to be significantly reduced compared to the amounts formed and released from PCB Transformers.

#### IV. Benefits of PCB-Transformers and the Availability of Substitutes

As part of the unreasonable risk determination, EPA must consider both the benefits of PCBs and the availability of substitute materials. The unreasonable risk determination requires EPA to balance the risks posed by the use of PCBs against the availability of adequate substitute materials and the costs associated with regulatory control measures.

### A. Benefits of PCBs

PCBs were originally used as dielectric fluid in electrical transformers primarily because of their fire-resistance properties. Generally, PCB Transformers were placed in locations where concerns for fire safety were paramount. Other dielectric fluids, such as mineral oil, have superior electrical properties to PCBs, but their fire resistance properties are not as good as PCBs.

Monsanto Company has had in progress for over a year a study assessing and comparing fire risks of PCBs and of mineral oil. The Monsanto-sponsored study indicates that the average frequency of a fire spreading beyond the transformer room is 300 times greater for a mineral oil transformer than for a PCB Transformer containing 50 percent PCBs and 50 percent chlorinated benzenes. The report further indicates that there is a significant decrease in the risk of fatalities when a mineral oil transformer is replaced by a PCB Transformer containing 50 percent PCBs and 50 percent chlorinated benzenes.

### B. Substitute Transformers

In its August 1982 PCB Electrical Use Rule, EPA concluded that adequate substitutes exist for PCBs in indoor transformer locations. There are two basic categories of transformers, fluid-filled and dry. There are six general types of fluid-filled substitutes for PCBs in transformers: Silicones; high-temperature hydrocarbon (HTH); chlorinated hydrocarbons; non-PCB askarels; fluorocarbons; and mineral oil. EPA summarized available data on these substitute fluids in the Proposed Rule and concluded that adequate substitutes exist for PCBs for indoor transformer locations, including silicone-filled transformers and dry transformers.

As discussed earlier, EPA-sponsored studies indicate that PCDFs and PCDDs can be formed from the incomplete combustion of chlorinated benzenes. Similarly, an EPA-sponsored study indicates that PCDFs can be formed from the incomplete combustion of tetrachloroethylene (perchloroethylene).

The replacement of PCB dielectric fluid with substitute fluids which in fire situations may also lead to the formation of PCDFs and PCDDs should be carefully considered in light of the Agency's decision in this rule to place additional conditions and restrictions on the use of PCB Transformers. EPA's evaluation of the risks posed by the incomplete combustion of PCB dielectric fluid and the frequency of occurrence of PCB Transformer fires indicate that the

fire-related risks posed by the use of a dielectric fluid which can be transformed into PCDFs and/or PCDDs can be significant. EPA will study this issue further and evaluate the need for additional EPA action.

### C. Retrofilling PCB Transformers

1. *Introduction.* Two general types of substitutes for PCBs in transformers stand out as the best retrofill candidates. These fluids are silicones and high temperature hydrocarbons (HTH). The principal questions to be considered are the cost of retrofill versus the value of the remaining life of the transformer and the qualification of the fluid as "less flammable" for insurance purposes. A related question is the potential for the formation of toxic products of incomplete combustion from the retrofill fluid and remaining residual concentration of PCBs. Other fluids, such as chlorinated hydrocarbons, fluorocarbon, and mineral oil, are used in new transformers but are inappropriate for retrofilling because the design of the PCB Transformers does not fit the properties of the fluids.

Experience with retrofilling to date indicates that reclassification of askarel PCB Transformers to non PCB status is often not cost-effective. Reclassification to PCB Contaminated status, however, has been accomplished in a cost-effective manner for a number of askarel PCB Transformer units. Testimony at the public hearing, however, indicates that retrofill technology continues to evolve, and, that cost-effective reclassification of askarel PCB Transformers to non PCB status may be on the horizon.

2. *Silicones.* There are six silicone fluids sold by six different companies for use as dielectric fluid. Four of the six fluids have been approved by Factory Mutual Research Corporation (FMRC) as "less flammable" fluids. Silicones have a higher viscosity than PCBs and are therefore not quite comparable to PCBs as a coolant. For this reason, it is possible that transformers retrofilled with silicone would have to be derated. According to one silicone fluid manufacturer, if the transformer were fully loaded, a derating not exceeding 5 percent could be necessary. (Derating means lowering the maximum level of electrical load that the transformer can handle.)

It has been mentioned in the literature that a leaking problem could be created because silicone fluids are not compatible with silicone rubber gaskets and the coefficient of expansion of silicone fluids is 50 percent greater than that of PCBs. In actual practice, however, the silicone gaskets are replaced during retrofilling. (Further,

even though the coefficient of expansion is greater than that for PCBs, the greater solubility of the filler gas (nitrogen) in silicone eliminates the expected increase in pressure.)

3. *HTHs.* There are six HTH fluids sold by five companies that may be used as transformer dielectric fluids. There are also two products sold by two other companies that when mixed with other products may be used as HTH transformer fluids. Three of the six fluids are paraffinic based oils and three are esters. As mentioned earlier, the three esters are more specialized for use in railroad transformers.

The other three fluids are more viscous than the silicones at lower temperatures, but thin more rapidly at higher temperatures. According to an HTH manufacturer, this property allows the transformers to be retrofilled with HTH without any derating. At lower normal load temperatures, however, the transformers do run hotter. These fluids are completely compatible with the materials that make up PCB Transformers, and they are soluble in PCBs. Two of these fluids are approved by FMRC as "less flammable transformer fluids," and the fire point of the third is over 300 °C.

Because the paraffinic HTHs have high convective and radiant heat release rates, the owner's insurance company may recommend more stringent installation requirements.

## V. Benefits and Costs of Regulatory Options

### A. Introduction

This unit presents an analysis of the effectiveness and economic impact of various regulatory options for reducing the fire-related risks posed by the continued use of PCB Transformers. For a full analysis of the expected economic impacts see the regulatory analysis for this final rule, support document 7 in Unit X.B. The analysis considers separately, the effectiveness and costs of five major regulatory control options for four categories of PCB Transformers: (1) PCB Transformers in or near commercial buildings, (2) PCB Transformers in or near industrial locations, (3) PCB Transformers in outdoor electrical substations, and (4) PCB Contaminated Transformers. The regulatory control measures considered are: (1) Placing no additional conditions or restrictions on the use of PCB Transformers; (2) requiring the registration and additional labeling of PCB Transformers, the removal of stored combustibles, the containment of potential water releases and the

reporting of PCB Transformer fires to the National Response Center; (3) requiring the isolation of PCB Transformers to reduce widespread structure and environmental contamination with PCBs and products of incomplete combustion; (4) requiring the installation of increased electrical protection on PCB Transformers to avoid PCB Transformer failures; and, (5) requiring the removal or retrofit of PCB Transformers. The analysis includes a consideration of the expected savings in cleanup costs as a result of implementing these measures.

Given the well-established toxicity of PCBs, and the presence of materials that are much more toxic than PCBs in the soot from a fire involving a PCB Transformer, owners of PCB Transformers involved in PCB Transformer fires have invested more than \$20 million dollars each to ensure the safety of persons returning to occupy these buildings. These costs, for sampling, cleanup and removal of contaminated materials containing PCBs, PCDFs, and PCDDs can be factored into the economic analysis of the benefits of the continued use of PCB Transformers. Earlier analyses of the benefits of the continued use of these transformers, completed in support of the August 1982 PCB Electrical Use Rule, did not take into consideration the costs of cleanup in the event of PCB Transformer fires.

#### B. Summary of Benefits and Costs

The removal or retrofit of PCB Transformers is both the most effective, and, the most costly measure for reducing the frequency of serious PCB Transformer fires. This measure, once implemented, gives the greatest assurance that PCB Transformer fires will be avoided, regardless of initiating cause. However, it is also the measure which, as a practical matter, would require the longest time for implementation. Concerns such as the availability of PCB disposal capacity, transformer manufacturing capacity, and avoiding the disruption of electrical service make phaseout and/or retrofit more difficult to implement quickly than other risk reduction measures. Based upon EPA's analysis of the frequency of PCB Transformer fires, it is likely that serious PCB Transformer fires will occur in the interim, between the date of promulgation of any phaseout requirement and the actual date of the removal of PCB Transformers from use.

Providing enhanced electrical protection is anticipated to be very effective in avoiding serious PCB Transformer fires, through the prevention of PCB Transformer fault-related failures. Studies of the causes of

PCB Transformer failures and fires and the level of protection currently provided indicate that many PCB Transformers could be better protected to avoid fires caused by more common mechanisms of failure, electrical faults. The effectiveness of increased electrical protection is expected to approach that of phaseout/retrofit, although EPA recognizes that electrical protective devices are subject to some (low) rate of malfunction, and, that PCB Transformer fires can also result from less common mechanisms of failure. Requiring a certain level of redundancy in the type of sensors used and the placement of sensors provide increased assurance of a higher level of effectiveness. Further, as a practical matter, this control measure could be implemented more quickly than phaseout/retrofit, because availability of PCB disposal capacity and transformer manufacturing capacity are not primary concerns. Further, this measure would be less disruptive to electrical service than phaseout/retrofit.

Increased electrical protection can be costly, however, compared to other risk reduction measures (other than phaseout/retrofit). Further, while electrical protection systems are expected to have a high degree of reliability in avoiding failures, there is the potential for false outages. These are circumstances in which a transformer is mistakenly deenergized when a sustained fault condition does not in fact exist. While EPA acknowledges the potential economic impact of false outages, EPA has not attempted to quantify this impact.

The isolation of PCB Transformers is expected to be effective in avoiding serious PCB Transformer fires by avoiding widespread structure and environmental contamination. The effectiveness of isolation in actually avoiding more serious PCB Transformer fires depends, however, to a great degree on the capability of a failed transformer to be deenergized within 15 minutes of failure. Isolation is not expected to be very effective for transformers which cannot be easily deenergized after failure occurs. Isolation is expected to be effective in minimizing the distribution of PCBs and incomplete combustion products in circumstances where a transformer has the capability to be deenergized within 15 minutes of failure.

