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Principles of Ergonomics

Maine Bureau of Labor Standards

Maine Industrial Safety Division

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INDUSTRIAL SAFETY DIVISION

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PRINCIPLES OF ERGONOMICS

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(3/92)
I. PURPOSE OF PROGRAM

A. Provide participants with an overview of the field of ergonomics, with an emphasis on cumulative trauma disorders

B. Present procedures for implementing a program for controlling cumulative trauma disorders

II. INTRODUCTION TO ERGONOMICS

A. What is ergonomics?

1. Multidisciplinary science dealing with the interaction of people with their work environment

2. Increased interest since WWII when complex equipment required changes in interaction between equipment and worker

3. Interactions between worker & job demands

4. Designing all aspects of the workplace to be compatible with what people are and are not capable of doing
   a. Physiologically
   b. Psychologically

5. Failure to consider human limitations -- Error, Illness, Injury

B. Goals of ergonomics

1. Reduce injuries/illnesses

2. Increase productivity

C. Scope of ergonomics

1. Cumulative Trauma Disorders

2. Manual Materials Handling

3. Workplace Design
4. Job Design
   a. Shiftwork, overtime, piece work
   b. Work physiology

5. Equipment Design
   a. Very important with high technology
   b. Design so that people can use without error or stress
   c. Based on people's perceptions & reactions; how people receive information

6. Environmental Factors
   a. Heat, cold, noise, illumination, vibration
   b. Pleasant & comfortable physical environment reduces physical & psychological stress

III. CUMULATIVE TRAUMA DISORDERS

A. Definition
   1. Disorders of various parts of the musculo-skeletal system
   2. From repeated small (micro) traumas, none of which alone would cause permanent health problems
   3. Not an injury, which results from a single event
   4. Not necessarily from high repetition; the micro-traumas can result from other factors

B. Scope
   1. Most frequent occupational illness in U.S.
   2. 30-40% of job injuries/illnesses nationwide
   3. Maine - 1989 - approx 7000 cases → $5,000,000
   4. 1987-$9 billion-low back compensation payments
   5. Greatest increase of all occupational illnesses, injuries in 1990, nationwide

C. High risk industries
   1. Construction, manufacturing, service
   2. Maine: Health services, shipbuilding and repair, groceries, paper mills, highway and street repair
D. High risk jobs

1. Any job with intensive hand-arm activity/repetition or heavy forces
2. Not necessarily assembly line type of job

E. Physiology of CTDs—How the body is affected

1. Structure and function of nerves, tendons, muscles
2. How injuries occur in upper extremities
   a. Tendonitis
   b. Carpal tunnel syndrome
3. Structure of the back
4. How back injuries occur

F. Risk Factors

1. Repetition
   over and over again
2. High Forces
   whole body or local
3. Posture
   a. Awkward or extreme postures
      easy to identify—think if you would like
      be in that position all day
   b. Static postures
4. Vibration
   whole body or local
5. Exposure to cold
   whole body or local
6. Mechanical Stress Concentrations
   hard surface digging into body damages soft tissue
7. Gloves
   ill-fitting reduce strength

G. Non-occupational factors

1. Can also contribute to CTDs
2. However, work factors are generally the
   significant factors: they make the difference
   between developing and not developing a CTD
H. Controlling CTDs

1. Engineering Controls/Preferred Method
   a. Workstation Design
      (1) Designed to accommodate persons who actually do the job
      (2) Easily adjustable and designed to fit specific task
   b. Tool design

2. Work Practice Controls
   a. Training on proper work techniques
      (1) Specific to the job
      (2) Include feedback and followup
      (3) If an excessive amount of training is needed it becomes too expensive; plus workers will not have enough reserves for unexpected events
      (4) NO AMOUNT OF TRAINING CAN MAKE UP FOR A JOB WHICH IS INHERENTLY UNSAFE
   b. Work hardening
   c. Enforcement

3. Administrative Controls
   a. Reduce number of repetitions
   b. Rest pauses
   c. Job rotation
   d. Job enlargement
   e. Maintenance programs for tools and equipment
   f. Adequate staffing
   g. Appropriate medical management

4. Personal Protective Equipment
   a. Proper fit essential
   b. Heat and cold protection
   c. Braces, splints, back belts, etc. - NOT PPE
   d. Should not increase ergonomic stresses
IV. OSHA AND ERGONOMICS

A. OSHA Guidelines - Commitment of Top Management/Employee Involvement

1. Worksite Analysis

   a. Analysis of injury/illness data
   b. Analysis of jobs

2. Hazard Prevention and Control

3. Medical Management

   a. To provide appropriate care for injured employees to facilitate prompt recovery and return to work
   b. Reporting procedures
   c. Coordination with medical providers
   d. Return to work policy
   e. Restricted/light duty jobs

4. Training and education

   For all levels of employees

B. 5.A.1 Citations

IV. ACTION PLANS

1. Developing an Action Plan

2. "Experience has shown that instituting programs in ergonomics has reduced cumulative trauma disorders and, often, improved productivity." OSHA 3123
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ERGO N O M I C S
PROGR AM
MANAGEMENT
GUIDELINES FOR
MEATPACKING PLANTS

INTRODUCTION
In recent years, there has been a significant increase in the reporting of cumulative trauma disorders (CTDs) and other work-related disorders due to ergonomic hazards. CTDs account for an increasingly large percentage of workers' compensation costs each year, and they represent nearly half of the occupational illnesses reported in the annual Bureau of Labor Statistics (BLS) survey. Much of the increase in CTDs is due to changes in process and technology that expose employees to increased repetitive motion and other ergonomic risk factors; some may be attributed to increased awareness—by industry, labor, and government—and reporting of these disorders.

Finding solutions to the problems posed by ergonomic hazards may well be the most significant workplace safety and health issue of the 1990s. The Occupational Safety and Health Administration (OSHA) is committed to a variety of efforts to address this issue.

The effective management of worker safety and health protection includes all work-related hazards, whether or not they are regulated by specific federal standards. The Occupational Safety and Health Act of 1970 (OSH Act) clearly states that the general duty of all employers is to provide their employees with a workplace free from recognized serious hazards. This includes the prevention and control of ergonomic hazards.

OSHA is therefore providing information and guidance on ergonomics program management to assist employers in meeting their responsibilities under the OSH Act. In January 1989, OSHA published voluntary, general Safety and Health Program Management Guidelines (Federal Register, Vol. 54, No. 16, January 26, 1989, pp. 3904-3916), which are recommended to all employers as a foundation for their safety and health programs and as a framework for their ergonomics programs. In addition, OSHA has developed the following ergonomics program management guidelines specifically for the meatpacking industry.

In this context, it is important to emphasize that this is not a new standard or regulation. We expect employers to implement effective ergonomics programs, adapted to their particular workplaces, containing the major elements described in the guidelines. OSHA's field inspection staff have been instructed that failure to implement the guidelines is not in itself a violation of the General Duty Clause of the OSH Act. The guidelines provide information on the steps employers should take (1) to determine if they have ergonomic-related problems in their workplaces, (2) to identify the nature and location of those problems, and (3) to implement measures to reduce or eliminate them.

Why meatpacking? Most importantly, CTDs are particularly prevalent in the meatpacking industry. Although ergonomic hazards are by no means confined to meatpacking, the incidence and severity of CTDs and other workplace injuries and illnesses in this industry demand that effective programs be implemented to protect workers from these hazards. These should be part of the employer's overall safety and health management program.

The publication and distribution of these guidelines is OSHA's first step in assisting the meatpacking industry in implementing a comprehensive safety and health program including ergonomics. OSHA's approach focuses on ergonomics, but also will cover the full range of safety and health hazards found in meatpacking. It will be a coordinated effort involving research, information, training, cooperative programs, and enforcement. The program will cover the "red meat" packing industry, Standard Industrial Classification (SIC) code 2111.

OSHA seeks the cooperation and commitment of you, the employer, in making this program an effective effort for occupational safety and health. It is essential that employers in SIC 2111 and related industries adopt an appropriately comprehensive program for addressing ergonomic hazards.

OSHA has developed its guidelines based on the best available scientific evidence, advice from the National Institute for Occupational Safety and Health (NIOSH), medical literature, and its experience in enforcement. They closely resemble the substance of settlement agreements with large meatpacking firms. These guidelines are intended to aid employers in implementing their programs. They are divided into three primary sections: (I) a discussion of the importance of management commitment and employee involvement, (II) recommended program elements, and (III) essential, detailed guidance and examples for the program elements. These elements are currently being implemented by leading employers voluntarily or by others, through settlement agreements with OSHA following enforcement actions. They are based on technical discussions and recommendations from NIOSH, representatives of the meat industry, employee representatives in the industry, and other sources.
The four recommended program elements are (1) worksite analysis, (2) hazard prevention and control, (3) medical management, and (4) training and education. While all of these elements should play a part in every employer’s program, the one that should receive first attention is worksite analysis—finding out what actual or potential hazards now exist in your facility. This should be a careful, step-by-step look at your workplace to find out where hazards leading to CTDs exist. For smaller employers, OSHA does not believe a complicated effort should be necessary. Look at your injury/illness records, review any workers’ compensation claims, look at the work as it is being done and ask questions of employees to see if there are ergonomic problems. Identify the jobs that appear to have the problems, and determine if those jobs involve ergonomic risk factors.

You should then take whatever measures are appropriate—including those set forth in the guidelines—to address the problems found, if any. If no problems exist, you should keep on with your current efforts to maintain a safe and healthful workplace.

In reading the guidelines, employers should be aware that the program elements are intended to be adapted, as appropriate, to the size and circumstances of the workplace. When OSHA visits a meatpacking plant, it does not expect a small facility to have the same type of hazard prevention program or medical management program as a large plant. The guidelines provide a general framework for action by employers and employees. Their flexibility allows for the incorporation of changes in technology and other advancements as they become available.

OSHA recognizes that small employers, in particular, may not have the need for as comprehensive a program as would result from implementation of every action and strategy described in these guidelines. There are numerous differences between large and small employers in the meatpacking industry—in types of operations, mechanization, and the degree of specialization in employee tasks. Accordingly, many small employers will not find the same extent of CTDs in their workplaces as their much larger counterparts.

Additionally, OSHA also realizes that many small employers may need assistance in implementing an appropriate ergonomics program. That is why we are emphasizing the availability of the free OSHA consultation service for smaller employers. The consultation service is independent of OSHA’s enforcement activity and will be making special efforts to provide help in the meatpacking program. A directory of the consultation project offices in each State is included at the end of the guidelines. Also included is a section of Questions and Answers that are designed to respond to concerns employers may have.

The goal of any safety and health program is to prevent injuries and illnesses by removing their causes. For ergonomic hazards, this goal is achieved through taking steps to eliminate or materially reduce worker exposure to conditions that lead to cumulative trauma disorders and related injuries and illnesses.

The science of ergonomics seeks to adapt the job and workplace to the worker by designing tasks and tools that are within the worker’s capabilities and limitations. Experience has shown that instituting programs in ergonomics has reduced cumulative trauma disorders and, often, improved productivity.

OSHA, therefore, looks to employers in the meatpacking industry to demonstrate that they are meeting their general duty under the OSH Act by evaluating the extent of CTDs and ergonomic hazards in their workplaces, and by implementing appropriate, systematic programs to resolve them.

I. MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

Commitment and involvement are complementary and essential elements of a sound safety and health program. Commitment by management provides the organizational resources and motivating force necessary to deal effectively with ergonomic hazards.

Employee involvement and feedback through clearly established procedures are likewise essential, both to identify existing and potential hazards and to develop and implement an effective way to abate such hazards.

A. Commitment by Top Management

The implementation of an effective ergonomics program includes a commitment by the employer to provide the visible involvement of top management, so that all employees, from management to line workers, fully understand that management has a serious commitment to the program. An effective program should have a team approach, with top management as the team leader, and should include the following:

1. Management’s involvement demonstrated through personal concern for employee safety and health by the priority placed on eliminating the ergonomic hazards.

2. A policy that places safety and health on the same level of importance as production. The responsible implementation of this policy requires management to integrate production processes and safety and health protection to assure that this protection is part of the daily production activity within each facility.

3. Employer commitment to assign and communicate the responsibility for the various aspects of the ergonomics program so that all managers, supervisors, and employees involved know what is expected of them.

4. Employer commitment to provide adequate authority and resources to all responsible parties, so that assigned responsibilities can be met.

5. Employer commitment to ensure that each manager, supervisor, and employee responsible for the ergonom-
ics program in the workplace is accountable for carrying out those responsibilities.

B. Written Program

Effective implementation requires a written program for job safety, health, and ergonomics that is endorsed and advocated by the highest level of management and that outlines the employer’s goals and plans. This written program should be suitable for the size and complexity of the workplace operations, and should permit these guidelines to be applied to the specific situation of each plant.

The written program should be communicated to all personnel, as it encompasses the total workplace, regardless of number of workers employed or the number of work shifts. It should establish clear goals, and objectives to meet those goals, that are communicated to and understood by all members of the organization.

The written program should include the earliest feasible implementation dates for completion of each program element.

C. Employee Involvement

An effective program includes a commitment by the employer to provide for and encourage employee involvement in the ergonomics program and in decisions that affect worker safety and health, including the following:

1. An employee complaint or suggestion procedure that allows workers to bring their concerns to management and provide feedback without fear of reprisal.
2. A procedure that encourages prompt and accurate reporting of signs and symptoms of CTDs by employees so that they can be evaluated and, if warranted, treated.
3. Safety and health committees that receive information on ergonomic problem areas, analyze them, and make recommendations for corrective action.
4. Ergonomic teams or monitors with the required skills to identify and analyze jobs for ergonomic stress and recommend solutions.

