Farm Emergency Preparedness Series:

Understanding Preparedness and Response

Hazard Identification Procedures

PART II, Chapter 2

TABLE OF CONTENTS

Hazard Identification Procedures

IDENTIFYING AND ASSESSING HAZARDS

1. Introduction
2. Definitions
3. Principles of hazard identification, assessment and control
4. Identifying and assessing health hazards
5. Identifying and assessing safety hazards
6. Controlling hazards

INTRODUCTION

Identifying, assessing and controlling hazards is one of the most important preparedness functions your operation can undertake. This section discusses how you can protect the health and safety of yourself, your family, your workers and others who may enter your farm as well as the safety of your product.

This guide is designed to assist those who are responsible for safety and health on farm operations. The guide provides procedures to identify hazards, assess risks present on the farm operation, and implement control measures to prevent or reduce the likelihood of the identified hazards to cause injury or product contamination.

This guide will:

1. Provide an understanding of what hazards are and how to identify them;
2. Explain what safety and health risks are and how to quantify them;
3. Explain basic farm safety, health and security issues; and
4. Introduce strategies for control or mitigation of risks caused by the identified hazards.

Definitions

What Is a Hazard?

A hazard is any activity, situation, material or substance that can cause harm. A hazard is anything with the potential to harm life, health, property or the environment. Occupational hazards are divided into two broad categories:

(1) Health hazards, and

(2) Safety hazards.

Generally, health hazards cause occupational illnesses, such as noise induced hearing loss (NIHL). Safety hazards cause physical harm, such as cuts, broken bones and so forth. Hazards exist in all workplaces.

Food safety hazards can be broadly divided into:

(1) Naturally occurring, and

(2) Manmade hazard.

The manmade hazards can be unintentional or intentional, such as, tampering or other malicious, criminal, or terrorist actions.

In this guidance we will focus on occupational hazards and introduce food safety and security issues that dovetail with both the hazard identification and control processes.

Hazard identification is the process of identifying all hazards in the workplace.

In order to understand what hazard identification involves, it is first necessary to understand the nature of hazards. Hazards are the main cause of occupational health and safety problems. Therefore, finding ways of eliminating hazards or controlling the associated risks is the best way to reduce workplace injury and illness.

The same principles hold for food safety and security and are the basis for comprehensive preparedness planning.

Some examples of general farm hazards - and an identified risk include:

- An unguarded bench grinder wheel - a broken wheel could be propelled across the shop
- A missing power take off shaft shield - has the potential to draw a worker's clothing and limbs around the shaft causing serious bodily injury or death
- Handling of flammable liquids in the presence of ignition sources - fire or explosion
- Contact with anhydrous ammonia - severe skin burns, respiratory edema
- Power tools and hand tools - cuts and lacerations, burns, eye damage
- Driving of large farm equipment on narrow rural roads or on fast traffic state roads - contact with other traffic and stationary roadside objects causing serious injury to the operator of other vehicle occupants
- Unshielded roller chain or v-belt - severe laceration, amputation or death
- Using an older chainsaw - cuts from a blade without anti-kickback and no chain brake
- Noise from an older chainsaw which can reach levels of up to 110 dB - serious permanent damage to hearing
- Operation of a tractor without a Roll Over Protection Structure (ROPS) on a slope or near a ditch - crushing injury, suffocation, death
- Badly designed or broken shovel (for example, a short handle and very large blade) - back injury
- Entering a controlled atmosphere storage or silo without proper ventilation - suffocation and death
- Type III ladder - serious injury due to collapse from being overloaded

What is an occupational injury?

Occupational injuries occurring on agricultural operations are usually caused by contact with equipment or animals or during a slip or fall. In a recent survey, the majority of agricultural work injuries (61%) occurred to the operator of the farm or a farm family member, followed by hired labor (29%), and partners in the farm or their family members (6%). Ninety-five percent of these injuries were temporary, with 4% being permanent in nature. About 80% of these injured workers sought medical attention, beyond first-aid, of some kind.

These injuries most commonly involved anatomical locations of the leg, knee, or hip (17%), followed by back (15%), and finger (12%). Finally, the leading nature of injury was a sprain or strain (26%), followed by fractures (18%), and cuts (17%). (Traumatic Injuries in Agriculture, David L. Hard, et.al University of Minnesota, School of Public Health http://www.cdc.gov/nasd/docs/d001701-d001800/d001773/d001773.html

What is an occupational illness?