As was the case for the installation of increased electrical protection, isolation measures can be implemented more quickly than PCB Transformer phaseout/retrofit, because availability of PCB disposal capacity and

transformer manufacturing capacity are not primary concerns. However, implementation of transformer isolation requirements would be, in general, more complex than providing enhanced electrical protection in a transformer installation. This is because the isolation of transformers would typically require negotiation between building owners and transformer owners for necessary structural changes to buildings. While transformer isolation is costly, it would be in many cases less expensive than either phaseout/retrofit or increased electrical protection.

The registration of PCB Transformers with building owners and fire departments, the labeling of the exterior of PCB Transformer locations, the containment of potential water releases, and the reporting of PCB Transformer fires to the NRC are measures which are expected to reduce exposures in the event of a serious PCB Transformer fire. However, these measures will not be effective in avoiding any of projected 50 serious building fires, or the estimated 3 outdoor PCB Transformer fires from occurring. The effectiveness of these risk reduction measures depends, to a large extent, on the implementation of voluntary measures based on knowledge about the contents of a transformer involved in a fire-related incident. These measures are the least costly control measures that EPA considered.

#### C. Regulatory Options and Economic Impacts

1. *PCB Transformers in or near commercial buildings*—a. *Summary table.* The following table (Table 1) summarizes the real costs, benefits, and net costs (after a consideration of savings in cleanup costs from avoided fires) of the major regulatory control measures considered for commercial PCB Transformers. For a full discussion of the assumptions made for this analysis, see support document 7 in Unit X.B.

TABLE 1.—COSTS AND BENEFITS OF CONTROL MEASURES FOR COMMERCIAL PCB TRANSFORMERS

Option	Real cost (millions)	Expected fires	Avoided fires	Net cost (millions)
No action	N/A	44	0	\$399
Labeling and registration	\$7.3	44	0	7.3
Enhanced E. protection, 5-years	590	9	35	343
Removal:				
5-years	953	8	36	704
10-years	640	15	29	470
Removal of 480 network 5-years	168	19	25	147

TABLE 1.—COSTS AND BENEFITS OF CONTROL MEASURES FOR COMMERCIAL PCB TRANSFORMERS—Continued

Option	Real cost (millions)	Expected fires	Avoided fires	Net cost (millions)
Removal of 400 network & E. protection of remaining (5-years)	628	9	35	390

<sup>1</sup> Fire-related cleanup expense over remaining useful life.

<sup>2</sup> Would be expected to reduce exposures.

<sup>3</sup> Avoided cleanup costs exceed real cost of measure.

b. *Take no additional action.* The first regulatory option that EPA considered for PCB Transformers located in or near commercial buildings was to take no further regulatory action at this time to restrict the use of these transformers. This would allow the continued use of PCBs in or near buildings such as office buildings, shopping centers, apartment buildings, and hospitals without additional restrictions above the requirements of the August 1982 PCB Electrical Use Rule. That rule authorized the continued use of transformers containing PCBs (that pose no exposure risk to human food or animal feed) for the remainder of their useful lives subject to certain recordkeeping and inspection requirements, based on the concentration of PCBs in the equipment.

There are no costs to transformer owners associated with EPA's allowing the continued use of these transformers, other than the potential future costs associated with cleanup and liability suits following fires involving this equipment. If the use of PCB Transformers in or near commercial buildings were authorized indefinitely, without additional restrictions, EPA expects that 44 additional incidents will occur over the remaining useful life of this equipment.

For purposes of this analysis, these 44 incidents would be expected to require cleanup efforts whose cost would approach \$20 million each (1985 dollars) or an estimated \$399 million over the remaining useful life of this equipment.

c. *Labeling and registration programs.* The registration of PCB Transformers located in or near commercial buildings with fire departments and building owners, in combination with the labeling of the exterior of transformer locations with PCB identification labels may be effective in reducing exposures to firemen, building occupants, and bystanders. Compared to the other regulatory alternatives under consideration (other than the alternative of taking no additional action), the cost of this option is relatively low. EPA believes that in addition to registration

with fire departments, the labeling of the exterior of transformer locations is necessary to insure that emergency response personnel arriving at the scene of a fire know that the fire involves a transformer that contains PCBs. EPA expects that the costs of labeling the exterior of PCB Transformer locations will be about \$76.00 per location. EPA estimates that the total cost of labeling the exterior of commercial PCB Transformer installations will be about \$3.5 million.

The costs of registering commercial PCB Transformers are also expected to be minimal, since the location of all PCB Transformers should already be known by the owners of this equipment. The costs to transformer owners of forwarding this information to all building owners and to fire departments with primary jurisdiction is expected to be minimal, on the order of \$50.00 per transformer. EPA estimates that total costs of this registration program for commercial PCB Transformers would be approximately \$3.8 million. The total real costs of registration and labeling of commercial PCB Transformers would be on the order of \$7 million.

While transformer registration and labeling programs would be expected to reduce human and environmental exposures to PCBs, and oxidation products, they will not reduce the frequency of serious PCB Transformer fires.

d. *Smoke control technologies.* Certain design techniques or changes in commercial PCB Transformer locations may be effective in reducing the likelihood of widespread structure and environmental contamination from a failed PCB Transformer. The effectiveness of transformer isolation as a control measure depends to a large extent, however, on the type of PCB Transformer installation and the ease of actuating deenergization.

Unlike the ventilation systems for other oil-filled transformers, the ventilation systems for PCB Transformers were not designed for the purpose of fire isolation but rather were designed only to keep the ambient temperature at or below 30° Centigrade (C). However, the removal or alteration of existing ventilation systems could result in higher operating temperatures which shorten transformer operating lives and may increase the likelihood of equipment failure.

Thus, the design of alternative ventilation or cooling systems may be necessary to reduce the potential for building contamination. Ventilation alternatives include air conditioners, redirected venting, and heat exchangers,

or simply limiting the contamination potential of the existing system by reducing the ventilation cooling effectiveness.

The objective of isolation is to reduce the widespread contamination of structures and the environment by smoke and soot from a transformer fire. These techniques often include the modification of the ventilation system serving the transformer location and/or sealing cracks or openings which would permit smoke to escape freely into occupied areas and the environment. In the more serious transformer incidents, the presence of building ventilation systems, building ductwork, and openings in construction in transformer locations have been responsible for the dispersion of toxic contaminants into buildings.

While transformer isolation can reduce exposures in the event of a failure and fire involving a PCB Transformer (by reducing the spread of contaminants), if a transformer cannot be easily deenergized within 15 minutes after a sustained fault occurs, then substantial quantities of smoke and soot can be generated. The longer a transformer remains energized after a serious fault occurs, the less likely it is that isolation will be effective in reducing exposures to PCBs and incomplete combustion products.

Although specific design changes and costs of isolation techniques are dependent on the individual transformer location, EPA has developed some general cost estimates. A firm involved in survey and design projects for PCB Transformers estimates that in 85 to 90 percent of all cases where isolation is the desired alternative, the costs are about \$8,000 per transformer location.

For purposes of the cost-effectiveness analysis, an average cost of \$8,000 per location is assumed for all locations where some form of suitable transformer enclosure is already present. For nonenclosed transformers, an estimated cost of \$15,000 is assumed for retrofit of an enclosure that provides for smoke containment.

In order to facilitate compliance monitoring efforts, EPA would require the development of written PCB Smoke Spread Reduction Plans (PCB-SSRPs). The development of PCB-SSRPs involves documenting measures taken to isolate PCB Transformers from building ventilation equipment, ductwork, and openings in construction. EPA expects that maintaining these records would create a minimal additional burden on PCB Transformer owners (above the burden created by requiring transformer isolation procedures).

The total real costs of isolation procedures for commercial PCB Transformers implemented over a 5-year period are \$318 million. Avoidance of cleanup costs through transformer isolation depends to a great extent on the ability to deenergize a transformer rapidly. EPA has limited data on the number of commercial transformers which can be rapidly deenergized (i.e., which currently have the capability to be deenergized within 15 minutes of a sustained fault); these transformers would be the group most likely to derive benefits from isolation in the event of PCB Transformer failure. Available data suggest that most commercial PCB Transformers are not capable of being rapidly deenergized in the event of a sustained fault. This severely reduces the effectiveness of PCB Transformer isolation alone, without increased electrical protection, as a mechanism for avoiding serious PCB Transformer fires in or near commercial buildings.

*e. Increased electrical protection.* Avoidance of serious PCB Transformer fires in commercial buildings through increased electrical protection involves the installation of appropriate sensors and disconnect equipment to detect common causes of transformer failures and to allow for deenergization. The disconnect equipment would either be automatically activated in response to sensed abnormal conditions (with a provision for manual deenergization), or, manually opened following the receipt of an audio or visual signal (indicating abnormal conditions) at an on-site manned control center. Devices which respond to overcurrent conditions and sensors which respond to low current faults would protect against failures from two basic mechanisms of fault-related transformer failures. Low current fault protection in the form of heat and pressure sensors and associated disconnect equipment would also provide deenergization following high temperatures and changes in pressure from other causes, such as mechanical failures or external fires.

As discussed in Unit IV.C, transformer failures can occur as a result of excessive current flow of a transformer. Of the 77,568 PCB Transformers used in or near commercial buildings, approximately 21,000 PCB Transformers (the network transformers) are currently without overcurrent protection on the primary side (the high voltage side) of the transformers. Second, virtually none of the 77,568 PCB Transformers in or near commercial buildings are currently equipped with sensors to detect low current faults. Finally, virtually none of the 21,000 network PCB Transformers in

use have disconnect equipment (in the form of a primary circuit breaker or equivalent technology) on site to allow for rapid deenergization, and, EPA expects that many of the 55,000 commercial radial PCB Transformers do not utilize primary circuit breakers for high current fault protection.

The installation of certain safety equipment to detect sustained high current and low current faults on PCB Transformers which currently lack such protection would reduce the probability of failures, fires, and explosions in commercial PCB Transformers, particularly events resulting from electrical malfunctions. Electrical malfunctions, specifically electrical faults, have been implicated in many known PCB Transformer fires.

The highest reduction in the probability of PCB Transformer fault-related failure is attained when protection is provided against both basic mechanisms of transformer fault-related failures. Installation of overcurrent protection without protection against low current faults will avoid only those PCB Transformer fires which occur as a result of overcurrent conditions.

Electrical faults in general are more likely in network transformers than radial transformers because network transformers have more associated electrical equipment (on the secondary side of transformers); network transformers have network protectors and network buswork for faults to occur in. This does not mean that faults will not occur in radial transformers; it simply means that when radial installations are compared to network installations, one would expect more electrical faults in general to occur in network installations.