D. Regular Program Review and Evaluation

Procedures and mechanisms should be developed to evaluate the implementation of the ergonomic program and to monitor progress accomplished. Top management should review the program regularly—semiannual reviews are recommended—to evaluate success in meeting its goals and objectives. Evaluation techniques include methods such as the following:

2. Employee surveys.
3. Before and after surveys/evaluations of job/worksite changes.
4. Review of results of plant evaluations.
5. Up-to-date records or logs of job improvements tried or implemented.

The results of management’s review should be a written progress report and program update, which should be shared with all responsible parties and communicated to employees. New or revised goals arising from the review—identifying jobs, processes, and departments—should be shared with all workers. Any deficiencies should be identified and corrective action taken.

Managers, supervisors, and employees should review the program frequently to reevaluate goals and objectives and discuss changes. Regular—e.g., quarterly—meetings should be held on the progress of ergonomic issues. These should include managers, supervisors, and employees who review the goals and objectives identified and discuss changes in the program.

II. PROGRAM ELEMENTS

An effective occupational safety and health program to address ergonomic hazards in the meatpacking industry includes the following four major program elements: worksite analysis, hazard prevention and control, medical management, and training and education.

A. Worksite Analysis

Worksite analysis identifies existing hazards and conditions, operations that create hazards, and areas where hazards may develop. This also includes close scrutiny and tracking of injury and illness records to identify patterns of traumas or strains that may indicate the development of CTDs. (A recommended worksite analysis program for ergonomics is provided in Section III. A.)

The objectives of worksite analysis, then, are to recognize, identify, and correct ergonomic hazards.

1. The first step in implementing the analysis program should be a review and analysis of injury and illness records to accomplish the following:

   a. Analyze medical, safety, and insurance records, including the OSHA-200 log and information compiled through the medical management program, for evidence of cumulative trauma disorders. This process should involve health care providers to ensure confidentiality of patient records.

   b. Identify and analyze any apparent trends relating to particular departments, process units, job titles, operations, or work stations. (For a complete discussion, see Sections III. A. and C.)

2. The worksite analysis should use a systematic method, such as the one provided in Section III. A., to identify those work positions needing a quantitative
analysis of ergonomic hazards. This analysis should do
the following:

a. Use an ergonomic checklist that includes compo-
nents such as posture, force, repetition, vibration, and
various upper extremity factors. (See Section III. A.)

b. Identify those work positions that put workers at
risk of developing CTDs.

c. Verify low risk factors for light duty or restricted
activity work positions.

d. Determine if risk factors for a work position have
been reduced or eliminated to the extent feasible.

e. Provide the results of such analyses to health care
providers for use in assigning “light duty” jobs. (See
Section III. C. for discussion of these types of jobs.)

f. Apply to all planned, new, and modified facilities,
processes, materials, and equipment to ensure that
workplace changes contribute to reducing or eliminat-
ing ergonomic hazards.

3. The analysis of ergonomics hazards should be
routinely performed and documented by a qualified
person—ideally, an ergonomist; trained plant engi-
neers, managers, health care providers, and affected
employees should also contribute to the process.

4. Periodic surveys of the worksite should be
conducted—at least annually, or whenever operations
change—to identify new or previously unnoticed risk
factors and deficiencies or failures in work practices or
engineering controls, and to assess the effects of
changes in the work processes.

Effective programs require a reliable system for
employees to notify management about conditions that
appear to be ergonomic hazards and to utilize their
insight to determine appropriate work practice and
engineering controls. This could be begun by a ques-
tionnaire on ergonomic problems and issues and
maintained through an active safety and health
committee or other forms of regular employee partici-
pation (e.g., a complaint log or suggestion book).

NOTE: After conducting a worksite analysis appro-
priate for the size and conditions of the workplace, the
employer may find that there are no significant ergo-
nomic hazards or resulting CTDs in the establish-
ment. If there are no hazards, the employer need not imple-
ment the other program elements recommended by the
guidelines. The employer should, however, continue
current efforts to ensure workplace safety and health
and should monitor changes in the workplace which
might indicate ergonomic hazards.

B. Hazard Prevention and Control

Once ergonomic hazards are identified through the
systematic worksite analysis discussed above, the next
step is to design measures to prevent or control these
hazards. Thus, a system for hazard prevention and
control is the second major program element for an
effective ergonomics program.

Ergonomic hazards are prevented primarily by
effective design of the workstation, tools, and job. To
be effective, an employer’s program should use appro-
priate engineering and work practice controls, personal
protective equipment, and administrative controls to
correct or control ergonomic hazards, including those
identified in the following paragraphs:

1. Engineering Controls

Engineering techniques, where feasible, are the
preferred method of control. The focus of an ergonom-
ics program is to make the job fit the person, not to
force the person to fit the job. This can be accom-
plished by designing or modifying the work station,
work methods, and tools to eliminate excessive exert-
ion and awkward postures and to reduce repetitive
motion.

a. Work Station Design. Work stations should be
designed to accommodate the persons who actually
work on a given job; it is not adequate to design for
the “average” or typical worker.

   Work stations should be easily adjustable and either
designed or selected to fit a specific task, so they are
comfortable for the workers using them.

   The work space should be large enough to allow for
the full range of required movements, especially where
knives, saws, hooks, and similar tools are used.

b. Design of Work Methods. Work methods should
be designed to reduce static, extreme, and awkward
postures; repetitive motion; and excessive force. Work
method design addresses the content of tasks
performed by the workers. It requires analysis of the
production system to design or modify tasks to elimi-
nate stressors.

c. Tool and Handle Design. Tools and handles, if
well-designed, reduce the risk of CTDs.

For any tool, a variety of sizes should be available
to achieve a proper fit and reduce ergonomic risk. The
appropriate tool should be used to do a specific job.
Tools and handles should be selected to eliminate or
minimize the following stressors:

- Chronic muscle contraction or steady force.
- Extreme or awkward finger/hand/arm positions.
- Repetitive forceful motions.
- Tool vibration.
- Excessive gripping, pinching, pressing with the
  hand and fingers.

For examples of engineering controls achievable in
the meat industry to eliminate extreme and awkward
postures and excessive force and to reduce repetitive
motion in the meat industry, see Section III. B.

2. Work Practice Controls

An effective program for hazard prevention and
control also includes procedures for safe and proper
work that are understood and followed by managers.
supervisors, and workers. Key elements of a good work practice program for ergonomics include proper work techniques, employee conditioning, regular monitoring, feedback, maintenance, adjustments and modifications, and enforcement.

a. **Proper Work Techniques.** A program for proper work techniques, such as the following, includes appropriate training and practice time for employees:

- Proper cutting techniques, including work methods that improve posture and reduce stress and strain on extremities.
- Good knife care, including steeling, and the regular sharpening or steeling of knives.
- Correct lifting techniques (proper body mechanics).
- Proper use and maintenance of pneumatic and power tools.
- Correct use of ergonomically designed work stations and fixtures.

b. **New Employee Conditioning Period.** Jobs in the meat industry will usually require conditioning, or break-in, periods, which may last several weeks. New and returning employees should be gradually integrated into a full workload as appropriate for specific jobs and individuals. Employees should be assigned to an experienced trainer for job training and evaluation during the break-in period. Employees reassigned to new jobs should also have a break-in period.

c. **Monitoring.** Regular monitoring at all levels of operation helps to ensure that employees continue to use proper work practices. This monitoring should include a periodic review of the techniques in use and their effectiveness, including a determination of whether the procedures in use are those specified; if not, then it should be determined why changes have occurred and whether corrective action is necessary.

d. **Adjustments and Modifications.** Modify work practice controls when the dynamics of the workplace change. Such adjustments include changes in the following:

- Line speeds.
- Staffing at position.
- Type, size, weight, or temperature of the product handled.

3. **Personal Protective Equipment (PPE)**

PPE should be selected with ergonomic stressors in mind. Appropriate PPE should be provided in a variety of sizes, should accommodate the physical requirements of workers and the job, and should not contribute to extreme postures and excessive forces. The following factors need to be considered when selecting PPE in the meat industry:

a. Proper fit is essential. For example, gloves that are too thick or that fit improperly can reduce blood circulation and sensory feedback, contribute to slippage, and require excessive grip strength. The same is true when excessive layers of gloves are used (e.g., rubber over fabric, over metal mesh, over cotton). The gloves in use should facilitate the grasping of the tools and knives needed for a particular job while protecting the worker from injury.

b. Protection against extreme cold (less than 40 degrees Fahrenheit in most meat operations) is necessary to minimize stress on joints.

c. Braces, splints, back belts, and other similar devices are not PPE. See Section III. C., "Medical Management Program."

d. Other types of PPE that may be selected for use (e.g., arm guards) should not increase ergonomic stressors.

4. **Administrative Controls**

A sound overall ergonomics program includes administrative controls that reduce the duration, frequency, and severity of exposures to ergonomic stressors.

a. Examples of administrative methods include the following:

- Reducing the total number of repetitions per employee by such means as decreasing production rates and limiting overtime work.
- Providing rest pauses to relieve fatigued muscle-tendon groups. The length of time needed depends on the task's overall effort and total cycle time.
- Increasing the number of employees assigned to a task to alleviate severe conditions, especially in lifting heavy objects.
- Using job rotation, used with caution and as a preventive measure, not as a response to symptoms. The principle of job rotation is to alleviate physical fatigue and stress of a particular set of muscles and tendons by rotating employees among other jobs that use different muscle-tendon groups. If rotation is utilized, the job analyses must be reviewed by a qualified person to ensure that the same muscle-tendon groups are not used.
- Providing sufficient numbers of standby/relief personnel to compensate for foreseeable upset condi-

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Undesirable Repetitive Turning

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tions on the line (e.g., loss of workers).

- Job enlargement—see the guidance on “Design of Work Methods” given in Sections II. B. 1. and III. B.

b. Effective programs for facility, equipment, and tool maintenance to minimize ergonomic stress and include the following measures:

- A preventive maintenance program for mechanical and power tools and equipment, such as powered knives and saws, to verify that they are in proper working order and within original manufacturer’s specifications. This may include vibration monitoring.

- Perform maintenance regularly and whenever workers report suspected problems. Sufficient numbers of spare tools should be available to facilitate regular maintenance.

- A specific knife sharpening program. Sharp knives should be readily available.

- Effective housekeeping programs to minimize slippery work surfaces and related hazards such as slips and falls.

C. Medical Management

Implementation of a medical management system is the third major element in the employer’s ergonomics program. Proper medical management is necessary both to eliminate or materially reduce the risk of development of CTD signs and symptoms through early identification and treatment and to prevent future problems through development of information sources.

Thus, an effective medical management program for CTDs is essential to the success of an employer’s ergonomics program. In an effective program, health care providers will be part of the ergonomic team, interacting and exchanging information routinely in order to prevent and properly treat CTDs.

The guidelines describe the elements of a medical management program for CTDs and related ergonomic issues to ensure early identification, evaluation, and treatment of signs and symptoms; and to aid in their prevention. Each plant should establish standard procedures for the medical management of work-related illnesses or injuries.

A physician or occupational health nurse (OHN) with training in the prevention and treatment of CTDs should supervise the program. Each work shift should have access to health care providers in order to facilitate treatment, surveillance activities, and recording of information. Where such personnel are not employed full-time, the part-time employment of appropriately trained health care providers is recommended.

The medical management program should address the following issues:

- Injury and illness recordkeeping.
- Early recognition and reporting.

- Systematic evaluation and referral.
- Conservative treatment.
- Conservative return to work.
- Systematic monitoring.
- Adequate staffing and facilities.

Recommendations for medical management of CTDs are evolving rapidly, and health care providers should monitor developments on the subject.

(See Section III. C. for a full description of a recommended program for the medical management of CTDs in meatpacking establishments.)

D. Training and Education

The fourth major program element for an effective ergonomics program is training and education. The purpose of training and education is to ensure that employees are sufficiently informed about the ergonomic hazards to which they may be exposed and thus are able to participate actively in their own protection. Employees should be adequately trained about the employer’s ergonomics program.

Training and education are critical components of an ergonomics program for employees potentially exposed to ergonomic hazards. Training allows managers, supervisors, and employees to understand ergonomic and other hazards associated with a job or production process, their prevention and control, and their medical consequences.

A training program should include the following individuals:

- All affected employees.
- Engineers and maintenance personnel.
- Supervisors.
- Managers.
- Health care providers.

The program should be designed and implemented by qualified persons. Appropriate special training should be provided for personnel responsible for administering the program.

The program should be presented in language and at a level of understanding appropriate for the individuals being trained. It should provide an overview of the potential risk of illnesses and injuries, their causes and early symptoms, the means of prevention, and treatment.

The program should also include a means for adequately evaluating its effectiveness. This might be achieved by using employee interviews, testing, and observing work practices, to determine if those who received the training understand the material and the work practices to be followed.
Training for affected employees should consist of both general and specific job training:

1. General Training

Employees who are potentially exposed to ergonomic hazards should be given formal instruction on the hazards associated with their jobs and with their equipment. This includes information on the varieties of CTDs, what risk factors cause or contribute to them, how to recognize and report symptoms, and how to prevent these disorders. This instruction should be repeated for each employee as necessary. OSHA's experience indicates that, at minimum, annual retraining is advisable.

2. Job-Specific Training

New employees and reassigned workers should receive an initial orientation and hands-on training prior to being placed in a full-production job. Training lines may be used for this purpose. Each new hire should receive a demonstration of the proper use of and procedures for all tools and equipment. The initial training program should include the following:

- Care, use, and handling techniques for knives.
- Use of special tools and devices associated with individual work stations.
- Use of appropriate guards and safety equipment, including personal protective equipment.
- Use of proper lifting techniques and devices.