Occupational illnesses are usually caused by health hazards. An occupational illness is a condition that results from exposure to a chemical or biological substance, a physical agent (an energy source such as noise) or other stressors (including harassment, work demands and so forth) capable of causing harm. The time that it takes an illness to develop after exposure to a health hazard is called the "latency period."

Examples of farm-related occupational illnesses include:

- Asbestosis
- Silicosis
- Elevated blood lead levels
- "Farmers, Millers, or Brown Lung"
- Other work-related lung diseases (asthma)
- Noise-induced hearing loss
- Skin diseases
- Certain cancers associated with chemical use and prolonged sun exposure
- Fatigue-related disorders

- Blood borne pathogens instigated illnesses
- Tuberculosis

Examples of activities causing illnesses include:

- Certain veterinary medications in a syringe - some have no antidote may cause human injury or death if injected into the worker
- Certain pesticides absorbed by the worker's skin, inhaled to the lungs, or splashed in eyes - multiple skin and lung risks as well as long term occupational illness
- Waste oil from engine oil changes - injury due to skin absorption of oil contaminates
- Welding Flash - skin and retina burns
- A food container, such as a pop bottle, used to store a pesticide - severe illness if accidently or intentionally consumed

How do hazards arise?

Hazards may arise from the workplace environment, equipment, the use of plants or substances, unintentional or intentional acts or omissions, and from work practices. Hazards can arise in many different ways and can take various forms. In order to be in a position to properly undertake hazard identification, it is important to understand the sources of hazards and the forms in which they may arise.

Understand there are many forms of hazards which may go unnoticed in a workplace (ergonomic hazards such as the discomfort from a badly designed seat or tool for example), but which, in the long run, may result in unnecessary costs to your operation and human suffering.

What does hazard identification involve?

Hazard identification involves the systematic investigation of all potential hazard sources and the recording of hazards identified. In simple terms, it means identifying all of the possible ways in which people, and now food products, may be harmed through work-related activities as well as criminal acts.

A coordinated, systematic approach to the process will allow farms with a wide range of plants, chemicals, animals, facilities and potentially hazardous work processes to assess their operations for significant hazards and implement control measures to minimize the hazards risk level.

Using a systematic approach

Agricultural and related operations do not fit neatly in narrow industrial work classifications. No two farm operations are alike. Practices and processes used by one dairy operation may not be used by another dairy operation. The harvest equipment used by one cherry farm may be different from another cherry farm, and, yet another may hand harvest cherries using tall ladders.

The principles and examples set forth in this guide may or may not be applicable to all agricultural settings. You should use the underlying concepts as a guide and those principles and procedures that have the greatest applicability to your own operation can be a model for development of your own hazard identification practice.

UNDERSTANDING HAZARD IDENTIFICATION, RISK ASSESSMENT AND CONTROL

The health and safety of workers depends on the owner/employer and workers working together, with or without a consulting entity such as MIOSHA Consultation, Education and Training Division, Michigan State University Extension, Michigan Farm Bureau or other consulting organizations and agencies, to identify, assess and control hazards.

This does not mean that all parties must be involved in every activity and procedure.

Ideally, your Farm Safety Program should prevent a hazard from causing a problem. The role of hazard identification procedures should be to:

1. Initially identify hazards present on your operation or during work activities off the farm, such as transportation
2. Identify control measures
3. Audit the performance of the Farm Safety Program to help keep it functioning properly.

However, if a serious hazard is discovered at any time, the operation should act immediately to mitigate the hazard's risk immediately.