When the secondary voltage of a transformer is higher, any faults which occur in the secondary are more likely to be sustained rather than self-clearing or self-extinguishing. Sustained faults cause PCB Transformer failures and fires. Thus, higher secondary voltage network PCB Transformers would have the highest probability of failure from faults. Using the same logic, low secondary voltage radial PCB Transformers would have the lowest probability of failure from faults.

According to comments on the Proposed Rule, historically, utilities have installed high current fault protection on the primaries and secondaries of radial transformer installations. Network installations, however, have been less well protected against high current faults.

The cost of installing increased protection on commercial PCB

Transformers depends both on the form of protection selected, and, whether the device involves a retrofit of the transformer. High current fault protection is much less costly than low current fault protection. Low current fault protection involves the installation of disconnect equipment as well as the installation of appropriate sensors. High current fault protection involves the installation of current-limiting or energy limiting fuses.

Since comments on the Proposed Rule and EPA's analysis indicate that the probability of a transformer failure from electrical faults is influenced by the type of transformer installation, not all of the above protection would be warranted on a cost/benefit basis for all types of commercial PCB Transformer installations.

Under the option of increased electrical protection, EPA would require that all commercial PCB Transformers be equipped with overcurrent protection to avoid transformer failures as a result of high current faults. Current-limiting fuses are relatively inexpensive, and would avoid failures from high current faults in the primary and secondary areas of transformers. The cost of installing current-limiting fuses (on the estimated 22,191 commercial network PCB Transformers which currently lack such protection) is estimated at \$53 million. The installation of these devices on the approximately 15,072 lower secondary voltage network transformers is estimated at \$35 million.

EPA would also require that all commercial PCB Transformers with higher secondary voltages be equipped with protection against sustained low current faults. This is because transformers with higher secondary voltages are more likely to experience sustained rather than self-clearing faults. While 480 volt network PCB Transformers may have a particularly high probability of sustained low current faults (because of the high secondary voltage and the presence of more associated electrical equipment), when a low current fault occurs in a higher secondary voltage radial PCB Transformer (in the voltage winding, low voltage leads, or other equipment), it too will be sustained and can result in transformer failure.

For the majority of these higher secondary voltage commercial PCB Transformers, protection against failures from low current faults would mean the installation of a primary circuit breaker on site as well as the installation of non-electrical sensors, such as pressure sensors and temperature sensors in the transformer. For high secondary voltage

network PCB Transformers, fault sensors would also be needed in the network protector and the network bus as well. Requiring the installation of both pressure and temperature sensors in the transformer tank and fault sensors in the network protector and network bus of high secondary voltage network PCB Transformers provides a level of redundancy in the protection system; this increases the reliability of electrical protection, and provides increased assurance that increased electrical protection would actually avoid PCB Transformer failures and fires.

The cost of protection against low current faults is principally the cost associated with the installation of disconnect equipment such as circuit breakers on site. The cost of the indicated sensors is a fraction of the cost of the installation of a primary circuit breaker.

The total real costs associated with requiring the installation of high current fault protection on all commercial PCB Transformers and low current fault protection on higher secondary voltage commercial PCB Transformers over a 5-year period is estimated at \$590 million. EPA expects that the installation of these electrical protection systems will avoid about 97 percent of serious PCB Transformer fires in commercial buildings which would have otherwise occurred, or, 35 serious PCB Transformer fires over the remaining useful life of this equipment. The net cost of this control measure, after adjusting for avoided cleanup costs is estimated at \$343 million.

The increased electrical protection requirement which appeared in the Proposed Rule required installation in 3 years, by October 1, 1988. Based on comments submitted in response to the Proposed Rule concerning the type of electrical protection needed, the higher costs of this protection (compared to the proposed electrical protection requirement) and the larger number of PCB Transformers which require additional electrical protection, EPA believes that it is reasonable to allow a longer phase-in period for this control measure than was proposed. Further, EPA recognizes that many PCB Transformer owners may choose PCB Transformer removal in lieu of enhanced electrical protection, and that this will place additional burdens on PCB disposal capacity. Requiring the installation of enhanced electrical protection on a schedule which recognizes both the fact that many PCB Transformer owners have chosen or will choose removal rather than electrical

protection and that there are constraints on PCB disposal capacity will encourage PCB Transformer owners who have voluntary 5-year phaseout programs in place to continue and may stimulate other owners to initiate such programs. Thus, EPA has allowed 5 years for the implementation of the requirement for enhanced electrical protection.

*f. Retrofilling.* Retrofilling of commercial PCB Transformers to reduce the PCB concentration to below 500 ppm would be expected to reduce human and environmental exposures to PCBs and their oxidation products in the event of a fire. This would be accomplished through a substantial reduction in the amount of PCBs present in the transformers. EPA has completed an analysis of the costs of retrofilling commercial PCB Transformers to reduce PCB concentrations to below 500 ppm. EPA estimates that retrofill costs will range from \$15,505 for a 50 KVA transformer to \$32,034 for a 3,000 KVA transformer. These estimates include the costs of disposal of PCB fluid, but do not include any consideration of a loss of efficiency or derating as a result of the retrofill.

An estimate of the total resource costs of retrofilling all commercial PCB Transformers (77,568 at end of 1984) to below 500 ppm is about \$1.2 billion. Although the retrofilling of PCB Transformers reduces the risks to humans posed by the transformer in the event of a fire (by reducing the amount of PCBs present, the amount of PCBs released, and the amount of PCDF formed and released), it is difficult to estimate the effectiveness of this option in avoiding cleanup costs from fire incidents, since PCDFs and PCDDs may still be formed.

*g. Phaseout of commercial PCB Transformers.* The removal of all PCB Transformers from locations in or near commercial buildings or the removal of particularly high risk PCB Transformers from locations in or near commercial buildings would give increased assurance that future serious PCB Transformer fires from all causes will be avoided. The following table uses a population of 77,568 units (EPA's estimate of the number of PCB Transformers in or near commercial buildings that will be in use at the end of 1984) and a population of 7,420 units (EPA's estimate of the number of high secondary network PCB Transformers in use). EPA uses an estimate of equipment life of 30 years, and presents total real costs of phase-out over 5- and 10-year periods of all commercial PCB Transformers, and phaseout over a 5-year period of higher secondary network

PCB Transformers, as well as estimates of the number of PCB Transformer fires avoided, and the net costs, after a consideration of avoided cleanup costs. (EPA did not evaluate an immediate ban because comments indicated that manufacturing capacity was insufficient to allow for this option.) For a full description of the assumptions used in the following analysis, and for a more detailed analysis of phaseout costs versus cleanup costs avoided, see the regulatory analysis for the final rule, support document 7 in Unit X.B.

TABLE 2—PHASEOUT COST COMPARISON

Group	Regular option	Cost (\$ milions)	PCB fires avoided	Net cost (\$ milions)
All commercial	10-year phaseout	640	29	470
All commercial	5-year phaseout	953	36	704
Commercial 480 Network	5-year phaseout	168	25	-4.7

## 2. PCB Transformers in or near industrial facilities—a. Summary table.

The following table (Table 3) summarizes the real costs, the benefits, and the net costs (after deducting avoided cleanup costs) of the major regulatory options for industrial PCB Transformers.

TABLE 3—COSTS AND BENEFITS OF CONTROL MEASURES FOR INDUSTRIAL PCB TRANSFORMERS

Option	Real cost (milions)	Expected fires	Avoided fires	Net cost (milions)
No action	N/A	6	0	\$64
Labeling & Registration	\$2.5	6	0	2.5
Enhanced E. protection 5-years	170	2	4	136
Removal 5-years	319	2	4	285

*b. Take no additional action.* This option would allow the continued use of PCB Transformers in or near facilities such as chemical manufacturing plants, electric power generating plants, forest products processing plants, and warehouses without additional restrictions above the requirements of the August 1982 PCB Electrical Use Rule. There are no costs associated with EPA's allowing the continued use of these transformers, other than the potential future costs associated with cleanup and liability suits following fires involving this equipment. If the use of PCB Transformers in or near industrial facilities were authorized indefinitely, without additional restrictions, EPA expects that up to six PCB Transformer fires with smoke

spread will occur over the remaining useful life of this equipment.

*c. Labeling and registration programs.*

The registration of PCB Transformers located in or near industrial facilities with fire departments or fire brigades and the registration with building owners (when the PCB Transformer is not owned by the building owner), in combination with the labeling of the exterior of PCB Transformer locations would cost approximately \$2.5 million, assuming that there are about 26,700 industrial PCB Transformers.

While labeling and registration programs would be expected to reduce exposures in the event of a PCB Transformer fire, they will not reduce the frequency of occurrence of these fires.

*d. Smoke control technologies.* Since many industrial PCB Transformers are currently unenclosed, the costs associated with industrial PCB Transformer isolation would be, on the average, higher than for PCB Transformers located in or near commercial buildings. For purposes of the cost-effectiveness analysis, EPA assumes that the cost of the isolation of industrial PCB Transformers will approach \$30,000 per transformer location. Assuming that there are 26,700 industrial PCB Transformers, and that there are, on average, 2 PCB Transformers per location, the total cost of the isolation of industrial PCB Transformers over a 5-year period is estimated at \$109 million.

The isolation of industrial PCB Transformers (which are typically capable of being more rapidly deenergized than commercial PCB Transformers) would be effective in reducing the relatively low fire-related risks posed by the use of PCB Transformers in industrial facilities even further. Since the majority of PCB Transformers located in or near industrial facilities are capable of being deenergized from an on-site location, isolation of these transformers would be expected to be effective in reducing the spread of any volatilized PCBs or oxidation products released before deenergization could occur.

*e. Increased electrical protection.* For industrial PCB Transformers, increased electrical protection would (typically) involve the installation of appropriate heat and pressure level sensors to detect low current faults and the connection of these sensors to existing primary circuit breakers to allow for automatic deenergization in the event of abnormal conditions. Since industrial PCB Transformers reportedly have primary circuit breakers which provide these transformers with the capability to be

deenergized from an on-site location, the costs of increased electrical protection of these transformers would be the costs of installing heat sensors in the secondary winding, and pressure sensors in the transformer tank and connecting these sensors to provide automatic or rapid manual deenergization of the equipment.