On-the-job training should emphasize employee development and use of safe and efficient techniques. (See also the section on "New Employee Conditioning Period" under Work Practice Controls, II. B. 1. b.)

3. Training for Supervisors

Supervisors are responsible for ensuring that employees follow safe work practices and receive appropriate training to enable them to do this. Supervisors therefore should undergo training comparable to that of the employees, and such additional training as will enable them to recognize early signs and symptoms of CTDs, to recognize hazardous work practices, to correct such practices, and to reinforce the employer's ergonomic program, especially through the ergonomic training of employees as may be needed.

4. Training for Managers

Managers should be aware of their safety and health responsibilities and should receive sufficient training pertaining to ergonomic issues at each work station and in the production process as a whole so that they can effectively carry out their responsibilities.

5. Training for Engineers and Maintenance Personnel

Plant engineers and maintenance personnel should be trained in the prevention and correction of ergonomic hazards through job and work station design and proper maintenance, both in general and as applied to the specific conditions of the facility.

III. DETAILED GUIDANCE AND EXAMPLES

A. Recommended Worksite Analysis Program for Ergonomics

General. While complex analyses are best performed by a professional ergonomist, the "ergonomic team"—or any qualified person—can use this program to identify stressors in the workplace. The purpose of the outline that follows is to give a starting point for finding and eliminating those tools, techniques, and conditions which may be the source of ergonomic problems. In addition to analyzing current workplace conditions, planned changes to existing and new facilities, processes, materials, and equipment should be analyzed to ensure that changes made to enhance production will also reduce or eliminate the risk factors.

As has been emphasized elsewhere, this program should be adapted to each workplace. It is based on the sources listed in the Selected Bibliography.

Outline. The discussion of the recommended program for worksite analysis is divided into four main parts:

- Gathering information from available sources;
- Conducting baseline screening surveys to determine which jobs need a closer analysis;
- Performing ergonomic job hazard analyses of those work stations with identified risk factors; and—after implementing control measures—
- Conducting periodic surveys and followup to evaluate changes.

1. Information Sources

- Records Analysis and Tracking. The essential first step in worksite analysis is to develop the information necessary to identify ergonomic hazards in the workplace. (See Section II. A.) Existing medical, safety, and insurance records, including OSHA-200 logs, should be analyzed for evidence of injuries or disorders associated with CTDs. Health care providers should participate in this process to ensure confidentiality of patient records.

  (NOTE: See also Section III. C., Medical Management Program.)

- Incidence Rates. Incidence rates for upper extremity disorders and/or back injuries should be calculated by counting the incidences of CTDs and reporting the incidences per 100 full time workers per year per facility.

  \[
  \text{Incidence Rate} = \frac{\text{(number of new cases/yr)} \times (200,000 \text{ work hrs/persit})}{\text{number of hours worked/ facility-yr}}
  \]

*The same method should be applied to departments, production lines, or job types within the facility.
2. Screening Surveys

The second step in worksite analysis under an effective ergonomics program is to conduct baseline screening surveys. Detailed baseline screening surveys identify jobs that put employees at risk of developing CTDs. If the job places employees at risk of developing CTDs, an effective program will then require the ergonomic job hazard analysis described at Section III.

a. Checklist. The survey is performed with an ergonomic checklist. This checklist should include components such as posture, materials handling, and upper extremity factors. (The checklist should be tailored to the specific needs and conditions of the workplace. One example of an ergonomics checklist is provided by Putz-Anderson in Cumulative Trauma Disorders, p. 52; see Selected Bibliography. Other examples of checklists will be given in OSHA's forthcoming Ergonomics Program Management Guidelines for General Industry.)

b. Ergonomic Risk Factors. Identification of ergonomic hazards is based on ergonomic risk factors: conditions of a job process, work station, or work method that contribute to the risk of developing CTDs. Not all of these risk factors will be present in every CTD-producing job, nor is the existence of one of these factors necessarily sufficient to cause a CTD.

c. CTD Risk Factors. Some of the risk factors for CTDs of the upper extremities include the following:

- Repetitive and/or prolonged activities.
- Forceful exertions, usually with the hands (including pinch grips).
- Prolonged static postures.
- Awkward postures of the upper body, including reaching above the shoulders or behind the back, and twisting the wrists and other joints to perform tasks.
- Continued physical contact with work surfaces; e.g., contact with edges.
- Excessive vibration from power tools.
- Cold temperatures.
- Inappropriate or inadequate hand tools.

d. Back Disorder Risk Factors. Risk factors for back disorders include items such as the following:

- Bad body mechanics such as (1) continued bending over at the waist; (2) continued lifting from below the knuckles or above the shoulders; and (3) twisting at the waist, especially while lifting.
- Lifting or moving objects of excessive weight or asymmetric size.
- Prolonged sitting, especially with poor posture.
- Lack of adjustable chairs, footrests, body supports, and work surfaces at work stations.
- Poor grips on handles.
- Slippery footing.

e. Multiple Risk Factors. Jobs, operations, or work stations that have multiple risk factors have a higher probability of causing CTDs. The combined effect of several risk factors in the development of CTDs is sometimes referred to as "multiple causation."

3. Ergonomic Job Hazard Analyses

At this point, the employer has identified—through the information sources and screening surveys discussed above—jobs that place employees at risk of developing CTDs. As an essential third step in the worksite analysis, an effective ergonomics program requires a job hazard analysis for each job so identified.

Job hazard analyses should be routinely performed by a qualified person for jobs that put workers at risk of developing CTDs. This type of analysis helps to verify lower risk factors at light duty or restricted activity work positions and to determine if risk factors for a work position have been reduced or eliminated to the extent feasible.

a. Work Station Analysis. An adequate analysis would be expected to identify all risk factors present in each studied job or workstation.

For upper extremities, three measurements of repetitiveness are the total hand manipulations per cycle, the cycle time, and the total manipulations or cycles per work shift.

Force measurements may be noted as an estimated average effort, and a peak force. They may be recorded as "light," "moderate," and "heavy." (See also Putz-Anderson, Selected Bibliography, pp. 57-59, for additional guidance on force measurements.)

Tools should be checked for excessive vibration. (See also NIOSH criteria document on hand/arm vibration, Selected Bibliography.)

The tools, personal protective equipment, and dimensions and adjustability of the work station should be noted for each job hazard analysis.

Finally, hand, arm, and shoulder postures and movements should be assessed for levels of risk.

b. Lifting Hazards. For manual materials handling, the maximum weight-lifting values should be calculated. (See the NIOSH Work Practices Guide for Manual Lifting, 1981, in the Selected Bibliography, for basic calculations. Note that this guide does not address lifting that involves twisting or turning motions.)

c. Videotape Method. The use of videotape, where feasible, is suggested as a method for analysis of the work process. Slow-motion videotape or equivalent visual records of workers performing their routine job tasks should be analyzed to determine the demands of
the task on the worker and how each worker actually performs each task.

NOTE: Ergonomic analysis is not complete without implementation of controls. Section III. B., which follows, offers examples of engineering controls and other methods that will be useful in reducing ergonomic hazards.

4. Periodic Ergonomic Surveys

The fourth step in worksite analysis is to conduct periodic review. Periodic surveys should be conducted, to identify previously unnoticed risk factors or failures or deficiencies in work practice or engineering controls. The “symptoms survey” described in Section III. C. is an effective tool in identifying jobs that require ergonomic job hazard analysis.

The periodic review process should also include the following:

a. Feedback and Followup. A reliable system should be provided so that employees can notify management about conditions which appear to be ergonomic hazards and to utilize their insight and experience to determine work practice and engineering controls. This might be initiated by an ergonomic questionnaire and be maintained through an active safety and health committee, or by employee participation with the “ergonomic team.”

Reports of ergonomic hazards or signs and symptoms of potential CTDs should be investigated by ergonomic screening surveys and appropriate ergonomic hazard analyses in order to identify risk factors and controls.

b. Trend Analysis. Trends of injuries and illnesses related to actual or potential CTDs should be calculated, using several years of data where possible.

Trends should be calculated for several departments, process units, job titles, or work stations. These trends may also be used to determine which work positions are most hazardous and need to be analyzed by the qualified person.

Using standardized job descriptions, incidence rates may be calculated for work positions in successive years to identify trends. Using trend information can help to determine the priority of screening surveys and/or ergonomic hazard analyses.

B. Hazard Prevention and Control: Examples of Engineering Controls for the Meat Industry

Engineering solutions, where feasible, are the preferred method of control for ergonomic hazards. The focus of an ergonomics program is to make the job fit the person, not to make the person fit the job. This is accomplished by redesigning the work station, work methods, or tool to reduce the demands of the job, including high force, repetitive motion, and awkward postures. A program toward this end entails research into currently available controls and technology. It also includes provisions for utilizing new technologies as they become available and for in-house research and testing.

The following are examples of engineering controls that have been found to be effective and achievable in the industry.

1. Work Station Design

Work stations should be designed to accommodate the persons who actually work on a given job; it is not adequate to design for the “average” or typical worker. Work stations should be easily adjustable and either designed or selected to fit a specific task, so that they are comfortable for the workers using them. The work space should be large enough to allow for the full range of required movements, especially where knives, saws, hooks, and similar tools are used.

a. EXAMPLES of methods for the reduction of extreme and awkward postures include the following:

- Adjustable fixtures and rotating cutting tables so that the position of the meat can be easily manipulated.
- Work stations and delivery bins that can accommodate the heights and reach limitations of various-sized workers.
- Work platforms that move up and down for operations such as splitters.

b. EXAMPLES of methods for the reduction of excessive force in the meat industry include the following:

- Adjustable fixtures to allow cuts and movements to be made easily.
- Bins properly located so that workers do not have to toss products and by-products.
- Mechanical or powered assists to eliminate the use of extreme force.
- Suspension of heavy tools.
c. An EXAMPLE of a means by which highly repetitive movements can be reduced is as follows:

- The use of diverging conveyors off the main line so that certain activities can be performed at slower rates.

2. Design of Work Methods

Traditional work method analysis considers static postures and repetition rates. This should be supplemented by addressing the force levels and the hand and arm postures involved. The tasks should be altered to reduce these and the other stresses identified with CTDs. The results of such analyses should be shared with the health care providers; e.g., to assist in compiling lists of “light-duty” and “high-risk” jobs.

a. EXAMPLES of methods for the reduction of extreme and awkward postures include the following:

- Enabling the worker to perform the task with two hands instead of one.

b. EXAMPLES of methods to reduce excessive force include the following:

- The use of automation, such as automated deboners.
- The use of mechanical devices to aid in removing bones and in separating meat from bones, and for heavy lifting.
- Substitution of power tools where manual tools are now in use.
- The use of articulated arms and counter balances suspended by overhead racks to reduce the force needed to operate and control power tools.
- Ensuring that the meat to be processed is kept from freezing or is completely thawed.

c. EXAMPLES of methods to reduce highly repetitive movements include the following:

- Increasing the number of workers performing a task.
- Lessening repetition by combining jobs with very short cycle times, thereby increasing cycle time. (Sometimes referred to as “job enlargement.”)
- Using automation.
- Designing jobs to allow self-pacing, when feasible.
- Designing jobs to allow sufficient rest pauses.

3. Tool Design and Handles

Attention should be paid to the selection and design of tools to minimize the risks of upper extremity CTDs and back injuries.

In any tool design, a variety of sizes should be available. EXAMPLES of criteria for selecting tools include the following:

- Matching the type of tool or knife to the task.
- Designing or selecting the tool handle or knife so that extreme and awkward postures are minimized.
- Using knife or tool handles with textured grips in preference to those with ridges and grooves.
- Designing tools to be used by either hand, or providing tools for both left- and right-handed workers.
- Using tools with triggers that depress easily and are activated by two or more fingers.
- Using handles and grips that distribute the pressure over the fleshy part of the palm, so that the tool does not dig into the palm.
- Designing/selecting tools for minimum weight: counter-balancing tools heavier than one or two pounds.
- Selecting pneumatic and power tools that exhibit minimal vibration and maintaining them in accordance with manufacturer’s specifications, or with an adequate vibration monitoring program. Wrapping handles and grips with insulation material (other than wraps provided by the manufacturer for this purpose) is normally not recommended, as it may interfere with a proper grip and increase stress.

C. Medical Management Program for the Prevention and Treatment of Cumulative Trauma Disorders in Meatpacking Establishments

I. General

As noted in several sections of these guidelines, an effective medical management program for cumulative trauma disorders (CTDs) is essential to the success of an employer’s ergonomic program in the meatpacking industry.

It is not the purpose of these guidelines to dictate medical practice for an employer’s health care providers. Rather, they describe the elements of a medical management program for CTDs to ensure early identification, evaluation, and treatment of signs and symptoms; to prevent their recurrence; and to aid in their prevention. Medical management of CTDs is a developing field, and health care providers should
monitor developments on the subject. These guidelines represent the best information currently available.

A physician or occupational health nurse (OHN) with training in the prevention and treatment of CTDs should supervise the program. Each work shift should have access to health care providers in order to facilitate treatment, surveillance activities, and recording of information. Where such personnel are not employed full-time, the part-time employment of appropriately trained health care providers is recommended.

In an effective ergonomics program, health care providers should be part of the ergonomics team, interacting and exchanging information routinely to prevent and properly treat CTDs. The major components of a medical management program for the prevention and treatment of CTDs are trained first-level health care providers, health surveillance, employee training and education, early reporting of symptoms, appropriate medical care, accurate recordkeeping, and quantitative evaluation of CTD trends throughout the plant.

For a definition of disorders associated with repeated trauma, also known as cumulative trauma disorders, see the Glossary.

2. Trained and Available Health Care Providers

Appropriately trained health care providers should be available at all times, and on an ongoing basis as part of the ergonomic program.