Use the following steps to identify, assess and control hazards:

- Collect information about hazards and potential hazards
- Assess the risk
- Set priorities
- Communicate information about the hazards and risks
- Develop, select and implement controls and monitor their effectiveness

Implementing Hazard Identification

Dividing hazard identification into manageable portions

Farming is inherently hazardous and identifying every hazard throughout the farm workplace can be an extremely large and complex job. The first step is to break the job down into 'bite-size chunks.' This can be done by using the following techniques:

1. Break your workplace into work sectors. Sectors can be broad or narrow. For example, you can identify your sectors by production unit (crop, animal, process, season, etc.), or work area (farm shop, dairy parlor, field, orchard, plantation, etc.), or work activity (planting, tillage, harvesting, storage, etc.)
2. Break each sector down into tasks
3. Break these tasks down to activities where needed
4. Develop a list of likely hazards for the work sector
5. Analyze the components and activities of each task to identify the individual hazards present

Developing an inventory of tasks

Once the workplace has been divided logically into work sectors, the next step is to develop an inventory of all of the tasks conducted in the identified sectors.

Examples of types of tasks

The task may be broad in nature such as:

- Transporting material, animals and/or equipment from one location to another
- Soil preparation
- Planting
- Feeding
- Crop protection material application
- Veterinary services
- Cultivation
- Husbandry practices
- Harvest
- Milking

- Packing, sorting, processing
- Marketing
- Storage
- Shipping
- Maintenance

The task may be specific in nature such as:

- Operating large machinery including tractors, combines, harvesters and forklifts
- Operating power tools or hand tools
- Mixing and loading pesticides
- Use of solvents and cleaners
- Obtaining and transferring biological specimens
- Working inside confined spaces (such as milk tanks, water tanks, silos, grain bins, certain fruit storages and manure lift pump stations)
- Spraying chemicals such as lacquer and pesticides
- Using anhydrous ammonia
- Injection of fertilizer or pesticides into irrigation systems
- Administering veterinary medicines
- Securing cargo and equipment on trucks
- Electrical maintenance
- Vehicle maintenance
- Refrigeration maintenance
- Welding and grinding
- Working in a pen with a bull or with an animal during birth
- Field fueling of vehicles
- Working during thunderstorms

It is also necessary to consider future tasks or situations that involve a change to the existing premises or process, or those which are non-routine such as:

- Open or temporary storage in buildings of grain
- Change in brand or type of equipment used
- Clearing and repair of storm damage
- Installation of new equipment
- Discovery of “meth lab” equipment
- Use of new pesticide or chemical
- Using backup generators

Analyzing tasks

Once the task inventory is completed (or possibly, simultaneously with developing the inventory), each task should be analyzed to prepare for identifying all of the hazards involved with the task or associated activities.

In order to later analyze the risks associated with the identified hazards, a manageable level of detail about the task is needed. This means that some tasks must be broken down further into component elements.

The component elements of a task may include:

- Individual activities
- Substances and materials
- Facilities, tools and equipment involved
- Processes used
- Characteristics of the place or time where and when the task is carried out

An easy method of breaking tasks down into elements is usually to consider how the task is undertaken step by step. You could consider the major elements or you could detail each aspect of each element of a task.

For example, the task of pesticide spraying could involve the major elements of:

1. Determination material(s) to be sprayed
2. Set up equipment and practices to be used
3. Mix/load
4. Apply material(s)
5. Clean equipment
6. Complete recordkeeping

The task elements of pesticide spraying could further be broken down to the activities of each elements. Continuing the example:

Hazard Identification Procedures

1. Determination material(s) to be sprayed
    a. Review results from pest scouting
    b. Apply risk/benefit analysis to pest control measures
    c. Review of pesticide label(s)
    d. Review of alternative measures
    e. Selection of control measures
    f. Determination of application restrictions
    g. *Identify and secure personal protective equipment

2. Set up equipment and practices to be used
    a. Determine application equipment and cost of use
        i. Review product labels
        ii. Evaluate field conditions
    b. Service equipment;
        i. *Don personal protective equipment as required if application equipment is contaminated with pesticides
        ii. Complete basic service, e.g. fuel, oil, lube, filters, hoses, lights, controls, SMV, PTO
        iii. Service power unit
        iv. Calibrate equipment
    c. *Determine Drift Management Plan requirement
    d. *Update Central Notification and Site Post as required

3. Mix/load
    a. *Don personal protective equipment as required
        i. *Check for damage and cleanliness of personal protective equipment
        ii. *Complete fit test as required
        iii. *Check for spill kit materials
    b. *Determine eyewash requirements and maintain eyewash at mix/load area and on application equipment as required
    c. Partially fill tank as required
    d. Determine mix sequence and mix materials
    e. Use steps, ladder or platform and put premix into tank
    f. Fill tank
    g. Secure mix load area