For some industrial PCB Transformers, new circuit breakers would have to be installed to allow for the use of these sensors and automatic deenergization.

During plant operating hours, these sensors would reduce the time between the occurrence of a low current fault (or mechanical failure) and the deenergization of the transformer, and, during plant off-hours/non-operational periods, would reduce the probability of a serious incident occurring. Increased electrical protection of industrial transformers (phased-in over a 5-year period) would be expected to avoid four serious PCB Transformer fires which would otherwise occur in these facilities.

The costs associated with the installation of this protection on industrial PCB Transformers would be approximately \$170 million for the estimated 26,700 industrial PCB Transformers (phased in over a 5-year period). After adjusting for avoided cleanup costs, the net costs would be estimated at \$136 million.

*f. Retrofilling of industrial PCB Transformers.* Retrofilling of industrial PCB Transformers would be expected to reduce even further the fire-related risks posed by the continued use of PCB Transformers in industrial facilities, by reducing the amount of PCBs present for potential release and for conversion to oxidation products. The costs associated with immediately retrofilling the 26,700 industrial PCB Transformers for purposes of reclassification to PCB Contaminated status is estimated at \$489 million.

*g. Phaseout of industrial PCB Transformers.* The removal of PCB Transformers from industrial facilities would eliminate the relatively low fire-related risks posed by the continued use of these transformers. Phaseout of industrial PCB Transformers over a 5-year period would avoid up to four industrial PCB Transformer fires with smoke spread at a total cost of \$319 million. After adjusting for avoided cleanup costs, the total net cost would be \$286 million. Phaseout of industrial PCB Transformers over a 10-year period would avoid about three serious PCB Transformer fires at a total cost of \$215 million. After adjusting for avoided

cleanup costs, the total net cost would be \$192 million.

*3. PCB Transformers in outdoor electrical substations—*a. *Take no additional action.* EPA has few data on PCB Transformer fires which have occurred in outdoor electrical substations. However, EPA has evaluated the potential risks posed by such fires and has developed an estimate of the frequency of these fires. This estimate is based on available information on the probability of serious PCB Transformer fires in or near buildings, and the probability of failures in different types of installations. EPA estimates that up to three outdoor electrical substation fires (with some PCB volatilization and smoke distribution) will occur over the remaining useful life of this equipment.

Since EPA believes that an outdoor PCB Transformer fire will not typically result in the formation of large amounts of incomplete combustion products which would require cleanup, EPA has assumed that cleanup from these incidents will involve primarily the cleanup of spilled PCBs. This type of cleanup operation is significantly less costly than cleanup following a PCB Transformer fire in or near a building.

*b. Labeling and registration programs.* The labeling of the exterior of outdoor PCB Transformer locations, and the registration of these transformers with appropriate fire department jurisdictions is expected to reduce exposures to firefighters and cleanup crews. The cost associated with this registration and labeling program for 17,000 outdoor PCB Transformers is approximately \$1.6 million.

*c. Isolation of outdoor PCB Transformers.* Outdoor PCB Transformers could be enclosed to reduce the spread of PCBs and any incomplete combustion products formed. However, enclosing these transformers could create conditions more conducive to the formation of incomplete combustion products. Heat is more likely to be retained rather than dissipated when transformers are enclosed. Thus, while enclosing these transformers would decrease the spread of PCBs following fire-related failures, it could increase the amount of PCBs converted into dibenzofurans from outdoor PCB Transformer fires.

The costs associated with enclosing 17,000 outdoor PCB Transformers over a 5-year period would be on the order of \$69 million.

*d. Increased electrical protection.* Outdoor PCB Transformers are typically radial installations, which are already equipped with current-limiting fuses.

The cost of the installation of low current fault protection on the higher secondary voltage outdoor PCB Transformers (over a 5-year period) would be on the order of \$108 million. Increased electrical protection would be expected to avoid up to three outdoor PCB Transformer fires.

*e. Retrofilling.* EPA has estimated the costs associated with requiring the immediate retrofilling of the approximately 17,000 outdoor PCB Transformers. These costs are estimated to be \$270 million.

*f. Phaseout.* EPA has estimated the costs associated with requiring the removal of an estimated 17,000 PCB Transformers in outdoor locations, over 5- and 10-year periods. A 5-year phaseout is estimated to cost \$203 million, and a 10-year phaseout is estimated to cost \$137 million.

*4. PCB Contaminated transformers.* EPA has also estimated the costs associated with requiring additional controls on the use of PCB Contaminated transformers. The costs range from over \$8 billion for the testing of transformer fluids for PCB concentration and the registration and labeling of PCB Contaminated transformers, to over \$263 billion for removal within 5 years. Registration and labeling of PCB Contaminated transformers would reduce the low PCB fire-related risks posed by the use of this equipment; and, removal would eliminate these risks.

#### VI. Risk/Benefit Assessment

*1. Use of PCB Transformers in or near commercial buildings.* PCBs can be released in fires involving PCB Transformers, and, (depending upon the contents of the transformer and the combustion conditions), 2,3,7,8-TCDF, PCDFs, 2,3,7,8-TCDD, and PCDDs can be formed. Laboratory studies on the formation of PCDFs from PCBs, and PCDDs from chlorinated benzenes, as well as sampling data from actual PCB Transformer fire sites confirm that PCBs can be released and 2,3,7,8-TCDF and 2,3,7,8-TCDD (as well as other PCDF and PCDD congeners) can be formed and released from fires involving PCB Transformers.

EPA believes that PCBs are both toxic and persistent, and, that PCDFs and PCDDs are orders of magnitude more toxic than PCBs. PCB Transformers that remain energized after sustained faults or following failures as a result of fires from external sources are more likely to result in the volatilization of large amounts of PCBs and the formation of large amounts of PCDFs, 2,3,7,8-TCDF, PCDDs and 2,3,7,8-TCDD through incomplete combustion than PCB

Transformers that are able to be deenergized rapidly and completely when an arc or fault occurs.

PCB Transformers can become involved in fires from many causes including sustained low current faults, sustained high current faults, and fires external to transformers involving stored combustibles or building materials followed by an inability to deenergize the transformer. The fire-related risks posed by the continued use of PCB Transformers in or near commercial buildings are much higher than the fire-related risks posed by the continued use of PCB Transformers in outdoor locations and industrial facilities. The overall probability of PCB Transformer fault-related failure is higher in commercial buildings than in other PCB Transformer locations and the risks posed are also higher in the event of a PCB Transformer fire.

The fire-related risks posed by the continued use of higher secondary voltage network PCB Transformers in commercial buildings are particularly high, because these transformers have the highest probability of failure from both high and low current faults, and, they are typically used in more densely populated commercial buildings, specifically, in locations such as high-rise office buildings.

The benefit of removing commercial PCB Transformers from use is the complete assurance that PCB Transformer fires will no longer occur in or near commercial buildings. Serious PCB Transformer fires which would have otherwise occurred will definitely be avoided. PCB Transformer fires in or near commercial buildings pose particularly high risks to human health, because sustained high temperatures are more likely in these locations (leading to the volatilization of large amounts of PCBs and the formation of large amounts of incomplete combustion products), and building occupants, cleanup crews, and fire response personnel are more likely to incur these higher exposures. In addition, the lack of knowledge on the part of commercial building occupants, firefighters, and cleanup crews about the potential risks posed make exposures even more likely.

There are an estimated 77,568 PCB Transformers located in or near commercial buildings, and 7,420 of these transformers are expected to be higher secondary voltage network PCB Transformers. The 77,568 PCB Transformers used in commercial buildings represent 64 percent of all PCB Transformers in use. The immediate removal of these transformers from use is not possible because of considerations such as PCB disposal

capacity, transformer manufacturing capability, and disruption of electrical service. The cost of removing all of these PCB Transformers from use over the next 5 years is estimated at \$953 million. Five years may not be an adequate amount of time for the removal and disposal of this many transformers. There are currently only four EPA-approved commercial PCB incinerators. According to comments on the Proposed Rule, PCB disposal capacity is such that the cost of PCB disposal has significantly jumped (almost doubled) over the last year. Disposal capacity will continue to be of concern over the next few years, since existing EPA regulations require the removal of PCB Transformers in use in food and feed processing facilities by October 1, 1985 and a limited phaseout of PCB Capacitors by October 1, 1988.

The removal of all commercial PCB Transformers by 1990 would, however, avoid an estimated 36 serious PCB Transformer fires in commercial locations. The removal of all commercial PCB Transformers by 1995 is estimated to cost on the order of \$640 million for the avoidance of an expected 29 serious PCB Transformer fires.

The costs of removing the particularly high risk 7,420 commercial higher secondary voltage network PCB Transformers from use over the next 5 years is estimated at \$168 million. The removal of these particularly high risk PCB Transformers from use by 1990 would be expected to avoid an estimated 25 serious PCB Transformer fires, or about 70 percent of all PCB Transformer fires in commercial buildings which EPA expects would otherwise occur. The removal of higher secondary voltage network PCB Transformers from use by October 1, 1990 will avoid an estimated 70 percent of serious commercial PCB Transformer fires for about 17 percent of the cost associated with the removal of all commercial PCB Transformers from use by this same date.

EPA believes that it is prudent to require the removal of commercial higher secondary voltage network PCB Transformers from use as soon as possible, taking into consideration factors such as PCB disposal capacity and continuity of electrical service. EPA believes that the soonest practical date for requiring the removal of this equipment is by October 1, 1990. Testimony at the public hearing, comments on the Proposed Rule, and EPA's analysis overwhelmingly support a determination that these transformers are of particularly high risk. EPA expects that 25 serious commercial PCB

Transformer fires will be avoided by the removal of these PCB Transformers (over a 5-year period) for a total real cost of less than \$7 million per avoided incident. Cleanup costs alone for a single incident in a commercial building would be expected to exceed this \$7 million figure substantially.

While EPA has decided to require the removal of these particularly high risk PCB Transformers from use, it believes that less costly yet highly effective measures can be implemented to reduce the remaining fire-related risks posed by the continued use of other commercial PCB Transformers. Namely, EPA has determined that enhanced electrical protection systems will be effective in avoiding many fires in these remaining commercial installations. Electrical protection can be very effective in avoiding PCB Transformer failures and fires through the early detection of common mechanisms of failure and the rapid deenergization of transformers.