In an effective medical management program, first-level health care providers should be knowledgeable in the prevention, early recognition, evaluation, treatment and rehabilitation of CTDs, and in the principles of ergonomics, physical assessment of employees, and OSHA recordkeeping requirements.

3. Periodic Workplace Walkthrough

In an effective program, health care providers should conduct periodic, systematic workplace walkthroughs to remain knowledgeable about operations and work practices, to identify potential light duty jobs, and to maintain close contact with employees. Health care providers also should be involved in identifying risk factors for CTDs in the workplace as part of the ergonomic team.

These walkthrough surveys should be conducted every month or whenever a particular job task changes. A record should be kept documenting the date of the walkthrough, area(s) visited, risk factors recognized, and action initiated to correct identified problems. Followup should be initiated and documented to ensure corrective action is taken when indicated.

4. Symptoms Survey

Those responsible for the medical management program should develop a standardized measure of the extent of symptoms of work-related disorders for each area of the plant, to determine which jobs are exhibiting problems and to measure progress of the ergonomic program. (See Putz-Anderson, pp. 42-44, Selected Bibliography.)

a. Institute a Survey. A survey of employees should be conducted to measure employee awareness of work-related disorders and to report the location, frequency, and duration of discomfort. Body diagrams should be used to facilitate the gathering of this information.

Surveys normally will not include employees' personal identifiers; this is to encourage employee participation in the survey. Survey information should include information such as that discussed in Exhibit 1 (Symptoms Survey Checklist).

The survey is one method for identifying areas or jobs where potential CTD problems exist. The major strength of the survey approach is in collecting data on the number of workers that may be experiencing some form of CTD. Reported pain symptoms by several workers on a specific job would indicate the need for further investigation of that job.

b. Conduct the Survey Annually. Conducting the survey annually should help detect any major change in the prevalence, incidence, and/or location of reported symptoms.

5. Compile a List of Light-Duty Jobs

The ergonomist or other qualified person should analyze the physical procedures used in the performance of each job, including lifting requirements, postures, hand grips, and frequency of repetitive motion. (See Section III. A. and Putz-Anderson, pp. 47-73, Selected Bibliography.) Positions with ergonomic stress should be so labeled.

The ergonomist and health care providers should develop a list of jobs with the lowest ergonomic risk. For such jobs, the ergonomic risk should be described. This information will assist health care providers in recommending assignments to light or restricted duty jobs. The light duty job should therefore not increase ergonomic stress on the same muscle-tendon groups.

Health care providers should likewise develop a list of known high-risk jobs.

Supervisors should periodically review and update the lists.

6. Health Surveillance

a. Baseline. The purpose of baseline health surveillance is to establish a base against which changes in health status can be evaluated, not to preclude people from performing work. Prior to assignment, all new and transferred workers who are to be assigned to positions involving exposure of a particular body part to ergonomic stress should receive baseline health surveillance.
These positions should be identified through the worksite analysis program discussed in Sections II. A. and III. A. and from the list of known high-risk jobs compiled by the health care provider. The majority of employees in the meatpacking industry can be expected to be in high-risk jobs.

The baseline health surveillance should include a medical and occupational history, and physical examination of the musculoskeletal and nervous systems as they relate to CTDs. The examination should include inspection, palpation, range of motion (active, passive and resisted), and other pertinent maneuvers of the upper extremities and back. Examples of the pertinent maneuvers for the hands and wrists include Tinel’s test, Phalen’s test, and Finkelstein’s test. (See Exhibits 2 of this Section.) Laboratory tests, X-rays, and other diagnostic procedures are not a routine part of the baseline assessment.

b. Conditioning Period Followup. New and transferred employees should be given the opportunity during a 4-to-6-week break-in period to condition their muscle-tendon groups prior to working at full capacity. (See Section II. B. 2. of the guidelines on “Work Practice Controls.”) Health care providers should perform a followup assessment of these workers after the break-in period (or after one month, if the break-in period is longer than a month) to determine if conditioning of the muscle-tendon groups has been successful; whether any reported soreness or stiffness is transient and consistent with normal adaptation to the job or whether it indicates the onset of CTD; and if problems are identified, what appropriate action and further followup are required.

c. Periodic Health Surveillance. Periodic health surveillance—every 2 to 3 years—should be conducted on all workers who are assigned to positions involving exposure of a particular body part to ergonomic stress. The content of this assessment should be similar to that outlined for the baseline. The worker’s medical and occupational history should be updated.

d. Documentation. Data gathered on workers as a result of health surveillance should be documented and filed in individual employee medical records.

7. Employee Training and Education

Health care providers should participate in the training and education of all employees, including supervisors and other plant management personnel, on the different types of CTDs and means of prevention, causes, early symptoms and treatment of CTDs. This information should be reinforced during workplace walkthroughs and the individual health surveillance appointments. All new employees should be given such education during orientation. This demonstration of concern and the distribution of information should facilitate the early recognition of CTDs prior to the development of more severe and disabling conditions and increase the likelihood of compliance with prevention and treatment.

8. Encourage Early Report of Symptoms

Employees should be encouraged by health care providers and supervisors to report early signs and symptoms of CTDs to the in-plant health facility. This allows for timely and appropriate evaluation and treatment without fear of discrimination or reprisal by employers. It is important to avoid any potential disincentives for employee reporting, such as limits on the number of times an employee may visit the health unit.

9. Protocols for Health Care Providers

Health care providers should use written protocols for health surveillance and the evaluation, treatment, and followup of workers with signs or symptoms of CTDs. The protocols should be prepared by a qualified health care provider. These protocols should be available in the plant health facility. Additionally, the protocols should be reviewed and updated annually and/or as state-of-the-art evaluation and treatment of these conditions changes. An example algorithm for the evaluation and treatment of upper extremity CTDs is included as Exhibit 3 of this Section. The date of review and signature of the reviewer should appear on each protocol.

10. Evaluation, Treatment, and Followup of CTD

If CTDs are recognized and treated appropriately early in their development, a more serious condition likely can be prevented; therefore, a good medical management program that seeks to identify and treat these disorders early is important. The following systematic approach, in general outline, is recommended in evaluating and following workers who report to the health unit.

a. Screening Assessment. Upon the employee’s presentation of symptoms, the health care provider’s screening assessment should include obtaining a history from the worker to identify the location, duration and onset of pain/discomfort, swelling, tingling and/or numbness, and associated aggravating factors. A brief non-invasive screening examination for the evaluation of CTDs consists of inspection, palpation, range of motion testing, and various applicable maneuvers. (See Barbara Silverstein, Evaluation of Upper Extremity and Low Back, Selected Bibliography.)

(1) Based on the severity of symptoms and physical signs, the OHN or other health care provider should decide whether to initiate conservative treatment and/or to refer promptly to a physician for further evaluation. For example, an employee experiencing pain with a positive physical sign, such as positive Tinel’s, Phalen’s, or Finkelstein’s tests, should be referred for physician evaluation. (See Exhibits 2 and 3 of this Section.)
(2) If mild symptoms and no physical signs are present, conservative treatment is recommended. Examples include the following:

- Applying heat or cold. Ice is used to treat overuse strains and muscle/tendon disorders for relief of pain and swelling, thus allowing more mobility. Ice decreases the inflammation associated with CTDs even if no overt signs of inflammation (redness, warmth, or swelling) are present. The use of ice may be inappropriate for Raynaud’s disease (vibration syndrome), rheumatoid arthritis, and diabetic conditions. Heat treatments should be used only for muscle strains where no physical signs of inflammation are present. (See Putz-Anderson, p. 125, Selected Bibliography.)

- Nonsteroidal anti-inflammatory agents. These agents may be helpful in reducing inflammation and pain. Examples of these types of agents include aspirin and ibuprofen.

- Special exercise. If active exercises are utilized for employees with CTDs, they should be administered under the supervision of the OHN or physical therapist. If these active exercises are performed improperly, they may aggravate the existing condition. (See Putz-Anderson, p. 126, Selected Bibliography.)

- Splints. A splint may be used to immobilize movement of the muscles, tendons, and nerves. Splints should not be used during working activities unless it has been determined by the OHN and ergonomist that no wrist deviation or bending is performed on the job. Splinting can result in a weakening of the muscle, loss of normal range of motion due to inactivity, or even greater stress on the area if activities are carried out while wearing the splint.

b. Followup Assessment After Two Days. (1) If the condition has resolved, reinforce good work practices and encourage the employee to return to the health facility if there are problems.

(2) If the condition has improved but is not resolved, continue the above treatment for approximately 2 more days and reevaluate.

(3) If the condition is unchanged or worse, check compliance with prescribed treatment and perform a screening examination. (See also section above, “Screening Assessment,” for screening examination.)

- If the screening examination is positive, or if the condition is worse, refer the worker to the company physician, and seek reassignment of the employee to a light or restricted duty position.

- If the screening examination is negative for physical signs, but the condition is unchanged, continue conservative treatment.

(4) A job reassignment must be chosen with knowledge of whether the new task will require the use of the injured tendons, or place pressure on the injured nerves. Inappropriate job reassignment can continue to injure the inflamed tendon or nerve, which can result in permanent symptoms or disability. The appropriate light duty job can be selected from the list maintained by the health care provider.

Restricted or light duty jobs are one of the most helpful treatments for CTDs. These jobs, if properly selected, allow the worker to perform while continuing to ensure recovery. Some CTDs require weeks (or months, in rare cases) of reduced activity to allow for complete recovery.

c. Followup Assessment After Six Days. (1) After about 6 days, if the condition has now resolved, reinforce good work practices and encourage the employee to return to the health facility with problems.

(2) If the condition has improved but is not resolved, continue the above treatment for approximately 2 more days and reevaluate.

(3) If the condition is unchanged or worse, check compliance with prescribed treatment and perform a screening examination. If the screening examination is positive, refer the worker to the company physician.

d. Followup After Eight Days. (1) If, after about 8 days, the condition has now resolved, reinforce good work practices and encourage the employee to return to the health facility with problems.

(2) If the condition has not resolved within approximately 8 days, refer to the company physician automatically.

e. Other Considerations. (1) If an employee misses a scheduled reevaluation, the health care provider should contact the employee to assess the condition within approximately 5 days of the last presentation.

(2) The referring physicians or health care providers should be furnished with a written description of the ergonomic characteristics of the job of the worker who is being referred.

(3) Surgery. Recommendations for surgery should be referred for a second opinion.

If surgery is performed, an appropriate amount of time off work is essential to allow healing to occur and prevent recurrence of symptoms. The number of days off work will depend on each worker’s individual response and should agree with the recommendations of the treating physician; however, this typically involves from 6 to 12 weeks recovery after carpal tunnel surgery.

(4) Return to Work. A physical evaluation of the worker after time away from work, to assess work capabilities, should be performed to ensure appropriate job placement.

When an employee returns to work after time off after an operation, or to rest an inflamed tendon, liga-
In order to be recordable, the following criteria must be met:

(1) **The illnesses must be work related.** This means that exposure at work either caused or contributed to the onset of symptoms or aggravated existing symptoms to the point that they meet OSHA recordability criteria. Simply stated, unless the illness was caused solely by a non-work-related event or exposure off-premises, the case is presumed to be work related. Examples of work tasks or working conditions that are likely to elicit a work-related CTD are as follows:

- Repetitive and/or prolonged physical activities.
- Forceful exertions, usually with the hands (including tools requiring pinching or gripping).
- Awkward postures of the upper body, including reaching above the shoulders or behind the back, and angulation of the wrists to perform tasks.
- Localized contact areas between the work or work station and the worker’s body; i.e., contact with surfaces or edges.
- Excessive vibration from power tools.
- Cold temperatures.

(2) **A CTD must exist.** There must be either physical findings, OR subjective symptoms and resulting action. Namely, there must be either:

- At least one physical finding (e.g., positive Tinel’s, Phalen’s, or Finkelstein’s test; or swelling, redness, or deformity; or loss of motion); OR
- At least one subjective symptom (e.g., pain, numbness, tingling, aching, stiffness, or burning), and at least one of the following:

  (i) medical treatment (including self-administered treatment when made available to employees by their employer), (ii) lost workdays (includes restricted work activity); or (iii) transfer/rotation to another job.

(3) **If the above criteria are met, then a CTD illness exists that must be recorded on the OSHA-200 form.**

**EXAMPLE.** A production line employee reports to the health unit with complaints of pain and numbness in the hand and wrist. The employee is given aspirin and, after a followup visit with no change in symptoms, is reassigned to a restricted duty job. Even though there are no positive physical signs, the case is recordable because work activity was restricted.

b. **Occupational Injuries.** Injuries are caused by instantaneous events in the work environment. To keep recordkeeping determinations as simple and equitable as possible, back cases are classified as injuries even though some back conditions may be triggered by an instantaneous event and others develop as a result of repeated trauma. (See BLS Recordkeeping Guidelines, Selected Bibliography.)
Any occupational injury involving medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job is to be recorded on the OSHA-200 form. Refer to the BLS guidelines for a definition of "medical treatment."

c. Other Considerations. (1) A case is considered to be complete once there is complete resolution of the signs and symptoms. After resolution of the problem, if signs or symptoms recur, a new case is established and must be recorded on the OSHA-200 form as such. Furthermore, failure of the worker to return for care after 30 days indicates symptom resolution. Any visit to a health care provider for similar complaints after the 30-day interval implies reinjury or reexposure to a workplace hazard and would represent a new case.

(2) It is essential that required data, including job identification, be consistently, fully, and accurately recorded on the OSHA-200 form. "Job identification" will include the appropriate job title for "Occupation" and the appropriate organizational unit for "Department" on the OSHA-200.

(3) OSHA recognizes that when an effective ergonomics program is implemented and occupational illnesses and injuries are recorded properly on the OSHA-200 form, the plant's total annual number of CTDs may increase. When engineering and administrative controls are put into place, however, these numbers should gradually decrease.