4. Apply material(s)
    a. *Don personal protective equipment as required
    b. Travel to application site
    c. *Check for required Site Posting
    d. *Check for workers or other personnel in application area
    e. *Check weather conditions for Drift Management Plan implementation
    f. Set controls to application levels, begin application
    g. Monitor controls, nozzles and filters for plugs, and for changing weather conditions
        i. Clean plugged nozzles
            (1) *Use proper personal protective equipment
            (2) Clean or remove contaminated personal protective equipment before reentering cab
            (3) *Maintain contaminated tools outside cab
        ii. *Implement Drift Management as necessary for changing application conditions
        iii. *Stop application if workers or other personnel enter the application area
    h. Return to equipment fill or storage area
    i. *Remove, clean and properly store personal protective equipment

5. Clean equipment
    a. *Don personal protective equipment as required if application equipment is contaminated with pesticides
    b. Clean nozzles and filters, clean interior/exterior of application equipment
    c. *Clean and properly store personal protective equipment

Hazard Identification Procedures

6. *Complete recordkeeping
    a. Update Central Notification with REI information
    b. Record Restricted Use Pesticide application information
    c. Record general application information
    d. Record use of Drift Management Plans
    e. Record pesticide inventory changes

*In the example above we have included some, but not all, of the risk control practices required by rules covering pesticide applications.

The preferred method is to write down the tasks as in the example above but group discussions leading to work practice development can also be effective in some cases. After breaking down the task into its component elements, the next stage is to identify the hazards involved.

Identifying the hazards

In undertaking the hazard identification task, there are many different factors to consider; including but not limited to, those related to specific hazards, individual tasks, workplace conditions, particular people involved and unique circumstances.

Considering the people factor

An important factor to consider is the people who may be exposed to risks from hazards, and how any individual characteristics may impact on exposure to the hazard. Gathering this information at the hazard identification stage will assist with later risk assessment efforts. In most cases, those affected will be the people involved in the tasks. But, people, plant material, and livestock both on and off your operation can be affected.

During hazard identification, try to take note of "people issues" such as:

- Any special characteristics which should be taken into account. For example, inexperience, age (young or old), chemical susceptibility/sensitivity and ergonomic issues (such as height or prior injuries)
- Whether people other than immediate workers could be affected

- How these groups of people could be or are affected by the circumstances surrounding the task, such as normal operation, peak production, environmental factors, maintenance activities and working alone

Aids to hazard identification

There are a number of practices which can be undertaken to aid identification of hazards present in the agricultural workplace. These practices may be conducted simultaneously with other risk management processes such as farm inventory development, planting intentions determination, soil testing and any management business assessment activities.

Practices, which will assist in the hazard identification process, include but are not limited to:

- Completing workplace and facility walkthrough/drive through
- Analyzing available information
- Conducting workplace inspections
- Using checklists

Workplace walkthrough/drive through

- Walking through an area, field or building, which the hazard identification process is targeting, is an essential practice even if the owner, worker, or individual involved is familiar with the area and task.

Observing how work is or will be carried out will reveal valuable clues about the hazards involved. It is important not to rely on how you think the work *should* be done (Standard Operating Procedure (SOP)) but to determine how the work is *actually* done.

Hazard Identification Procedures

How specific tasks are undertaken under normal workplace practice may vary greatly from what standard operating procedures or work rules provide.

Developing Standard Operating Procedures can assist with business planning activities such as hiring, capital investment, enterprise accounting, as well as reduce the risk of injury.

Analyzing available information

Another important aid to identify hazards is to review as much available information as you can. This may assist in identifying potential hazards from the types of equipment, plants, environment, chemicals, materials and work procedures at your workplace.