EPA is requiring all commercial PCB Transformers to be protected against failures from sustained high current faults in the primary and secondary areas of the transformers. Further, EPA is requiring that all commercial higher secondary voltage radial PCB Transformers be equipped with protection against sustained low current faults as well.

EPA has determined that all commercial PCB Transformers should be registered with fire departments and building owners and that commercial PCB Transformer locations should be labeled on the exterior. Finally, EPA has determined that stored combustible materials should be removed from all commercial PCB Transformer locations, that all fire-related incidents should be reported to the National Response Center, and that measures be taken to contain all potential releases to water associated with a fire-related incident.

The real cost of requiring registration, labeling, and removal of stored combustibles for all commercial PCB Transformers and enhanced electrical protection for 56,605 commercial PCB Transformers (over a 5-year period) is estimated at \$459 million. The expected incremental benefit of these measures (for other than higher secondary voltage network PCB Transformers) is the avoidance of an additional 10 serious PCB Transformer fires which would have otherwise occurred, or about 30 percent of all commercial PCB Transformer fires which EPA expects would otherwise occur over the remaining useful life of these transformers.

Increased electrical protection and the removal of stored combustibles is

expected to avoid sustained high temperatures in commercial PCB Transformer locations; thus, significantly reducing the likelihood of PCB volatilization and the formation of large amounts of incomplete combustion products. Reducing the likelihood of PCB Transformer failures in commercial locations reduces potential exposures to building occupants, cleanup crews, and emergency response personnel. PCB Transformer fires may occur through less likely mechanisms and electrical protection systems are subject to some (low) rate of malfunction. The requirement for the registration and labeling of commercial PCB Transformers will reduce exposures in the event that sustained high temperatures occur despite the presence of increased electrical protection.

EPA has selected the option of the removal of commercial higher secondary voltage network PCB Transformers from use by October 1, 1990, the immediate registration, labeling, and removal of stored combustibles for all commercial PCB Transformers, and enhanced electrical protection (by October 1, 1990) for a large majority of the remaining 70,000 commercial PCB Transformers currently in use. EPA is also requiring the reporting of all PCB Transformer fire-related incidents to the National Response Center, and, that measures be taken as soon as practically (and safely) possible to contain any potential releases to water in the event of a PCB Transformer fire-related incident. The total real cost of this program to reduce the fire-related risks posed by the continued use of PCB Transformers in commercial locations is estimated at \$635 million and is expected to avoid 35 serious PCB Transformer fires which would have otherwise occurred over the remaining useful life of commercial PCB Transformers, or about \$17 million per serious PCB Transformer fire avoided. The net cost, after deducting for avoided cleanup costs, is estimated at \$390 million, or about \$10 million per serious PCB Transformer fire avoided.

EPA has also banned the further installation of PCB Transformers in locations in or near commercial buildings. EPA recognizes that the costs associated with PCB Transformer removal include the costs of physically removing PCB Transformers as well as providing replacement transformers. The costs associated with not installing a PCB Transformer (which has been placed into storage for reuse) in a commercial building are minimal. Further, even with increased electrical protection, there is some level of risk posed by the use of PCB Transformers in or near commercial buildings. While

EPA has selected increased electrical protection for many commercial PCB Transformers, it has determined that the installation of PCB Transformers (which have been placed into storage for reuse) in or near commercial buildings presents an unreasonable risk. Thus, EPA has banned the new installation of PCB Transformers in or near commercial buildings.

2. *Use of PCB Transformers in or near industrial facilities.* PCBs can be released in fires involving industrial PCB Transformers, and, depending upon combustion conditions, incomplete combustion products can be formed. PCB Transformers that remain energized for prolonged periods after sustained faults occur or following failures as a result of fires external to the PCB Transformers are more likely to result in the volatilization of PCBs and the formation of incomplete combustion products than PCB Transformers that are able to be deenergized rapidly and completely when a fault or failure occurs.

Based on comments on the Proposed Rule, EPA believes that PCB Transformers located in or near industrial facilities are less likely to be involved in fires involving sustained high temperatures than PCB Transformers located in or near commercial buildings. This is because these transformers, as a group, are typically equipped with more protection from failures than commercial PCB Transformers, and, are typically able to be deenergized from an on-site location. Thus, the probability of industrial PCB Transformer fault-related failure and fire is lower in industrial facilities than in commercial buildings, and the risks posed in the event of a fault-related failure and fire are also expected to be less.

EPA recognizes that exposures from PCB Transformer fires in atypical industrial facilities (where deenergization does not occur as rapidly) could be higher than the exposure previously described. However, EPA's estimate of the frequency of industrial PCB Transformer fires indicates that up to 6 PCB Transformer fires (with smoke spread into industrial facilities) are expected to occur over the remaining useful life of this equipment. Four industrial PCB Transformer fires would be expected to occur after October 1, 1990. Even if EPA were to assume as a worst-case that the risks posed by PCB Transformer fires in industrial facilities were equivalent to the risks posed by PCB Transformer fires in commercial buildings, EPA expects that only 4 serious industrial

PCB Transformer fires could be avoided by requiring the removal or enhanced electrical protection of industrial PCB Transformers by 1990.

The costs, however, of the removal of these industrial PCB Transformers from use by 1990 is estimated at \$319 million. The removal of industrial PCB Transformers from use by 1990 would avoid about four PCB Transformer fires involving smoke spread into buildings. The real cost per avoided serious fire is almost \$80 million. Enhanced electrical protection of these transformers by 1990 would be expected to avoid about the same number of incidents at a total real cost of \$170 million, or \$43 million per avoided incident. Isolation of these transformers by 1990 would be expected to reduce building contamination; thereby, reducing potential exposures to workers, cleanup crews, and fire response personnel at a total cost of \$109 million, or \$27 million per incident.

The benefit of removing these transformers or protecting these transformers by 1990 is the avoidance of up to four industrial PCB Transformer fires. PCB Transformer fires involving the formation of large amounts of incomplete combustion products are less likely in industrial facilities than in or near commercial buildings. Sustained high temperatures are less likely in these locations due to equipment visibility and deenergization capability, and, as a result, building occupants (workers), cleanup crews, fire response personnel, and members of the general population are less likely to incur high exposures. Further, there are generally fewer people at risk of incurring these exposures from fires in industrial facilities than from fires in commercial buildings.

The cost of requiring the registration, increased labeling, and removal of stored combustibles from industrial PCB Transformer locations is estimated at \$1.9 million. While these measures will not reduce the frequency of serious industrial PCB Transformer fires, they should reduce any exposures to workers, cleanup crews, and fire response personnel.

EPA has selected the option of the registration, external labeling, and removal of stored combustibles from industrial PCB Transformer locations for the estimated 26,700 industrial PCB Transformers in use or in storage for reuse in industrial locations. This is a relatively inexpensive measure which will reduce exposures in the event of a PCB Transformer fire. EPA is also requiring the reporting of all PCB Transformer fire-related incidents to the National Response Center, and, that measures be taken as soon as

practically and safely possible to contain any potential release to waterways. These requirements are not burdensome, and will reduce further any human and environmental exposures following industrial PCB Transformer fires.

3. *Use of PCB Transformers in outdoor locations.* EPA's evaluation of the risks posed by PCB Transformer fires indicates that the use of PCB Transformers in outdoor locations away from commercial areas poses less risk to public health and the environment than the use of this equipment in or near buildings. First, combustion conditions in outdoor locations may not be so conducive to the volatilization of PCBs and the formation of incomplete combustion products as combustion conditions in enclosed areas such as sidewalk vaults and machinery rooms.

Second, EPA believes that fewer people are generally present near outdoor PCB Transformer locations, and, that many of these areas are fenced in to restrict access to authorized personnel. Further, if PCBs were volatilized and dispersed into the environment, individual human exposures to PCBs and potential oxidation products from such a fire are expected to be much lower than from fires in or near buildings. EPA expects fewer than three outdoor PCB Transformer fires (with smoke spread) over the remaining useful life of this equipment.

There are an estimated 17,000 PCB Transformers in outdoor locations. The total real cost of the removal of these PCB Transformers from use by 1990 is estimated at \$207 million, or \$69 million per avoided incident. The total real cost of installing increased electrical protection on these transformers is \$36 million, or \$12 million per avoided incident.

EPA believes, however, that it is prudent to require registration and increased labeling of outdoor PCB Transformers, the containment of all potential releases to water, and the reporting of all PCB Transformer fire-related incidents to the NRC. These measures will reduce exposures of emergency response personnel to spilled PCBs (which is anticipated to be the more prevalent situation in outdoor locations) and would serve to limit the spread of these materials into the environment.

4. *PCB Contaminated transformers.* A fire involving a PCB Contaminated transformer can result in the formation and/or release of PCBs and oxidation products. Thus, the use of these transformers does pose some level of risk in a fire-related incident. However,

the level of risk posed is considerably less than the risks posed by the use of PCB Transformers. Further, there are an estimated 20 million PCB Contaminated transformers in use. Even the least costly regulatory alternative, the registration and external labeling of PCB Contaminated transformers, would cost more than \$8 billion.

Thus, EPA has determined that the continued use of PCB Contaminated transformers without additional controls will not present unreasonable risks to public health or the environment.

## VII. Findings on the Use of PCBs in Electrical Transformers

1. Based on the analyses presented in Unit VI, EPA has determined that the use of PCBs in electrical transformers does not pose unreasonable risks to public health or the environment, provided, that in addition to the inspection, recordkeeping, and servicing requirements of the August 25, 1982 Electrical Equipment Rule:

a. Higher secondary voltage network PCB Transformers (network PCB Transformers with secondary voltage at or above 480 volts, including 480/277 volt network PCB Transformers) in or near commercial buildings are removed from use, reclassified, placed into storage for disposal or disposed by October 1, 1990.

b. By October 1, 1990, higher secondary voltage radial PCB Transformers (radial PCB Transformers with secondary voltages at or above 480 volts, including 480/277 volts radial PCB Transformers) and lower secondary voltage network PCB Transformers used in or near commercial buildings are equipped with sensors to detect electrical faults and insure rapid deenergization prior to transformer failure.

c. All PCB Transformers are registered with appropriate fire response organizations and PCB Transformers located in or near buildings are also registered with building owners.

d. The vault door, machinery room door, or means of access (other than grates and manhole covers) to PCB Transformers are labeled with PCB identification labels.

e. PCB Transformer locations are cleared of stored combustibles.

f. In the event of a PCB Transformer fire, measures are taken to contain water releases.

g. In the event of a PCB Transformer fire, the National Response Center is immediately notified.