(4) Health care providers and others should contact the BLS Regional Office or participating State agency serving their area with questions regarding OSHA recordkeeping. Refer to the BLS guidelines (or the list at the end of these guidelines) for addresses and telephone numbers of Regional Offices.

12. Monitor Trends

a. Health care providers should periodically (e.g., quarterly) review health care facility sign-in logs, OSHA-200 forms, and individual employee medical records to monitor trends for CTDs in the plant. This ongoing analysis should be made in addition to the "symptoms survey" (described previously in this Section) to monitor trends continuously and to substantiate the information obtained in the annual symptoms survey. The analysis should be done by department, job title, work area, etc. (See also Section III. A., "Worksite Analysis Program.")

b. The information gathered from the annual symptoms survey will help to identify areas or jobs where potential CTD problems exist. This information may be shared with anyone in the plant, since employees' personal identifiers are not solicited. The analysis of medical records (e.g., sign-in logs and individual employee medical records) may reveal areas or jobs of concern, but it may also identify individual workers who require further followup. The information gathered while analyzing medical records will be of a confidential nature; thus care must be exercised to protect the individual employee's privacy.

c. The information gained from the CTD trend analysis and symptoms survey will help determine the effectiveness of the various programs initiated to decrease CTDs in the plant.
Exhibit 1
Symptoms Survey Checklist

Symptoms Survey: Ergonomics Program

DATE __/__/___

[Diagram of human figure with shaded areas for symptoms]

Have you had any pain or discomfort during the last year?
1) Yes ___ 2) No ___ (If NO, stop here)

If YES, carefully shade in the area of the drawing which bothers you the MOST.

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Symptoms Survey Checklist Continued

(Check Area: Neck__ Shoulder__ Elbow/Forearm__ Hand/Wrist__ Fingers__
Upper Back__ Low Back__ Thigh/Knee__ Low Leg__ Ankle/Foot__)

1. Please put a check by the word(s) that best describe your problem
   ___ 1) Aching        ___ 5) Numbness(asleep)  ___ 9) Tingling
   ___ 2) Burning       ___ 6) Pain              ___ 10) Weakness
   ___ 3) Cramping       ___ 7) Swelling          ___ 11) Other
   ___ 4) Loss of Color  ___ 8) Stiffness

2. When did you first notice the problem? ___(month)___(year)

3. How long does each episode last? (Mark an X along the line)
   ___ 1 hour ___ 1 day ___ 1 week ___ 1 month ___ 6 months
   ____________ ____________ ____________

4. How many separate episodes have you had in the last year? ___

5. What do you think caused the problem
   ____________________________________________

6. Have you had this problem in the last 7 days? 1) Yes 2) No

7. How would you rate this problem (mark an X on the line)

   NOW
   None Unbearable

   When it was the WORST
   None Unbearable

8. Have you had medical treatment for this problem? 1) Yes 2) No
   8a. If NO, why not ____________________________________________
   8b. If YES, where did you receive treatment?
       1. Company Medical__ Times in past year__
       2. Personal doctor__ Times in past year__
       3. Other________________ Times in past year__
   8c. If YES, did the treatment help? 1) Yes 2) No

9. How much time have you lost in the last year because of this problem? __________ days

10. How many days in the last year were you on restricted or light duty because of this problem? __________ days

11. Please comment on what you think would improve your symptoms
Exhibit 2
Screening Tests

Positive Tinel's sign: Gentle tapping over the median nerve at the wrist resulting in pain, tingling, or numbness in the median nerve distribution.

Positive Finkelstein's test: Ulnar deviation of the hand with the thumb flexed against the palm and the finger flexed over the thumb. Severe pain results at the radial styloid due to stretching of the abductor pollicus longus and extensor pollicis brevis.

Positive Phalen's test: Unforced, complete flexion of the wrist for 60 seconds resulting in pain, numbness, or tingling in the median nerve distribution.

Exhibit 3
Upper Extremity (UE) Cumulative Trauma Disorders (CTDs) Algorithm

Flowchart not transcribed in this text format.
SELECTED BIBLIOGRAPHY FOR
ERGONOMICS PROGRAM MANAGEMENT
IN THE MEATPACKING INDUSTRY

Primary Sources cited in the Guidelines:


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Additional Sources


**GLOSSARY**

A wide variety of terms are currently used by employers, occupational safety and health professionals, and others in describing ergonomic programs. The following definitions are provided to clarify the terms used by OSHA in the ergonomic program management guidelines:

"**Cumulative trauma disorders (CTDs)**" is the term used in these guidelines for health disorders arising from repeated biomechanical stress due to ergonomic hazards. Other terms that have been used for such disorders include “repetitive motion injury,” “occupational overuse syndrome,” and “repetitive strain injury.”

CTDs are a class of musculoskeletal disorders involving damage to the tendons, tendon sheaths, synovial lubrication of the tendon sheaths, and the related bones, muscles, and nerves of the hands, wrists, elbows, shoulders, neck and back. The more frequently occurring occupationally induced disorders in this class include carpal tunnel syndrome, epicondylitis (tennis elbow), tendinitis, tenosynovitis, synovitis, stenosing tenosynovitis of the finger, DeQuervain’s Disease, and low back pain.

"**Ergonomic hazards**" refer to workplace conditions that pose a biomechanical stress to the worker. Such hazardous workplace conditions include, but are not limited to, faulty work station layout, improper work methods, improper tools, excessive tool vibration, and job design problems that include aspects of work flow, line speed, posture and force required, work/rest regimens, and repetition rate. They are also referred to as “stressors.”

"**Ergonomic risk factors**" are conditions of a job, process, or operation that contribute to the risk of developing CTDs. Examples include repetitiveness of activity, force required, and awkwardness of posture; for further discussion, see Section III. A. Risk factors are regarded as synergistic elements of ergonomic hazards which must be considered in light of their combined effect in inducing
CTDs. Jobs, operations, or work stations that have multiple risk factors will have a higher probability of causing CTDs, depending on the relative degree of severity of each factor.

"Ergonomics team" refers to those responsible for identifying and correcting ergonomic hazards in the workplace, including ergonomic professionals or other qualified persons, health care providers, engineers and other support personnel, plant safety and health personnel, managers, supervisors, and employees.

"Ergonomist" or "ergonomics professional" means a person who possesses a recognized degree or professional credentials in ergonomics or a closely allied field (such as human factors engineering) and who has demonstrated, through knowledge and experience, the ability to identify and recommend effective means of correction for ergonomic hazards in the workplace.

"Health care provider" is a physician who specializes in occupational medicine, or a registered nurse specializing in occupational health, or other health personnel (such as emergency medical technicians) working under the supervision of a physician or registered nurse. Health care providers will have the training outlined in Appendix B, "Medical Management Program."

"Qualified person" means one who has thorough training and experience sufficient to identify ergonomic hazards in the workplace and recommend an effective means of correction. An example would be a plant engineer fully trained in ergonomics.

A "systems approach" to safety and health management means a comprehensive program by the employer which addresses workplace processes, operations, and conditions as interdependent systems in order to identify and to eliminate or reduce all types of hazards to employees. Thus, complex ergonomic problems may require a combination of solutions.
Ergonomics Program Management Guidelines for Meatpacking Plants—
Questions and Answers

GENERAL/SCOPE

1. Q: Do the guidelines apply to just red meat plants? What about sausage processors, or fish and poultry?

A: The guidelines are being sent to every establishment in Standard Industrial Classification (SIC) code 2011, “Meat Packing Plants”—large and small—which covers red meat processing establishments that include slaughtering. They are specifically intended to cover facilities in that SIC code, because OSHA’s special emphasis program (SEP) will be confined to SIC 2011.

However, OSHA believes that all of the general guidance, and much of the specific guidance, can and should be applied to establishments in other industries, especially fish and poultry processing. OSHA encourages employers in other industries to use the guidelines in developing and implementing their own ergonomics programs.

2. Q: I'm a small employer in the meatpacking industry. How do this program and the guidelines affect me?

A: As noted above, the guidelines are being sent to every meatpacking facility, large and small. So far, the ergonomic problems that OSHA and other experts have identified in this industry have been concentrated in the larger plants. This may be due to their production operations and the amounts of repetitive motion expected of workers in these plants. Accordingly, the enforcement part of this program will be directed, at first, to larger meatpacking employers.

However, small employers in the industry should also take a careful look at their workplaces to determine if they have similar problems; and if so, they should take appropriate actions to correct them. The guidelines are provided to help employers do this. The OSHA consultation program can also be of assistance (see questions 30 and 33). OSHA hopes to work with employers of all sizes over the course of this program to find out what specific problems exist, and what the best ways of dealing with them are.

3. Q: Why don't the guidelines provide examples of how small meatpackers can adapt the program elements to their own needs and resources? Will OSHA provide more guidance later?

A: The guidelines were developed primarily with a view to the larger meatpacking employers where the greatest ergonomic problems are known to exist—and where most of the employees in the industry work. OSHA believes, however, that the guidelines can and should be adapted to the circumstances of meatpacking employers of all sizes. Sample compliance plans were not included because of the wide variety of plant sizes, products, operations, and conditions in the meatpacking industry. It would not be possible—and perhaps misleading—for OSHA to make such specific recommendations at this stage of the program, beyond that already given in the guidelines.

An important part of this program will be the learning process—for OSHA, employers, and employees—about how to identify and solve ergonomic problems.

OSHA will work cooperatively with small employers to try out techniques for preventing and correcting ergonomic problems, so that successful methods can be passed on to other employers. OSHA will be distributing a new publication called “ErgoFacts” to highlight successful means of solving ergonomic problems. In addition, if experience warrants, OSHA may publish a revised version of the guidelines at a later point in the program.

4. Q: The guidelines are all about ergonomic hazards in meatpacking. Are the other safety and health hazards in meatpacking (e.g., cuts, slips & falls) under control? Is OSHA still going to be enforcing on those?

A: The other hazards still remain, which is a major reason why SIC 2011 is consistently listed as a high-hazard industry. OSHA will continue to enforce compliance with standards which relate to those hazards, and employers must continue with safety and health programs to control them. OSHA will also continue to accord the same priority for conducting safety and health inspections in both large and small meatpacking plants as before.

5. Q: What about workers with off-the-job activities that contribute to CTDs?

A: The guidelines are intended to be applied to workplace conditions over which the employer exercises control. Both OSHA and NIOSH acknowledge that, at present, there is no scientifically validated test or other means to determine which individuals are at risk of developing CTDs.

CTDs arise from repeated biomechanical stress to a particular part of the body. The length of time employees spend on the job indicates that risk from ergonomic stressors in the workplace is proportionately greater, and therefore must be controlled to the extent feasible.

In terms of recordability for OSHA recordkeeping regulations, BLS guidelines state that, unless a CTD illness was caused solely by a non-work-related event or exposure off-premises, it is presumed to be work-related.
ENFORCEMENT

6. Q: Is this a new regulation? Will I be cited for not following the guidelines?

A: This is not a new standard or regulation. We expect employers to implement an effective ergonomics program which contains the major program elements described in the guidelines. OSHA’s field inspection staff have been instructed that failure to implement the guidelines is not in itself a violation of the General Duty Clause of the OSH Act. The guidelines provide information on the steps employers should take (1) to determine if they have ergonomic-related problems in their workplaces, (2) to identify the nature and location of those problems, and (3) to implement measures to reduce to eliminate them.

7. Q: How is OSHA going to enforce ergonomics?

A: As in the past, employers will be cited, where appropriate, for violations of Section 5(a)(1) of the OSH Act—the General Duty Clause—for employee exposure to ergonomic hazards. Employers who develop effective programs and implement them fully in their workplaces will have taken appropriate steps to substantially reduce or eliminate ergonomic hazards that could be subject to citation. The guidelines are intended to help meatpacking employers understand what OSHA considers when it inspects a workplace.

8. Q: When can I expect an OSHA ergonomics inspection? Will there be some “lead time” to allow employers to begin implementing the guidelines before inspections start?

A: The initial enforcement emphasis of the SEP will be on a limited number of comprehensive inspections—covering safety, health, and ergonomics—in larger meatpacking establishments. These will begin in the latter part of 1990. The inspections in this program will be carefully planned and targeted, but otherwise will be similar to the major ergonomics inspections OSHA has conducted in several meatpacking plants over the past few years in response to specific complaints. The comprehensive inspections will cover all aspects of workplace safety and health, including ergonomics, and recordkeeping.

For the smaller establishments, OSHA will probably continue to inspect workplaces in SIC 2011 with about the same frequency as it currently is doing, in response to complaints and fatalities and as part of the general schedule programming of high hazard workplaces. There are usually a few hundred of these each year, because meatpacking is a hazardous industry.

When OSHA looks at ergonomics in smaller establishments, it will simply be to determine if the employer has a problem, and if so, if steps (such as those described in the guidelines) are being taken to deal with it. Citations will not be issued for failure to follow the specific guidelines. If an employer has a serious problem that he or she is not addressing, however, a citation for violation of Section 5(a)(1) may be issued.

COMPLIANCE

9. Q: What does it mean to adapt the program elements to the size and circumstances of the workplace?

A: The guidelines are not intended to be “one size fits all.” OSHA regards each of the program elements—worksite analysis, hazard prevention and control, training and education, and medical management—as essential to a comprehensive program. Every meatpacker’s ergonomics program should include all of them. But the manner and extent to which they are implemented will vary according to the size of the plant and its workforce, its operations, its product, its current safety and health program, and the extent of any ergonomic problems. OSHA does not expect small employers to have exactly the same problems—or solutions—as larger employers. The aim of the guidelines is for all meatpacking employers to set about identifying and correcting ergonomic hazards in the same systematic way.