Sources of information, which may assist in indicating how hazards have arisen in the past, and are likely to happen again, include:

- Accident, incident and first aid records and reports
- Insurance records
- Facility and equipment maintenance and breakdown records
- Site-specific equipment work procedures documentation (sanitation, transportation, field and animal husbandry practices)
- Industry and operation specific safety and health rules, procedures and policies
- Employee training records and in particular "retraining" or disciplinary records
- Operators' manuals and equipment instruction booklets, which often provide specific safety procedures and risks associated with a particular task or piece of equipment
- State, national and international extension publications
- Industry and fatality, injury, illness and incident data, workers compensation statistics and guidance material from the Bureau of Labor Statistics, National Institute of Occupational Safety and Health (NIOSH), Michigan Fatality Assessment and Control Evaluation program (MIFACE), industry organizations, and the Michigan Department of Labor and Economic Growth, Consultation, Education, and Training Division
- MIOSHA, Agricultural, Construction, and General Industry Safety and Health Standards
- Industry consensus standards providing specifications for issues such as design, manufacturing, inspection, testing, use and work methods

While reading and analyzing these resources, take note of hazards, risks, and conditions which may be relevant to your workplace. Developing a list of potential hazards for your type of operation will be valuable as a prompt in identifying actual hazards at your workplace.

Undertaking a workplace inspection

One of the most important aids to hazard identification is the workplace inspection.

This may be conducted as part of, or independently, of the workplace walkthrough.

Inspections can focus on specific tasks, locations, or hazards. Essentially, the inspection should be regarded as a fact-finding mission to detect *potential* hazards. Before undertaking the inspection, it is vital that those assigned to the task recognize the intent of the inspection is to uncover both actual and potential hazards.

While the owner and/or internal staff can complete the inspection, a consultant or other "outside pair of eyes" may provide a more accurate assessment of the potential hazards present on your operation.

It is common to hear statements during farm facility reviews such as; "I've walked by that missing auger shield for years and just don't see it anymore," or "I would never let a

worker use that machine."

Activities undertaken during the inspection may include:

- Taking notes or photographs - in most cases the information gained during the inspection will be used over longer periods of time (months or even years) to develop procedures or alter the practice, equipment or facility
- Interacting with family members, employees, product suppliers/buyers and insurance representatives
- Observing work being done - recognize workers will be more likely to "do it right" during the inspection so look for signs of other work practices - be nice
- Visual inspections of equipment
- Taking measurements and readings (such as noise level readings, SO_2 and CO levels, work platform heights, and electrical readings)
- Taking time lapse photos and/or video

Consideration should be given to the following basic hazard categories:

- Impact (falling/flying/rotating objects)
- Penetration (sharp objects capable of piercing body)
- Compression (roll-over or pinching objects including animal contact and equipment operation)
- Chemical exposure (inhalation, ingestion, skin contact, eye contact or injection)
- Temperature (extreme heat or cold, excessive physical exertion)
- Air contaminants (dust, mold, plant material, animal disease, pesticides, welding gas, silo and manure gas causing skin and lung disorders)
- Light (optical) radiation (retinal and skin burns)
- Noise (over 85dB capable of causing permanent hearing damage)
- Water (potential for drowning or fungal infections caused by prolonged wetness)
- Vibration (ergonomic disorders))
- Electrical (sudden exposure to high voltage, prolonged exposure to low voltage)

Using checklists

Checklists are an invaluable aid in any safety and management procedure. They assist in ensuring that:

- Important issues are not overlooked
- There is consistency if the activity is being undertaken by several different people
- There is a formal record of efforts made (can be used in certain circumstances to minimize penalties and provide for insurance reductions)

To gain maximum benefit, checklists used should be specifically developed for the individual workplace. This will ensure that circumstances unique to that workplace are taken into account.

Examples of basic and agricultural checklists can be obtained beginning in July 2006 at the Safety page of Michigan Farm Bureau at http://www.michiganfarmbureau.com as well as many industry and government sources. These may be used as a basis from which a customized checklist can be developed for your operation.

In most diverse agricultural operations these checklists provide a base to build on and should not be deemed to cover all potential hazards you may have.

Ongoing process of hazard identification

Hazard identification does not end with the initial walkthrough, inspection, or investigation. Hazard identification should be regarded as an ongoing, integral part of workplace operations. Hazard identification is required for many General Industry operations, and, while agricultural operations have some qualifications from these requirements, agricultural operations

are required to perform hazard identification at some level for activities such as:

- Before and during the introduction of pesticides, chemicals, and certain hazardous materials to the workplace
- Before and during any alterations or changes to the use of pesticides, chemicals, and certain hazardous materials
- Where new information on hazards or control measures become available for pesticides, chemicals and certain hazardous materials.