2. The use of PCBs in transformers that comply with: (1) The inspection, recordkeeping, and servicing

requirements of the August 25, 1982 Electrical Use Rule; and (2) the fire hazard risk reduction measures described above, does not pose unreasonable risks to public health or the environment for the following reasons:

a. If EPA immediately banned the continued use of PCB Transformers it would cost the public and United States industry billions of dollars, primarily as a result of the disruption of electrical service. There are over 120,000 PCB Transformers currently in use and an estimated 20 million PCB Contaminated transformers currently in use. The resulting reduction in risk from an immediate ban, after considering both the risks posed by spills and leaks of PCBs as well as the risks posed by fires involving this equipment, would not outweigh these substantial costs.

b. The required inspection, maintenance, and servicing requirements under the August 25, 1982 Electrical Use Rule, and the fire hazard risk reduction measures listed above (including the required removal of commercial higher secondary voltage network PCB Transformers from use by October 1, 1990) reasonably reduce the exposures associated with the use of PCBs in PCB Transformers. The required fire hazard risk reduction measures and the required 5-year phaseout of commercial higher secondary voltage network PCB Transformers are measures which are much less costly than a total ban on the use of PCBs but are of similar effectiveness in reducing the overall fire-related risks posed by the use of these transformers.

c. The costs of phaseout and retrofitting of all PCB Transformers are not reasonable when considering the potential reduction in release of PCBs and the reduction in the risks posed by PCB Transformer fires if these measures were required for all PCB Transformers. EPA has targeted phaseout requirements for those PCB Transformers which EPA has concluded pose particularly high risks of failure and fire.

d. Releases of PCBs to the environment and exposures to humans and biota from the use of PCB-Contaminated and non-PCB transformers are minimal. Further, the risks posed by fires involving this equipment are substantially less than the risks posed by fires involving PCB Transformers, and the costs of any control measures to reduce these low risks further are very high.

## VIII. Amendments to the PCB Electrical Equipment Rule

### A. Registration/Labeling/Removal of Stored Combustibles

EPA has required the registration of all PCB Transformers by December 1, 1985, with fire departments with primary response jurisdiction. This means that each PCB Transformer in use or in storage for reuse must be registered with the fire department(s) which would be called upon for the initial response to a fire involving the equipment. The information to be supplied to the fire department(s) includes the address of the building in which the transformer is located (or the nearest building for PCB Transformers located near buildings, or, the nearest intersection for outdoor PCB Transformers); the location of the transformer within the building or near the building (e.g., third floor east end, or, west side of the building); and the principal constituent of the dielectric fluid in the transformer (e.g., PCBs, mineral oil, silicone oil). For industrial PCB Transformers, this may mean only the registration of the transformers with the industrial fire brigade on site.

EPA has also required the registration, by December 1, 1985, of PCB Transformers located in or near buildings with building owners. Each owner of a PCB Transformer(s) is responsible for registering the transformer(s). This means that all PCB Transformers located in or near buildings must be registered with appropriate building owners. For PCB Transformers located inside buildings, this means the registration of the transformer(s) with the building owner of record. For PCB Transformers located "near" buildings, this means the registration of the PCB Transformer(s) with all building owners whose buildings are located within 30 meters of the PCB Transformer(s).

EPA has required the labeling of the exterior of all PCB Transformers with the Mark M<sub>T</sub>. This means that doors, fences, hallways, and other easily markable means of access to PCB Transformer locations must be marked with PCB identification labels. These labels must be prominently displayed and visible to emergency response personnel in the event of a fire involving this equipment. The exterior of sidewalk and underground vaults, that is, grates and manhole covers, are not required to be marked (because of difficulties in maintaining the mark over time).

EPA has required the removal of stored combustibles from all PCB Transformer locations. This means that materials such as paints, solvents, paper, rubber, and sawn wood must not

be stored within a PCB Transformer enclosure, within 5 meters of a PCB Transformer enclosure, or within 5 meters of a PCB Transformer. A PCB Transformer enclosure is defined as a confined area such as a vault, machinery room, partitioned area or fenced-in area that contains a PCB Transformer.

The objective of requiring the removal of stored combustibles is to avoid, to the extent possible and practical, PCB Transformer involvement in fires initiated by the combustion of stored materials and to eliminate a potential source of fuel for a fire initiated by an electrical fault or malfunction in a transformer.

### B. Phaseout of Commercial Higher Secondary Voltage Network PCB Transformers

EPA has prohibited the use of all network PCB Transformers with secondary voltages at or above 480 volts (this includes 480 volt network PCB Transformers, 480/277 volt network PCB Transformers and other network PCB Transformers with secondary voltages at or above 480 volts) in or near commercial buildings beyond October 1, 1990, and has required that these transformers be placed into storage for disposal or disposed (or be reclassified to PCB Contaminated or non PCB status).

Commercial buildings are defined as non industrial (non substation) buildings which are generally or typically accessible to both members of the general public and employees. These buildings include: public assembly properties (e.g., arenas, stadiums, libraries, museums, restaurants, theaters, etc.); educational properties (e.g., schools, colleges, universities, etc.); institutional properties (e.g., nursing homes, hospitals, prisons, etc.); residential properties (e.g., apartments, hotels, dormitories, etc.); stores (e.g., supermarkets, clothing stores, malls, etc.); offices (e.g., general business offices (including those located on industrial sites), banks, municipal office buildings, etc.); and, transportation centers (e.g., airport terminal buildings, subway stations, bus stations, train stations, etc.).

An industrial building is defined as a building directly used in manufacturing or technically productive enterprises. Industrial buildings are not generally or typically readily accessible to other than workers. Industrial buildings include buildings used directly in the production of power, the manufacture of products, the mining of raw materials, and the storage of textiles, petroleum products,

wood and paper products, chemicals or plastics, and metals.

A PCB Transformer located in or near a commercial building is located within the interior of the building, on the roof of the building or attached to the exterior wall of the building, in the parking area serving the building, or located within 30 meters of the building.

EPA has required the removal of PCB Transformers located near commercial buildings (in addition to those located inside commercial buildings) because incidents like the San Francisco fire indicate that PCB Transformers located near commercial buildings can result in building contamination. Several comments on the Proposed Rule requested that EPA define the term "near" in a more quantitative manner, such as, within 25, 50 or 100 feet of a commercial building. EPA recognizes the desirability of defining the term "near" in a quantitative manner—this would facilitate monitoring compliance with the rule and make the rule more easily understood by the regulated community.

In adopting this suggestion, EPA has three objectives: (1) to facilitate compliance by industry with the rule, (2) to facilitate EPA's monitoring of compliance with the rule, and (3) to insure that any PCB Transformer which poses a real risk of commercial building contamination is covered by the rule. EPA is somewhat hesitant to dictate an absolute distance at which a PCB Transformer would be considered to pose little risk of significant building contamination. Local climactic and geographic conditions could greatly influence the potential for building contamination from PCB Transformer fires in locations such as sidewalk and underground vaults. However, the benefits of establishing a numerical standard, in terms of ease of compliance with the rule and ease of enforcement, are great.

In urban locations, sidewalk vaults and underground vaults are typically located within 15 to 30 meters of buildings, with many located immediately adjacent to exterior walls. It is EPA's intent to include all of these transformers within the definition of PCB Transformers located "near" commercial buildings. Further, outdoor pad-mounted and pole top PCB Transformers located within 15 to 30 meters of commercial buildings are also covered within the definition of PCB Transformers located "near" commercial buildings.

EPA expects that in general very few vaulted PCB Transformers in urban and metropolitan areas are located at distances greater than 30 meters from commercial buildings. However, EPA

has also evaluated the potential for building contamination from vaulted PCB Transformers located at distances greater than 30 meters from commercial buildings. EPA believes that the potential for commercial building contamination from a PCB Transformer fire in a vault located more than 30 meters from a building can be greatly influenced by factors such as wind velocity, wind direction, and plume height. While EPA has defined the term "near" by establishing a distance of 30 meters from commercial buildings, EPA recognizes that in certain geographic locales, vaulted PCB Transformers located more than 30 meters from a commercial building could also present a risk of building contamination. EPA suggests that owners of vaulted PCB Transformers located more than 30 meters from commercial buildings individually evaluate the potential for commercial building contamination from fires involving these transformers as well. Factors considered in this evaluation could include average wind velocity for the region and normal wind direction.

#### C. Increased Electrical Protection

EPA has required the installation of enhanced electrical protection on many of the remaining commercial PCB Transformers (i.e., other than higher secondary voltage network PCB Transformers) by October 1, 1990. The electrical protection requirements are intended to avoid PCB Transformer fires by allowing for the early detection of faults and the complete deenergization of PCB Transformers prior to failure (rupture and/or release of PCBs). The installation of current-limiting fuses or other equivalent energy limiting devices on PCB Transformers is intended to avoid failures from high current faults. In order to be effective in avoiding PCB Transformer failures from high current faults, these current-limiting devices must (in accordance with good engineering practices) be properly installed, appropriately placed, maintained, and set sensitive enough to provide for complete deenergization within several power cycles or several tenths of a second of the occurrence of a sustained high current fault.

The installation of heat and pressure sensitive detectors in higher secondary voltage commercial radial PCB Transformers (and appropriate disconnect equipment) is intended to avoid PCB Transformer failures from sustained low current faults. Equivalent technology that accomplishes the same goal, that is, the early detection of sustained low current faults and complete deenergization prior to failure,

is acceptable. In order to be effective in avoiding PCB Transformer failures, these devices must be maintained, and set sensitive enough to allow for complete deenergization within 30 seconds to 1 minute of detection of a sustained low current fault. In addition, if these sensors are electrically powered, they must be provided with a secondary source of power configured to deenergize the transformer on failure (fail-safe).

The disconnect equipment may be set either to open automatically upon the sensing of abnormal conditions (e.g., temperature or pressure), or, it may be set to send a signal to an on-site manned control center where deenergization must occur (during facility operating hours) within 1 minute of the receipt of an audio or visual signal indicating abnormal conditions. Automatically operated circuit breakers must also have the capability to be opened manually.