The first step for all employers—large and small—should be to assess the extent of any problems they may have related to ergonomic hazards. They should use a systematic method of worksite analysis, such as that recommended in the guidelines, to do this. They should then take whatever measures are appropriate—including those set forth in the guidelines—to address the problems found, if any. If, after conducting this systematic analysis, the employer determines that there is no problem, then further implementation of the program would be limited to monitoring workplace conditions for changes and responding accordingly.

As this effort continues, OSHA hopes to work with employers of all sizes in sharing our acquired experience in implementing effective ergonomic programs and finding solutions to common problems.

10. Q: What are the “program elements” I am supposed to be adapting? The guidelines have a number of sections and subsections—do I have to follow all of them? Are some more important than the rest?

A: As described at the beginning of Section II, there are four major program elements that OSHA regards as essential to a good ergonomics program: (1) worksite analysis, (2) hazard prevention and control, (3) medical management, and (4) training and education.

Although they are all important and should be included in the employer’s program, worksite analysis should get first attention. That is, the employer should first analyze the workplace to find out what ergonomic problems now exist, and then begin determining how to correct them.
11. **Q:** The "systematic method" the guidelines describe for worksite analysis seems very technical and complicated. Is all of this necessary for a small plant?

**A:** The analysis should be "systematic"—step-by-step—in order to prevent it from becoming more complicated or extensive than it needs to be. The first step is looking at the injury and illness records every employer should keep to determine if employees are experiencing cumulative trauma disorders—or any related problems that may have been entered on the OSHA-200 log—and to see which jobs are presenting the problems. In a small establishment it may be relatively simple to find out where problems, if any, exist.

For smaller employers, OSHA does not believe a complicated effort should be necessary. Look at your injury/illness records, review any workers’ compensation claims, look at the work as it is being done and ask questions of employees to see if there are ergonomic problems. Identify the jobs that appear to have the problems, and determine if those jobs involve ergonomic risk factors. You should then take whatever measures are appropriate—including those set forth in the guidelines—to address the problems found, if any. If no problems exist, you should keep on with your current efforts to maintain a safe and healthful workplace.

12. **Q:** Do I have to get a consultant to help perform surveys and analyze jobs? Is videotaping required?

**A:** Once the employer has determined which jobs are showing problems, those jobs then should receive a more rigorous analysis to pinpoint the "risk factors" that are causing the problems, such as posture, repetition, and force. This is where a consultant, or advice from an OSHA office, can be most helpful. However, a great deal can be accomplished by using common sense and discussing the job with the employees who do it.

Videotaping is one method that can be very useful in analyzing jobs; many consultants use it because it helps in taking a close look at work operations off-site. It is not required, however, and is recommended only for those jobs that have already been identified as having problems. Its value lies in being able to look at work tasks in slow motion and to break down their elements. When videotaping is done it should only require a few minutes for each job being analyzed—enough to capture the full cycle of the work task.

13. **Q:** Do I need a special written program just for ergonomics?

**A:** OSHA is recommending that every employer in SIC 2011 implement a comprehensive program to address ergonomic hazards in the workplace. Although this should be done as part of a sound overall safety and health program, OSHA believes that it is essential that there should be either a separate written program for ergonomics, or a separate section of the employer’s overall written safety and health program. OSHA has found that a written program is an invaluable management tool to ensure consistency in the program’s implementation, to establish definite goals and timetables, and to assign responsibilities.

14. **Q:** Do OSHA guidelines require me to make expensive workstation design changes and go out and buy new equipment?

**A:** Any changes in workstations or equipment should be determined by the employer’s ergonomics team to be appropriate for the specific conditions in the plant. Although changes in workstation design and equipment used are the preferred means of hazard prevention and control, as discussed in the guidelines, they are not the only means. OSHA’s guidelines recommend that employers first identify the ergonomic problems in their workplaces, analyze those problems to determine appropriate means of correcting them, and implement the corrective measures. Also important among possible control measures are improvements in the design of work operations or jobs, and in the work practices employees use.

It has been OSHA’s experience that many changes to equipment and workstation design that are effective in correcting ergonomic hazards are also not costly and relatively simple, involving comparatively little in modifications to existing conditions. Moreover, the most effective solution is not necessarily the most expensive. Purchases should therefore be made carefully, after thorough analysis of the circumstances.

15. **Q:** Does this require slowing down the line?

**A:** This is one of a wide variety of control measures that can be implemented to address specific, identified problems. Modifying line speed is one means of work method design that may be appropriate after a systematic worksite analysis has been conducted to determine the nature of existing problems. The guidelines (Sections II. B. and III. B.) provide a number of examples of engineering, work practice, and administrative controls.

16. **Q:** What is a "break-in period"?

**A:** Most jobs in the meat industry will require conditioning or break-in periods, which may last several weeks for new and transferred employees to condition their muscle-tendon groups prior to working at full capacity. Use of a break-in period is recommended by the American Meat Institute in its "Ergonomics and Safety Guidelines" (1989). It is that time before an employee is expected to "pull full count"—for example, when the employee gradually works up from performing the assigned task on every 10th carcass coming down the line to performing it on every second or third. The length of the break-in period varies with the job; a typical time is about a month.

17. **Q:** Am I supposed to have a special training line just for workers in the break-in period? Do I have to
slow down the line for this period every time a new employee is hired?

A: A special training line or area is highly recommended, based on OSHA's experience in this industry. It is especially needed where production lines move at high speeds, or in any meatpacking workplace where there is a considerably higher rate of injury to new workers than to experienced ones. A special training line is not necessary, however, to accommodate a break-in period when employees are gradually working up to full capacity. While break-in procedures may involve adjusting numbers of employees on the line, they do not necessarily entail slowing the line.

18. Q: What does OSHA mean by “providing sufficient numbers of standby/relief personnel” as an administrative control?

A: One of the administrative control methods suggested by the guidelines is providing sufficient numbers of standby or relief personnel to compensate for foreseeable upset conditions on the line, such as a decrease in the number of workers normally on the line due to absences or other reasons. This would help to ensure that remaining workers are not overburdened by having to make up for the upset by increasing their output, thereby increasing ergonomic stress.

19. Q: When the guidelines refer to a specific knife sharpening program, does this mean we must switch from individual sharpening to centralized sharpening?

A: The guidelines recommend having a specific knife sharpening program—clearly established procedures to ensure that workers have adequate opportunity to sharpen their knives or obtain a sharpened knife—so that sharp knives are always readily available for workers who need them. Using knives that are not properly sharpened causes the worker to use greater force, thus increasing ergonomic stress. Employers may use either individual or centralized sharpening, as appropriate for conditions in their plant.

20. Q: We just buy tools, not design them. How are we supposed to control tool design?

A: OSHA realizes that meatpacking employers, in most cases, do not design the tools they use. However, employers should select and purchase well-designed tools to minimize ergonomic stressors and replace poorly designed ones. They can also exercise their influence as the consumers of such tools to ask for improved designs from the tool manufacturers.

21. Q: What does job rotation mean? A worker does one job in the morning and another in the afternoon? Switching jobs every week—or month—or three months?

A: Job rotation can mean that a worker performs two or more different tasks in different parts of the day. (For example, switching between task “A” and task “B” at 2-hour or 4-hour intervals.) The important consideration is to ensure that the different tasks do not present the same ergonomic stressors to the same parts of the body (muscle-tendon groups). There is no single work-rest regimen that OSHA recommends; it must be determined by the nature of the task.

22. Q: The guidelines state that “if job rotation is utilized, the job analyses must be reviewed by a qualified person. . . .” What is a “qualified person”?

A: As discussed in the glossary of the guidelines, a “qualified person” is one who has thorough training and experience sufficient to identify ergonomic hazards in the workplace and recommend an effective means of correction; for example, a plant engineer fully trained in ergonomics—not necessarily an ergonomist. For job rotation, the important consideration is that the different jobs between which employees rotate should use different muscle-tendon groups, to minimize ergonomic stress. In analyzing jobs for job rotation, the qualified person must have sufficient expertise to identify the ergonomic stressors each job presents and which muscles and tendons are used.

23. Q: Based on my experience and records, I don’t believe my plant has a problem. Do I have to implement a program?

A: The first step in implementing the program is a systematic worksite analysis, including a thorough review of injury/illness data and workstation screening surveys. After performing these, the employer will be able to determine the extent of the ergonomic hazards and identified cumulative trauma disorders (CTDs) in the workplace. These findings will indicate any further steps the employer should take. If, after conducting this systematic analysis, the employer determines that there is no problem, then further implementation of the program would be limited to monitoring workplace conditions for changes and responding accordingly.

MEDICAL MANAGEMENT

24. Q: When the guidelines refer to a health care provider being part of the ergonomic team, does this mean I am required to have a full-time medical expert to oversee our medical management program?

A: The guidelines recommend that the medical management program should be designed by and operated under the supervision of an occupational medicine physician (a medical doctor trained and experienced in the prevention and treatment of workplace injuries and illnesses) or an occupational health nurse (a registered nurse trained and experienced in the prevention and treatment of workplace injuries and illnesses). All other health care providers or medical personnel who may be involved in the employer’s medical management program should be answerable to such a medical professional.

OSHA would like every employer to have the best medical program possible. Obviously, however, an
employer's program for providing medical care for employees will vary according to the needs, circumstances, and resources of the plant. Smaller employers which do not employ a physician or nurse—or perhaps do not even have a medical facility on the premises—may, however, have an established relationship with a physician or health care facility to which injured or ill employees routinely go. They might also engage the services of an occupational health nurse on a part-time or consultative basis to oversee their program. OSHA strongly recommends that these health care providers be made familiar with the types of hazards to be found in the employer's workplace. In addition, the health care providers should be familiar with the recommendations in the guidelines on medical management programs.

25. Q: Is every plant expected to have a full-time occupational health nurse on duty?

A: The guidelines recommend that "each work shift should have access to health care providers" and that "appropriately trained health care providers should be available at all times." While it would be highly desirable to have a full-time occupational health nurse on duty in every plant, OSHA recognizes that this will not be possible for all employers, particularly small employers. The important consideration is for employees to have access to medical care at appropriate times from health care providers—on site or off site—who are familiar with the types of safety and health hazards the employees may encounter in their workplace, including ergonomic hazards.

The employer's health care providers should be familiar with the recommendations in the guidelines on medical management programs. This recommendation applies especially when the employer's ergonomics program requires an extensive or complex medical management effort.

26. Q: How do I find an occupational health nurse?

A: The American Association of Occupational Health Nurses (AAOHN) should be able to recommend qualified nurses, either directly or by referring an employer to its local chapter. The address and telephone number of the National headquarters of AAOHN is:

American Association of Occupational Health Nurses
50 Lenox Pointe
Atlanta, Georgia 30324
Telephone: (404) 262-1162

27. Q: Where do I find an occupational medicine physician?

A: Local branches of the American Medical Association (AMA) should be able to recommend occupational medicine physicians. Information may also be obtained from the American College of Occupational Medicine in Chicago, Illinois [telephone: (708) 228-6850]. It should be remembered that not all physicians have the training and experience in occupational medicine needed for medical management of a good workplace ergonomics program.

28. Q: Do paramedics, emergency medical technicians, or qualified first aid individuals qualify as medical experts in the eyes of OSHA's ergonomics guidelines?

A: Paramedics, emergency medical technicians, and qualified first aid individuals would not be regarded as medical experts. They may, however, be among the health care providers involved in the employer's medical management program. Such health personnel should be working under the supervision of a physician or a registered nurse, should have basic training in the recognition and treatment of CTDs, and should be familiar with the recommendations in the guidelines on medical management programs.

29. Q: The medical management guidelines call for putting workers with CTDs on restricted duty jobs. What if there are no such jobs—or not enough? Can such workers be laid off/terminated?

A: Removing employees who have actual or potential CTDs from exposure to ergonomic hazards is an essential part of an effective medical management program. Such workers should be placed in light or restricted duty jobs, or in some other status which does not add to their ergonomic risk, in order to allow the affected muscle-tendon group to rest. Implementing administrative measures to protect the pay and employment status of workers who need to be removed from hazardous exposure will help to ensure that workers who are experiencing problems report them and seek treatment promptly.

RESOURCES

30. Q: I am a small meat packing employer. Do I have to hire an ergonomist? Is an ergonomist necessary for a small plant?

A: The guidelines state that several aspects of the program—e.g., conducting the worksite analysis, determining appropriate controls—can only be done by a qualified person, ideally an ergonomist. OSHA therefore strongly recommends engaging the services of an ergonomist or other properly qualified person.

OSHA realizes, however, that it may be difficult for smaller employers to retain an ergonomist. Small employers may wish to act jointly or through an industry association to do so.

OSHA is also reminding all such employers of the availability of the free (OSHA-funded) consultation service in each State, which is independent of the enforcement program. OSHA is also taking steps to ensure that these consultation services can provide expertise in ergonomics, and that they will be available to small and medium size employers—up to 500 employees—in the meat industry (although there may be waiting periods). In addition, OSHA Area and Regional Offices can answer specific questions employers may have.
31. Q: What is OSHA's definition of an ergonomist? Where do I find one?

A: By "ergonomist" we generally mean a professional with a doctoral/graduate degree in ergonomics or a closely allied field—e.g., industrial engineering, human factors engineering, physiology—who has had sufficient training and experience to competently assess and recommend solutions for ergonomic problems of worksites and work operations.

OSHA recognizes that the number of fully qualified ergonomists available to employers is limited. OSHA's Regional and Area Offices and NIOSH should be able to provide lists of recognized, qualified ergonomists. Industry associations may also be able to provide such information.

32. Q: What is the ergonomics team—who should be on it?

A: As defined in the glossary of the guidelines, the "ergonomics team" refers to those responsible for identifying and correcting ergonomic hazards in the workplace. OSHA recommends a team approach to assessing a workplace's problems and implementing solutions, on an ongoing basis, involving appropriate personnel from all levels. The makeup of the team will vary from plant to plant, depending on the establishment's operations and circumstances and the actual people who have responsibility for some aspect of the ergonomics program in the particular workplace. Personnel who might typically be included are the ergonomist or other qualified person, plant safety and health personnel, management, line supervisors, health care providers, and affected employees.

33. Q: How do I get a consultant? How much will it cost me?

A: OSHA's Regional and Area Offices can provide the name and address of the OSHA Consultation Service for each State. A list of the addresses and telephone numbers of these services is also included with the guidelines. There may be a waiting period for the State consultation service to respond to an employer's request.

OSHA offices and industry associations should be able to provide the names of private consultants; we have no estimates as to their cost. Smaller employers may also wish to act jointly or through an industry association (such as the American Meat Institute, the American Association of Meat Processors, or the National Association of Meat Purveyors) to engage consultants.

34. Q: Where and how do I get training for this?

A: OSHA provides general instruction in its "Principles of Ergonomics" course at the OSHA Training Institute, which may have openings for private employers and industry groups. The Training Institute will also be offering a special course for the meatpacking emphasis program, beginning in December 1990 and running quarterly thereafter for the next year or two. The first classes will be restricted to OSHA and State compliance officers and State consultants; later sessions may have openings for private employers.

In addition, OSHA Area and Regional Offices can provide speakers and training sessions for employers or employer groups. This may be of particular interest to smaller employers. OSHA offices will also have copies of an "Ergonomics Training Resource List" now being developed by the OSHA Training Institute. A list of OSHA Regional Office addresses and telephone numbers is provided with the guidelines.

Meatpacking employers should also consult with the American Meat Institute (AMI), the National Association of Meat Purveyors, American Association of Meat Processors, Western States Meat Association, and other industry groups for training resources. OSHA is aware that the AMI, in particular, has demonstrated interest in the development of training resources in ergonomics. Moreover, labor groups such as the United Food and Commercial Workers and the AFL-CIO can provide help in training, or work cooperatively with employers in supporting academic training resources. The University of Michigan, for example, conducts special programs in ergonomics; the Universities of Nebraska and Oklahoma also have ergonomics programs.

35. Q: Where do I get the books listed in the bibliography?

A: Copies of some of the books in the bibliography—especially the "primary sources"—may be available for researching in OSHA Regional Office libraries (although most OSHA Regional Offices do not lend books out). Other sources are the National Technical Information Service (NTIS), OSHA's Technical Data Center in Washington, DC, NIOSH, and other technical libraries (such as those at universities).

36. Q: Can I/my organization reproduce the guidelines and distribute them?

A: Yes. In fact, OSHA encourages this. As noted near the beginning of the guidelines booklet, source credit for the U.S. Department of Labor is requested, but not required.
U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND
BUREAU OF LABOR STATISTICS (BLS) REGIONAL OFFICES

Questions regarding safety and health, including ergonomics, may be directed to OSHA Regional Offices. BLS Regional Offices can answer questions about recordkeeping requirements.

Region I (Connecticut,* Massachusetts, Maine, New Hampshire, Rhode Island, Vermont*)

OSHA
133 Portland Street
1st Floor
Boston, Massachusetts 02114
Telephone: (617) 565-7164

BLS
Kennedy Federal Building
Suite 1603
Boston, Massachusetts 02203
Telephone: (617) 565-2327

Region II (New Jersey, New York,* Puerto Rico,* Virgin Islands)

OSHA
201 Varick Street
Room 670
New York, New York 10014
Telephone: (212) 337-2378

BLS
201 Varick Street
Room 808
New York, New York 10014
Telephone: (212) 337-2400

Region III (District of Columbia, Delaware, Maryland,* Pennsylvania, Virginia,* West Virginia)

OSHA
Gateway Building, Suite 2100
3535 Market Street
Philadelphia, Pennsylvania 19104
Telephone: (215) 596-1201

BLS
3535 Market Street
P.O. Box 13309
Philadelphia, Pennsylvania 19101
Telephone: (215) 596-1154

Region IV (Alabama, Florida, Georgia, Kentucky,* Mississippi, North Carolina,* South Carolina,* Tennessee*)

OSHA
1375 Peachtree Suite, N.E.
Suite 587
Atlanta, Georgia 30367
Telephone: (404) 347-3573

BLS
1371 Peachtree Suite, N.E.
Atlanta, Georgia 30367
Telephone: (404) 347-4416

Region V (Illinois, Indiana,* Michigan,* Minnesota,* Ohio, Wisconsin)

OSHA
230 South Dearborn Street
Room 3244
Chicago, Illinois 60604
Telephone: (312) 353-2220

BLS
9th Floor
Federal Office Building
230 South Dearborn Street
Chicago, Illinois 60604
Telephone: (312) 353-1880

Region VI (Arkansas, Louisiana, New Mexico,* Oklahoma, Texas)

OSHA
Federal Building
525 Griffin Street
Room 602
Dallas, Texas 75202
Telephone: (214) 767-4731

BLS
Federal Building
525 Griffin Street
Room 221
Dallas, Texas 75202
Telephone: (214) 767-6970

*These States and Territories operate their own OSHA-approved job safety and health programs. The Connecticut and New York plans cover public employees only.
Region VII (Iowa. Kansas, Missouri, Nebraska)

OSHA
911 Walnut Street
Room 406
Kansas City, Missouri 64106
Telephone: (816) 426-5861

BLS
911 Walnut Street
Kansas City, Missouri 64106
Telephone: (816) 426-2481

Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)

OSHA
Federal Building, Room 1576
1961 Stout Street
Denver, Colorado 80224
Telephone: (303) 844-3061

BLS
911 Walnut Street
Kansas City, Missouri 64106
Telephone: (816) 426-2481

Region IX (Arizona, California, Hawaii, Nevada)

OSHA
71 Stevenson Street
Room 415
San Francisco, California 94105
Telephone: (415) 744-6670

BLS
71 Stevenson Street
P.O. Box 3766
San Francisco, California 94119
Telephone: (415) 744-6600

Region X (Alaska, Idaho, Oregon, Washington)

OSHA
1111 Third Avenue, Suite 715
Seattle, Washington 98101-3212
Telephone: (206) 442-5930

BLS
71 Stevenson Street
P.O. Box 3766
San Francisco, California 94119
Telephone: (415) 744-6600
<table>
<thead>
<tr>
<th>State</th>
<th>Telephone</th>
<th>State</th>
<th>Telephone</th>
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<td>Alabama</td>
<td>(205) 348-3033</td>
<td>Nebraska</td>
<td>(402) 471-4717</td>
</tr>
<tr>
<td>Alaska</td>
<td>(907) 264-2599</td>
<td>Nevada</td>
<td>(702) 789-0546</td>
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<td>Arizona</td>
<td>(602) 255-5795</td>
<td>New Hampshire</td>
<td>(603) 271-3170</td>
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<td>Arkansas</td>
<td>(501) 682-4522</td>
<td>New Jersey</td>
<td>(609) 984-3507</td>
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<td>California</td>
<td>(415) 557-2870</td>
<td>New Mexico</td>
<td>(505) 827-2885</td>
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<tr>
<td>Colorado</td>
<td>(303) 491-6151</td>
<td>New York</td>
<td>(212) 488-7746</td>
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<tr>
<td>Connecticut</td>
<td>(203) 566-4550</td>
<td>North Carolina</td>
<td>(919) 733-2360</td>
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<tr>
<td>Delaware</td>
<td>(302) 571-3908</td>
<td>North Dakota</td>
<td>(701) 224-2348</td>
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<tr>
<td>Dist. of Columbia</td>
<td>(202) 576-6339</td>
<td>Ohio</td>
<td>(614) 644-2631</td>
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<td>Florida</td>
<td>(904) 488-3044</td>
<td>Oklahoma</td>
<td>(405) 235-0530</td>
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<td>Georgia</td>
<td>(404) 894-3806</td>
<td>Oregon</td>
<td>(503) 378-2890</td>
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<tr>
<td>Guam</td>
<td>9-011(671) 646-9246</td>
<td>Pennsylvania</td>
<td>(800) 382-1241</td>
</tr>
<tr>
<td>Hawaii</td>
<td>(808) 548-7510</td>
<td>(Toll-free in State)</td>
<td>(412) 357-2561 2396</td>
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<tr>
<td>Idaho</td>
<td>(208) 385-3283</td>
<td>Puerto Rico</td>
<td>(809) 754-2134 2171</td>
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<tr>
<td>Illinois</td>
<td>(312) 917-2339</td>
<td>Rhode Island</td>
<td>(401) 277-2438</td>
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<td>Indiana</td>
<td>(317) 232-2688</td>
<td>South Carolina</td>
<td>(803) 734-9599</td>
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<td>Iowa</td>
<td>(515) 281-5352</td>
<td>South Dakota</td>
<td>(605) 688-4101</td>
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<tr>
<td>Kansas</td>
<td>(913) 296-4386</td>
<td>Tennessee</td>
<td>(615) 741-2793</td>
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<td>Kentucky</td>
<td>(502) 564-6895</td>
<td>Texas</td>
<td>(512) 458-7287</td>
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<td>Louisiana</td>
<td>(504) 925-6005</td>
<td>Utah</td>
<td>(801) 530-6868</td>
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<td>Maine</td>
<td>(207) 289-3331</td>
<td>Vermont</td>
<td>(802) 828-2765</td>
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<td>Maryland</td>
<td>(301) 333-4218</td>
<td>Virginia</td>
<td>(804) 786-5675</td>
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<tr>
<td>Massachusetts</td>
<td>(617) 727-3567</td>
<td>Virgin Islands</td>
<td>(809) 772-1315</td>
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<tr>
<td>Michigan</td>
<td>(517) 353-8250 (H)</td>
<td>Washington</td>
<td>(206) 586-0961</td>
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<tr>
<td></td>
<td>(517) 322-1814 (S)</td>
<td>West Virginia</td>
<td>(304) 348-7890</td>
</tr>
<tr>
<td>Minnesota</td>
<td>(612) 297-2393 (S)</td>
<td>Wisconsin</td>
<td>(608) 266-8579 (H)</td>
</tr>
<tr>
<td>Mississippi</td>
<td>(612) 623-5100 (H)</td>
<td>Wisconsin</td>
<td>(414) 521-5063 (S)</td>
</tr>
<tr>
<td>Missouri</td>
<td>(601) 987-3981</td>
<td>West Virginia</td>
<td>(307) 777-7786</td>
</tr>
<tr>
<td>Montana</td>
<td>(314) 751-3403</td>
<td>Wyoming</td>
<td>(406) 444-6424</td>
</tr>
</tbody>
</table>

H = Health  
S = Safety
Checklist for Identification of Upper Extremity CTD Risk Factors

Plant:  
Job:  
Area:  
Worker:  

1.) Repetitiveness:  
   a.) A single task, motion or posture is performed more than 50% of the time.  
   b.) The production standard exceeds 900 units per shift.

2.) Forcefulness: Are forceful exertions required to:
   a.) lift  
   b.) hold  
   c.) assemble  
   d.) use tool  
   e.) use gloves  
   f.) pinching

3.) Mechanical stresses on the fingers, hands, wrists, elbows, arms:
   a.) tools  
   b.) controls  
   c.) parts  
   d.) machines  
   e.) workbench  
   f.) keyboards  
   g.) desks

4.) Posture: wrist deviation  
    wrist flexion  
    wrist hyperextension  
    elbow flexion  
    extreme supination  
    extreme pronation  
    shoulder: elbows raised more than 30°  
    elbows behind torso  
   a.) reaching for: control, material, tool  
   b.) using: control, material, tool  
   c.) assembling

5.) Physical stresses:
   Vibration:  
   a.) hand-held power tools  
   b.) bench-mounted power tools  
   c.) impact tools  
   d.) vehicle controls
   
   Skin temperatures below 70°F:  
   a.) cold ambient air  
   b.) gripping cold tools or parts  
   c.) cold air exhaust
Checklist for Analysis of Upper Extremity CTD Risk Factors

Plant: Area: 
Job: Worker: 

1.) Physical Stress:

1.1 Can the job be done without contact of fingers or wrist with sharp edges?
1.2 Is the tool operating without vibration?
1.3 Are the worker's hands exposed to temperature > 70°?
1.4 Can the job be done without using gloves?

2.) Force:

2.1 Does the job require less than 10 pounds of force?
2.2 Can the job be done without using finger pinch grip?

3.) Posture:

3.1 Can the job be done without flexion or extension of the wrist?
3.2 Can the tool be used without flexion or extension of the wrist?
3.3 Can the job be done without deviating the wrist side to side (ulnar or radial deviation)?
3.4 Can the tool be used without ulnar or radial deviation of the wrist?
3.5 Can the worker be seated while performing the job?
3.6 Can the job be done without "clothes wringing" motion?

4.) Workstation Hardware:

4.1 Can the orientation of the work surface be adjusted?
4.2 Can the height of the work surface be adjusted?
4.3 Can the location of the tool be adjusted?

5.) Repetitiveness:

5.1 Is the cycle time above 30 seconds?

6.) Tool Design:

6.1 Can the thumb and finger slightly overlap around a closed grip?
6.2 Is the span of the tool's handle between 5 and 8 cm?
6.3 Is the handle of the tool made from material other than metal?
6.4 Is the weight of the tool below ten (10) lbs.?
6.5 Is the tool suspended?
HAND TOOL DESIGN

1. Power grip maximizes strength of hand.
2. Handle diameter - 1.25-2"
3. Span on double handled tools - 2-3.5"
4. Handle length - 4"
5. Handle oriented to keep wrist straight.
6. Textured handles (without finger recesses) reduce force needed.
7. Handle surface hard enough to resist embedding of particles and impervious to chemicals.
8. Handles should insulate from heat and cold.
9. Reduce vibration as much as possible.
10. Suspend or counterbalance tools over 5 pounds.
VIDEO DISPLAY TERMINALS

Most of the worker complaints associated with VDT use have ergonomic solutions. These complaints include eye strain, sore backs, necks, shoulders, hands, and wrists.