EPA received several comments on the Proposed Rule which suggested that EPA should give PCB Transformer owners the option of implementing risk reduction measures on shorter schedule (such as enhanced electrical protection by 1990) or PCB Transformer removal on a longer schedule (such as PCB Transformer removal by 1992). EPA did not adopt this suggestion because, without additional reporting requirements (including the reporting to EPA of the address and location of each PCB Transformer and the option selected by the owner), EPA believes that its ability to effectively enforce the shorter term risk reduction measures would be compromised.

#### D. Prohibition on the Installation of PCB Transformers

EPA has prohibited the new installation of PCB Transformers in or near commercial buildings. PCB Transformers must not be newly installed in or near commercial buildings after October 1, 1985. This means that PCB Transformers which have been placed into storage for reuse cannot be taken out of storage for reuse and placed in use in or near commercial buildings.

While EPA has placed restrictions on the installation of PCB Transformers (by prohibiting the placement of the equipment in or near commercial buildings), owners of PCB Transformers which are in storage for reuse still have many available options. Owners of PCB Transformers which are in storage for reuse may use these transformers in industrial applications and in any outdoor location where there is no real risk of commercial building

contamination. These transformers may also be reclassified to PCB Contaminated status or non-PCB status and be placed in any desired location.

*E. Reporting of Fire-Related Incidents and Contaminations of Potential Water Releases*

EPA has required the reporting of all PCB Transformer fire-related incidents to the National Response Center. A fire-related incident is defined as any incident in which high temperatures or high pressures in a transformer location lead to the rupture of a transformer and/or the release of PCBs. PCB Transformer fire-related incidents must be immediately reported to the NRC. The information to be reported must include the type of PCB Transformer installation involved in the fire-related incident, and reasonably ascertainable information on the cause of the fire-related incident.

EPA has required that owners of PCB Transformers involved in fire-related incidents take measures as soon as practically and safely possible to contain any potential releases of PCBs and oxidation products to waterways. This means that measures must be taken to prevent further environmental release and contamination of waterways as soon as there is no immediate danger of injury from the fire itself. These measures include, but are not limited to the blocking of floor drains, the containment of runoff, and the containment and treatment of cleanup water prior to release. If there is evidence of the release of PCBs, PCDFs, and PCDDs down floor drains, the PCB Transformer owner should also notify the sewer system and water treatment system operators as soon as possible to prevent further environmental release.

**IX. Compliance and Enforcement**

EPA recognizes that technology is constantly evolving in areas such as the development of electrical protection systems. Thus, EPA has allowed some flexibility on the part of transformer owners in the selection of appropriate enhanced electrical protection systems. Further, by requiring electrical protection for commercial PCB Transformers, EPA implicitly allows the replacement of all commercial PCB Transformers with substitute equipment, and the refilling and reclassification of PCB Transformers to PCB Contaminated or non-PCB status.

EPA has, however, required the installation of protection against failures from high current faults and low current faults in all commercial higher secondary voltage radial PCB Transformer installations. The installation of protection against high

current faults alone without protection against low current faults in these installations constitutes a violation of the PCB Transformer use authorization. For lower secondary voltage commercial PCB Transformer installations, EPA has required protection against failures from high current faults.

Failure to install properly and maintain protection which is set sensitive enough, based on good engineering judgment, to prevent PCB Transformer failures from sustained high and low current faults (for higher secondary voltage radial PCB Transformers) and PCB Transformer failures from high current faults (for lower secondary voltage PCB Transformers) constitutes a violation of the PCB Transformer use authorization.

**X. Official Record of Rulemaking**

*A. Previous Rulemaking Records*

(1) Official rulemaking record from "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibition Rule" published in the *Federal Register* of May 31, 1979, (44 FR 31514).

(2) Official rulemaking record from "Polychlorinated Biphenyls (PCBs); Disposal and Marking Final Regulation" published in the *Federal Register* of February 17, 1978, (43 FR 7150).

(3) Official rulemaking record from "Polychlorinated Biphenyls (PCBs); Manufacture, Processing, Distribution, and Use in Closed and Controlled Waste Manufacturing Processes" published in the *Federal Register* of October 21, 1982, (47 FR 46980).

(4) Official rulemaking record from "Polychlorinated Biphenyls (PCBs); Manufacturing, Processing, Distribution in Commerce and Use Prohibitions: Use in Electrical Equipment" published in the *Federal Register* of August 25, 1982, (47 FR 37342).

(5) Official record from "Polychlorinated Biphenyls (PCBs); Manufacturing, Processing, Distribution in Commerce and Use Prohibitions: Use in Electrical Transformers" Advance Notice of Proposed Rulemaking, published in the *Federal Register* of March 23, 1984, (49 FR 11070).

(6) Official record from "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions: Use in Electrical Transformers" Proposed Rule, published in the *Federal Register* of October 11, 1984, (49 FR 39966).

*B. Support Documents*

(1) USEPA, OPTS, EED, Versar, Inc., "Exposure Assessment for Polychlorinated Biphenyls (PCBs),

Polychlorinated Dibenzofurans (PCDFs), and Polychlorinated Dibenzodioxins (PCDDs) Released During Transformer Fires" (June 1985).

(2) USEPA, OPTS, HERD, "HERD Work for Proposed Polychlorinated Biphenyl (PCB) Transformer Fires Rulemaking" (August 1, 1984).

(3) USEPA, OPTS, HERD, "Addendum to August 1, 1984 HERD Work for Proposed Polychlorinated Biphenyl (PCB) Transformer Fires Rulemaking" (October 1, 1984).

(4) USEPA, OPTS, HERD, "Response to Comments on Health Effects of PCBs Submitted by the Chemical Manufacturers Association and the Edison Electric Institute" (August 19, 1982).

(5) USEPA, OW, "Ambient Water Quality Criteria for 2,3,7,8-Tetrachlorodibenzo-p-dioxin" (February 1984).

(6) USEPA, ORD, OHEA, ECAO, "(DRAFT) Health Assessment Document for Polychlorinated Dibenzop-dioxins" (May 1984).

(7) USEPA, OPTS, ETD, Putnam, Hayes and Bartlett, Inc. "Regulatory Impact Analysis of the Final Rule for PCB Transformers" (June 1985).

(8) Kimbrough, Renate, D., et al. "Health Implications of 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Contamination of Residential Soil," *Journal of Toxicology and Environmental Health* (in press).

(9) USEPA, OPTS, EED, "NFIRS Data for 1982" (April 1984).

(10) USEPA, OPTS, EED, Midwest Research Institute, "Thermal Degradation Products from Dielectric Fluids" (December 1984).

(11) USEPA, OPTS, EED, Midwest Research Institute, "Products of Thermal Degradation of Dielectric Fluids" (January 28, 1985).

(12) National Bureau of Standards, "Factors To Be Considered Regarding Hazard Reduction Strategies for Fires Involving Electrical Transformers Containing Polychlorinated Biphenyls" (March 1985).

(13) USEPA, Barnes and Bellin, "Health Hazard Assessment for Chlorinated Dioxins and Dibenzofurans Other Than 2,3,7,8-TCDD" (October 1984).

(14) USEPA, EED, Versar, "Summary of Comments on the PCB Transformer Fires Proposed Rule" (June 1985).

(15) USEPA, EED, "Response to Comments on the PCB Transformer Fires Proposed Rule" (June 1985)

**XI. Executive Order 12291**

Under Executive Order 12291, issued February 17, 1981, EPA must judge

whether a rule is a "major rule" and, therefore, subject to the requirement that a Regulatory Impact Analysis be prepared. EPA believes that this amendment to the PCB rule is a major rule as the term is defined in section 1(b) of the Executive Order. Therefore, EPA has prepared a Regulatory Impact Analysis.

While the rule places additional restrictions and conditions on the use of PCB Transformers, it is worth noting that this regulation allows the continued uses of PCBs in electrical transformers that would otherwise be prohibited by section 6(e) of TSCA. This rule avoids the severe disruption of electric service to the public and industry that would occur if the use of this equipment were immediately prohibited. It also avoids the economic impact that would result from a requirement to replace the equipment as soon as possible.

This rule was submitted to the Office of Management and Budget (OMB), as required by the Executive Order.

**XII. Regulatory Flexibility Act**

Under section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Administrator may certify that a rule will not, if promulgated have a significant impact on a substantial number of small entities and, therefore, does not require a regulatory flexibility analysis.

In general, this rule will reduce the burden on small businesses that would otherwise be encountered if an immediate ban on PCB-containing transformers were to take effect. If an immediate ban on the use of PCBs in transformers were imposed, large costs would be incurred by all producers and users of electricity, including small businesses.

I certify that this rule will not have a significant economic impact on a substantial number of small entities.

**XIII. Paperwork Reduction Act**

The information collection requirements of this rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 et seq. In response to the information collection requirements associated with the proposed rule, OMB commented that the Agency should resubmit the information collection requirements with the final rule showing how EPA has reduced the burdens by limiting the rule's applicability to transformers which because of location or installation type are of higher risk. Based on this comment and other comments made during the public comment period, EPA has segmented

transformers for variable treatment based on type and location. The Office of Management and Budget has approved the information collection requirements of this rule under OMB Control Number: 2070-0073.

**List of Subjects in 40 CFR Part 761**

Hazardous substances, Labeling, Polychlorinated biphenyls, Recordkeeping and reporting requirements, Environmental protection.

Dated: July 1, 1985.

A. James Barnes,  
Acting Administrator.

**PART 761--[AMENDED]**

Therefore, 40 CFR Part 761 is amended as follows:

1. The authority citation for Part 761 is revised to read as follows:

Authority: 15 U.S.C. 2605, 2607, and 2611.

2. In § 761.3, the following paragraphs are alphabetically added to read as follows:

**§ 761.3 Definitions.**

"In or Near Commercial Buildings" means within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters of a non-industrial non-substation building. Commercial buildings are typically accessible to both members of the general public and employees, and include: (1) Public assembly properties, (2) educational properties, (3) institutional properties, (4) residential properties, (5) stores, (6) office buildings, and (7) transportation centers (e.g., airport terminal buildings, subway stations, bus stations, or train stations).

"Industrial buildings" means a building directly used in manufacturing or technically productive enterprises. Industrial buildings are not generally or typically accessible to other than workers. Industrial buildings include buildings used directly in the production of power, the manufacture of products, the mining of raw materials, and the storage of textiles, petroleum products, wood and paper products, chemicals, plastics, and metals.

"Manned Control Center" means an electrical power distribution control room where the operating conditions of a PCB Transformer are continuously monitored during the normal hours of operation (of the facility), and, where the duty engineers, electricians, or other trained personnel have the capability to deenergize a PCB Transformer

completely within 1 minute of the receipt of a signal indicating abnormal operating conditions such as an overtemperature condition or overpressure condition in a PCB Transformer.

"On site" means within the boundaries of a contiguous property unit.

"Rupture of a PCB Transformer" means a violent or non-violent break in the integrity of a PCB Transformer caused by an overtemperature and/or overpressure condition that results in the release of PCBs.

3. In § 761.30, the introductory text of paragraph (a) and paragraph (a)(1) are revised and OMB Control Number 2070-0073 is added to read as follows:

**§ 761.30 Authorizations.**

(a) Use in and servicing of transformers (other than railroad transformers). PCBs at any concentration may be used in transformers (other than in railroad locomotives and self-propelled railroad cars) and may be used for purposes of servicing including rebuilding these transformers for the remainder of their useful lives, subject to the following conditions:

(1) Use conditions. (i) As of October 1, 1985, the use and storage for reuse of PCB Transformers that pose an exposure risk to food or feed is prohibited.

(ii) As of October 1, 1990, the use of network PCB Transformers with higher secondary voltages (secondary voltages equal to or greater than 480 volts, including 480/277 volt systems) in or near commercial buildings is prohibited. Network PCB Transformers with higher secondary voltages which are removed from service in accordance with this requirement must either be reclassified to PCB Contaminated or non PCB status, placed into storage for disposal, or disposed.

(iii) As of October 1, 1985, the installation of PCB Transformers (which have been placed into storage for reuse or which have been removed from another location) in or near commercial buildings is prohibited.

(iv) As of October 1, 1990, all radial PCB Transformers and lower secondary voltage network PCB Transformers (network transformers with secondary voltages below 480 volts) in use in or near commercial buildings must be equipped with electrical protection to

avoid transformer failures caused by high current faults. Current-limiting fuses or other equivalent technology must be used to detect sustained high current faults and provide for complete deenergization of the transformer within several tenths of a second of detection, before transformer failure occurs. The installation, setting, and maintenance of current-limiting fuses or other equivalent technology to avoid PCB Transformer failures from sustained high current faults must be completed in accordance with good engineering practices.

(v) As of October 1, 1990, all radial PCB Transformers with higher secondary voltages (480 volts and above, including 480/277 volt systems) in use in or near commercial buildings must (in addition to the requirements of paragraph (a)(1)(iv) of this section) be equipped with protection to avoid transformer failures caused by sustained low current faults.

(A) Pressure and temperature sensors (or other equivalent technology which has been demonstrated to be effective in the early detection of sustained low current faults) must be used in these transformers to detect sustained low current faults.

(B) Disconnect equipment must be provided to insure complete deenergization of the transformer in the event of a sensed abnormal condition (e.g., an overpressure or overtemperature condition in the transformer), caused by a sustained low current fault. The disconnect equipment must be configured to operate automatically within 30 seconds to 1 minute of the receipt of a signal indicating an abnormal condition from a sustained low current fault, or can be configured to allow for manual deenergization from a manned on-site control center upon the receipt of an audio or visual signal indicating an abnormal condition caused by a sustained low current fault. Manual deenergization from a manned on-site control center must occur within 1 minute of the receipt of the audio or visual signal indicating an abnormal condition caused by a sustained low current fault. If automatic operation is selected and a circuit breaker is utilized for disconnection, it must also have the capability to be manually opened if necessary.

(C) The enhanced electrical protective system required for the detection of sustained low current faults and the complete and rapid deenergization of transformers must be properly installed, maintained, and set sensitive enough (in accordance with good engineering practices) to detect sustained low current faults and allow for rapid and

total deenergization prior to PCB Transformer rupture (either violent or non violent rupture) and release of PCBs.

(iv) As of December 1, 1985, all PCB Transformers (including PCB Transformers in storage for reuse) must be registered with fire response personnel with primary jurisdiction (that is, the fire department or fire brigade which would normally be called upon for the initial response to a fire involving the equipment). Information required to be provided to fire response personnel includes:

(A) The location of the PCB Transformer(s) (the address(es) of the building(s) and the physical location of the PCB Transformer(s) on the building site(s) and for outdoor PCB Transformers, the location of the outdoor substation).

(B) The principal constituent of the dielectric fluid in the transformer(s) (e.g., PCBs, mineral oil, or silicone oil).

(C) The name and telephone number of the person to contact in the event of a fire involving the equipment.

(vii) As of December 1, 1985, PCB Transformers in use in or near commercial buildings must be registered with building owners. For PCB Transformers located in commercial buildings, PCB Transformer owners must register the transformers with the building owner of record. For PCB Transformers located near commercial buildings, PCB Transformer owners must register the transformers with all owners of buildings located within 30 meters of the PCB Transformer(s). Information required to be provided to building owners by PCB Transformer owners includes but is not limited to:

(A) The specific location of the PCB Transformer(s).

(B) The principal constituent of the dielectric fluid in the transformer(s) (e.g., PCBs, mineral oil, or silicone oil).

(C) The type of transformer installation (e.g., 208/120 volt network, 280/120 volt radial, 208 volt radial, 480 volt network, 480/277 volt network, 480 volt radial, 480/277 volt radial).

(viii) As of December 1, 1985, combustible materials, including, but not limited to paints, solvents, plastics, paper, and sawn wood must not be stored within a PCB Transformer enclosure (i.e., in a transformer vault or in a partitioned area housing a transformer); within 5 meters of a transformer enclosure, or, if unenclosed (unpartitioned), within 5 meters of a PCB Transformer.

(ix) A visual inspection of each PCB Transformer (as defined in the definition of "PCB Transformer" under § 761.3) in use or stored for reuse shall be

performed at least once every 3 months. These inspections may take place any time during the 3-month periods: January-March, April-June, July-September, and October-December as long as there is a minimum of 30 days between inspections. The visual inspection must include investigation for any leak of dielectric fluid on or around the transformer. The extent of the visual inspections will depend on the physical constraints of each transformer installation and should not require an electrical shutdown of the transformer being inspected.

(x) If a PCB Transformer is found to have a leak which results in any quantity of PCBs running off or about to run off the external surface of the transformer, then the transformer must be repaired or replaced to eliminate the source of the leak. In all cases any leaking material must be cleaned up and properly disposed of according to disposal requirements of § 761.60. Cleanup of the released PCBs must be initiated as soon as possible, but in no case later than 48 hours of its discovery. Until appropriate action is completed, any active leak of PCBs must be contained to prevent exposure of humans or the environment and inspected daily to verify containment of the leak. Trenches, dikes, buckets, and pans are examples of proper containment measures.

(xi) If a PCB Transformer is involved in a fire-related incident, the owner of the transformer must immediately report the incident to the National Response Center (toll-free 1-800-424-8802; in Washington, D.C. 202-426-2675). A fire-related incident is defined as any incident involving a PCB Transformer which involves the generation of sufficient heat and/or pressure (by any source) to result in the violent or non-violent rupture of a PCB Transformer and the release of PCBs. Information must be provided regarding the type of PCB Transformer installation involved in the fire-related incident (e.g., high or low secondary voltage network transformer, high or low secondary voltage simple radial system, expanded radial system, primary selective system, primary loop system, or secondary selective system or other systems) and the readily ascertainable cause of the fire-related incident (e.g., high current fault in the primary or secondary or low current fault in secondary). The owner of the PCB Transformer must also take measures as soon as practically and safely possible to contain and control any potential releases of PCBs and incomplete combustion products into

water. These measures include, but are not limited to:

- (A) The blocking of all floor drains in the vicinity of the transformer.
- (B) The containment of water runoff.
- (C) The control and treatment (prior to release) of any water used in subsequent cleanup operations.
- (xii) Records of inspection and maintenance history shall be maintained at least 3 years after disposing of the transformer and shall be made available for inspection, upon request by EPA. Such records shall contain the following information for each PCB Transformer:
  - (A) Its location.
  - (B) The date of each visual inspection and the date that leak was discovered, if different from the inspection date.
  - (C) The person performing the inspection.
  - (D) The location of any leak(s).
  - (E) An estimate of the amount of dielectric fluid released from any leak.
  - (F) The date of any cleanup, containment, repair, or replacement.
  - (G) A description of any cleanup, containment, or repair performed.
  - (H) The results of any containment and daily inspection required for uncorrected active leaks.

(xiii) A reduced visual inspection frequency of at least once every 12 months applies to PCB Transformers that utilize either of the following risk reduction measures. These inspections may take place any time during the calendar year as long as there is a minimum of 180 days between inspections.

(A) A PCB Transformer which has impervious, undrained, secondary containment capacity of at least 100 percent of the total dielectric fluid volume of all transformers so contained or

(B) A PCB Transformer which has been tested and found to contain less than 60,000 ppm PCBs (after 3 months of in service use if the transformer has been serviced for purposes of reducing the PCB concentration).

(xiv) An increased visual inspection frequency of at least once every week applies to any PCB Transformer in use or stored for reuse which poses an exposure risk to food or feed. The user of a PCB Transformer posing an exposure risk to food is responsible for the inspection, recordkeeping, and maintenance requirements under this section until the user notifies the owner

that the transformer may pose an exposure risk to food or feed. Following such notification, it is the owner's ultimate responsibility to determine whether the PCB Transformer poses an exposure risk to food or feed.

\* \* \* \* \*

[The recordkeeping requirements of paragraphs (a)(1) (vi), (vii), and (xi) were approved by the Office of Management and Budget under OMB Control Number 2070-0073. The recordkeeping requirements of paragraph (xii) were approved by the Office of Management and Budget under OMB Control Number 2070-0007.]

4. In § 761.40, paragraph (j) is added to read as follows:

**§ 761.40 Marking requirements.**

\* \* \* \* \*

(j) As of December 1, 1985, the vault door, machinery room door, fence, hallway, or means of access (others than grates and manhole covers) to a PCB Transformer must be marked with the mark M<sub>L</sub>. The mark must be placed so that it can be easily read by firemen fighting a fire involving this equipment.

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