These problems can be minimized by good workstation design. Design considerations include chairs which are adjustable for height and back angle, detachable keyboards, vertically and horizontally adjustable terminals, document holders, and careful attention to light sources.

Operators should be given regularly scheduled breaks or assigned other duties to lessen the effects of repetitive motion. A series of short breaks is of greater benefit than fewer longer breaks, e.g., three five-minute breaks rather than one fifteen-minute break.

Legs and Feet

The chair height is correct when the entire sole of the foot can rest on the floor or footrest and the back of the knee is slightly higher than the seat of the chair. This allows the blood to circulate freely in the legs and feet.

Adjustment of Screen Position

Screens which swivel horizontally and tilt or elevate vertically enable the operator to select the optimum viewing angle.

Workstation Surface

The table or workstation should suit the kind of task to be done. It should be large enough for any reference books, files, telephone, text and so forth and also permit different positions of the screen and keyboard. Adjustable surface height is an advantage.
An individual workstation should provide the operator with a comfortable sitting position sufficiently flexible to reach, use and observe the screen, keyboard and document. Some general guidelines to minimize fatigue include:

**Posture Support**

The seat and backrest of the chair should support a comfortable posture permitting occasional variations in the sitting position. Chair height and backrest angle should be easily adjustable. A footrest may be necessary for short individuals.

**Arms**

When the operator's hands are resting on the keyboard, the upper arm and forearm should form a right angle. The hands should be in a reasonably straight line with the forearm. Long or unusually high reaches should be avoided. Armrests would permit periodic support as needed.
ELECTROMAGNETIC FIELDS

Many people are concerned about the possible health effects of exposure to the electromagnetic fields produced by VDT’s and other electrical equipment and appliances. The greatest concern is for pregnant women and their fetuses.

This is a controversial area and there is no definitive answer as to whether a hazard exists or not. There are ongoing studies which should answer the many questions which have been raised.

Exposure to these fields can be reduced by having terminals four to five feet apart and only in horizontal rows. Also, VDT’s are available which are advertised as emitting no electromagnetic fields or lower levels than standard equipment. Employers may wish to establish alternative work for pregnant women who do not wish to operate VDT’s.

Lead aprons do not shield the body from electromagnetic fields.

NOISE AND ELECTRICAL HAZARDS

VDT’s and all electrical equipment should be properly installed and grounded.

It is unlikely that noise levels in the typical office setting would exceed OSHA standards, although a cluster of high speed printers without screens could produce questionable noise levels.

Noise levels should be kept within comfortable limits. Unacceptably noisy sources should be shielded. Distracting sounds can be reduced by using well placed, absorbent material such as acoustic ceiling tile, carpets, curtains, and upholstery.

LIGHTING

Workstations should be arranged to avoid reflections on the screen or surrounding surfaces. Light should not shine in the worker’s eyes when he or she is looking at the screen. Light should be bright enough to allow the worker to see the text and screen but not so bright as to cause glare. Ambient light levels should be lower than in an office without VDT’s.

In work places with windows, natural light in the work area can change considerably from time of day and season to season. Artificial light can create “warm” or “cool” environments which influence the care of reading. Red, orange and yellow are warm and greens and blues are cool. Generally, warm lighting is more pleasant at lower levels while cool lighting is more appropriate at higher levels. Individual “task lighting” at a workstation allows operators to adjust the level to their individual preferences.
GLARE

Glare is harsh, uncomfortable bright light. The reflection of light off a VDT screen or other reflective surface can cause glare for the operator.

To avoid glare, display screens can be placed near a window so the line of sight between eye and screen is parallel to the window surface. If this is not possible, the windows can be shielded to reduce excess sunlight and to minimize glare.

Walls should be a medium to dark color and painted with nonreflective finish. Work surfaces visible around the screen should have nonreflective finishes.

Antiglare screens which fit over the terminal screen are also available.
Video Display Terminals (VDTs) have been a subject of some concern as their use in business and industry has become more commonplace. Most problems involve dedicated or full time operators, those using the VDT four or more hours a day. Complaints have included back, neck and wrist pains, eye strain, headaches, and stress. These are often associated with fatigue and discomfort that results from poor installations of VDT equipment. The application of ergonomic principles in the design of VDT workstations has largely eliminated these problems.

RECOMMENDED VDT WORKSTATION

A — Height of work surface: adjustable 25 to 30 inches (635 to 760 mm)
B — Width of work surface: 30 inches (760 mm)
C — Viewing distance: 18 to 20 inches (450 to 500 mm)
D — Thickness of work surface: 1 inch (25 mm)
E — Height of screen: Top of screen at approximately eye level
F — Palm rest: 1-1/2 inches (40 mm)
G — Knee room height: 24 inches (610 mm) minimum
H — Knee room width: 20 inches (510 mm) minimum
I — Knee room depth: 18 inches (460 mm) minimum
J — Seat height: adjustable 16 to 20 inches (400 to 500 mm)
K — Seat size: 16 by 16 inches (400 by 400 mm)
L — Seat slope: adjustable ± 6°
M — Back rest size: 7 inches high (180 mm) 13 inches wide (330 mm)
N — Back rest height: adjustable 3 to 6 inches (80 to 150 mm) above seat
O — Back rest depth: adjustable 14 to 17 inches (350 to 430 mm)
P — Back rest tilt: adjustable ± 15°
The Maine VDT Law

Maine has a VDT law that gives VDT operators certain rights. If you work on a VDT for more than four hours a day you are a VDT operator.

Your employer must train you to use your VDT and to avoid or minimize conditions that may arise from long or improper use.

Your employer must train you on the importance of proper posture when you use a VDT and how to adjust your workstation to achieve proper posture.

Your employer must train you within six months of your being hired and once a year after.

Your employer must post a notice of your rights under this law.

If you have questions about this law you can call the Bureau of Labor Standards at 624-6460.
STATE OF MAINE

IN THE YEAR OF OUR LORD
NINETEEN HUNDRED AND EIGHTY-NINE

H.P. 481 - L.D. 661

An Act to Establish Occupational Health and Safety Standards for Operators of Video Display Terminals

Be it enacted by the People of the State of Maine as follows:

26 MRSA c. 5, sub-c. II-A is enacted to read:

SUBCHAPTER II-A

VIDEO DISPLAY TERMINAL OPERATORS

§251. Definitions

As used in this subchapter, unless the context otherwise indicates, the following terms have the following meanings.


2. Employ. "Employ" means to employ or permit to work.

3. Employee. "Employee" means any person engaged to work on a steady or regular basis as an operator by an employer located or doing business in the State.

4. Employer. "Employer" means any person, partnership, firm, association or corporation, public or private, which uses 25 or more terminals at one location within the State. The term "employer" includes, but is not limited to:

A. Any person, partnership, firm, association or corporation acting in the interest of any employer, directly or indirectly; and

B. The State, in its capacity as an employer.
5. Operator. "Operator" means any employee whose primary task is to operate a terminal for more than 4 consecutive hours, exclusive of breaks, on a daily basis.

6. Terminal. "Terminal" means any electronic video screen data presentation machine, commonly called video display terminals, VDTs or cathode-ray tubes, CRTs. The term does not apply to television or oscilloscope screens, cash registers or memory typewriters.

§252. Education and training

Every employer shall establish an education and training program for all operators as provided in this section.

1. Requirements. An employer's education and training program shall be provided both orally and in writing and shall include, at a minimum:  

A. Notification of the rights and duties created under this subchapter by posting in a prominent location in the workplace a copy of this subchapter and a written notice that explains these rights and duties in plain language.

B. An explanation or description of the proper use of terminals and the protective measures that the operator may take to avoid or minimize symptoms or conditions that may result from extended or improper use of terminals; and

C. Instruction related to the importance of maintaining proper posture during terminal operation and a description of methods to achieve and maintain this posture, including the use of any adjustable work station equipment used by the operator.

2. Literature: clearinghouse. The bureau shall recommend to employers, for use in education and training programs, occupational safety literature that provides appropriate, current and pertinent data on terminal use. The bureau shall also serve as a clearinghouse for information regarding workplace safety and health relative to the use of terminals.

3. Training schedule. Employers shall provide current operators with this education and training program within 6 months after the effective date of this section and annually thereafter. Beginning 6 months after the effective date of this section, employers shall provide all new operators with the education and training program within the first month of employment as operators.
VIDEO DISPLAY TERMINAL WORKSTATION SURVEY

Office: 
Date: Completed by: 
Person and/or Location Surveyed: 
Number Hours Per Day VDT Used: 

<table>
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<tr>
<th>CRITERIA</th>
<th>YES</th>
<th>NO</th>
<th>If No, How does the workstation differ from criteria and what controls if any are needed?</th>
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<td><strong>VDT UNIT:</strong></td>
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</tr>
<tr>
<td>1) The top surface of the keyboard space bar (or bottom row of keys) is no higher than 2 1/2 inches above the work surface.</td>
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<tr>
<td>2) During keyboard use, the operator's upper arm and forearm form a right angle.</td>
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<tr>
<td>3) During keyboard use, the operator's wrists are neutral or slightly extended.</td>
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<tr>
<td>4) The top of the viewing screen is at or slightly below eye level.</td>
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<td>5) The screen is 18 to 20 inches from the operator's eyes.</td>
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<td>6) The screen swivels horizontally and tilts or elevates vertically.</td>
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<td>7) The operator can control brightness and contrast.</td>
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<td>8) The images on the screen are clean, sharp, and easy to read.</td>
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<td>9) If the operator reads from a document, an adjustable document holder is located at approximately the same height and distance from the user as the screen.</td>
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<tr>
<td>10) The keyboard is detachable.</td>
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<tr>
<td><strong>CHAIR:</strong></td>
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<tr>
<td>11) The chair height is easily adjustable.</td>
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<tr>
<td>12) The chair has an easily adjustable back rest.</td>
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<tr>
<td>13) The backrest supports the inward curve of the operator's spine in the lumbar region.</td>
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<tr>
<td>14) The seat is padded and has a rounded front.</td>
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<tr>
<td>15) The front edge of the seat does not put pressure on the operator's thighs.</td>
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<tr>
<td>16) When comfortably seated, the operator's thighs are horizontal and lower legs vertical.</td>
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<tr>
<td>17) When comfortably seated, the operator's feet are flat on the floor or on a foot rest.</td>
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<tr>
<td>18) The chair is comfortable to the operator.</td>
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<td></td>
</tr>
<tr>
<td>CRITERIA</td>
<td>YES</td>
<td>NO</td>
<td>If No, How does the workstation differ from criteria and what controls if any are needed?</td>
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<tr>
<td><strong>WORK SURFACE</strong></td>
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<tr>
<td>19) There is sufficient space</td>
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<tr>
<td>under the desk for knees,</td>
<td></td>
<td></td>
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<tr>
<td>feet and thighs.</td>
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<tr>
<td>20) The edge of the work</td>
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<tr>
<td>surface in front of the</td>
<td></td>
<td></td>
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<tr>
<td>keyboard is rounded or</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>padded.</td>
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<tr>
<td>21) The keyboard rests on an</td>
<td></td>
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<tr>
<td>adjustable height work</td>
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<td></td>
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<tr>
<td>surface.</td>
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<tr>
<td>22) There is adequate working</td>
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<tr>
<td>space.</td>
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<tr>
<td><strong>ENVIRONMENT</strong></td>
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<tr>
<td>23) There is no glare or</td>
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<tr>
<td>reflection on the screen.</td>
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<tr>
<td>24) The lighting is not so</td>
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<tr>
<td>bright as to cause</td>
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<tr>
<td>discomfort or reflections.</td>
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<tr>
<td>25) The lighting is not so</td>
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<td></td>
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<tr>
<td>dim as to cause the operator</td>
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<tr>
<td>to strain to see.</td>
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<tr>
<td>26) There is no light shining</td>
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<tr>
<td>into the operator's eyes.</td>
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<tr>
<td>27) The general environment</td>
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<tr>
<td>is clean, with comfortable</td>
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<tr>
<td>temperature and humidity</td>
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<td></td>
<td></td>
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<tr>
<td>and no excess noise.</td>
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<tr>
<td><strong>TRAINING AND WORK PRACTICE</strong></td>
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<tr>
<td>28) Adequate breaks away from</td>
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<tr>
<td>the VDT are provided</td>
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<td>(minimum 15 minutes for</td>
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<td>every 2 hours VDT use).</td>
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<td>29) There are no incentive</td>
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<td>pay systems.</td>
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<tr>
<td>30) The operator can pace</td>
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<tr>
<td>her/his stroke rate.</td>
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<tr>
<td>31) The operator has had</td>
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<tr>
<td>initial and periodic vision</td>
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<tr>
<td>exams specifically for VDT</td>
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<tr>
<td>use.</td>
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<tr>
<td>32) The operator has been</td>
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<tr>
<td>trained in hazards</td>
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<tr>
<td>associated with VDT use,</td>
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<tr>
<td>how to avoid the hazards,</td>
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<td>proper use and adjustment</td>
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<tr>
<td>of work station components,</td>
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<td>and how to seek assistance</td>
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<td>with concerns.</td>
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<tr>
<td><strong>COMMENTS:</strong></td>
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<tr>
<td><strong>RECOMMENDATIONS:</strong></td>
<td></td>
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</tbody>
</table>