Vertically integrated agricultural operations may be required to develop a hazard monitoring system for certain chemicals, work practices, and food safety practices. These requirements will form part of the monitoring and review element of your safety and preparedness program.

Recording hazard identification data

Once gathered, the hazard identification data should be recorded for farm operations and must be recorded for certain activities performed in conjunction with farming operations so that it can be used for risk assessment activities, hazard elimination, and in determining appropriate control and protection measures. A Hazard Identification Report Form is provided in the Appendix of this section.

In practice, the same form may be used to record the hazard identification information, risk assessment details and details of control measures to be used or practices to be implemented. Many operations combine general management activities with the hazard identification forms.

Collect information

Collect information from sources such as:

- Workers, family members, supervisors and managers – Workers often know, or suspect, what hazards exist and where they are located. On-farm family members, regardless of age, can provide valuable risk information from different perspectives. A teenage youth may not recognize his or her own poor work practices but may easily identify questionable practices of others including their parent's issues.
- Associations – Many Associations provide training and can recommend appropriate publications they have developed as well as state and national Occupational Health and Safety organizations and agencies, the National Safety Council and others.
- Suppliers and manufacturers – Equipment manuals, users' guides, hazard warnings, pesticide and chemical labels, and material safety data sheets are your primary source of hazard information.
- Occupational safety and health professionals – Safety professionals such as Certified Safety Professionals (CSP), Associate Safety Professional (ASP), Extension staff, industry consultants and physical engineers (PE) can provide technical advice. The Michigan Department of Labor and Economic Growth, Consultation, Education and Training Division has a library of safety videotapes and publications at http://www.michigan.gov/cis
- Legislation – The statutory requirements and the implementing regulations are an excellent guide to identifying and controlling recognized hazards. Use the Agricultural Standards (see Appendix for one of the standards) as a basis for compliance and refer to the General Industry and Construction Standards to assist in developing a comprehensive safety program.
- Unions – Although there are few unions representing farm workers in Michigan or the Midwest, many

unions provide health and safety training and information about hazards to their members and others. It is a very good idea to review these materials as a good indicator of how your type of workplace is perceived by workers and their advocates.

Identifying and assessing health hazards

A health hazard is any agent, situation or condition that can cause an occupational illness. There are five types:

1. Chemical hazards, such as battery acid, fuels, pesticides and solvents
2. Biological hazards, often called "biohazards," such as bacteria, viruses, molds, human and animal fluids
3. Physical agents (energy sources) strong enough to harm the body, such as electric currents, heat, light, vibration, noise and radiation
4. Work design (ergonomic) hazards
5. Workplace stress such as harassment, long hours, and isolated work sites

A health hazard may produce serious and immediate (acute) effects or it may cause long-term (chronic) problems. All or part of the body may be affected. Someone with an occupational illness may not recognize the symptoms immediately. For example, noise-induced hearing loss is often difficult for victims to detect until it is advanced.

How can health hazards be identified?

- ➢ Prepare a list of known health hazards in similar workplaces such as brown lung, hearing loss, asthma, sun burn, contact dermatitis, etc.
- ➢ Review work practices and processes to identify hazard sources and locations
- ➢ Interview workers, family members, supervisors and managers to identify known and suspected health hazards not already on the list
- ➢ Use your five senses

The Hazard Communication Standard (MIOSHA Part 42, 92 and 430) provides for the identification and listing of chemical hazards in the workplace and the development of a written Hazard Communication program. The standard specifically excludes pesticides having the Agricultural Use Requirements box on the label when used within the label's agricultural use application procedures. These pesticides are covered under the Environmental Protection Agency's Worker Protection Standard (WPS).

When pesticides are used outside of the agricultural label procedures they are covered by the MIOSHA Hazard Communication Standard.

Farm operations must follow the MIOSHA Hazard Communication Standard for agricultural pesticides where non-agricultural workers such as electrical and plumbing contractors may be exposed to pesticides while on the farm.

Knowledge acquired under the Hazard Communication Standard helps employers provide safer workplaces for their employees. When employers have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish proper work practices including proper personal protective equipment.

The MIOSHA Part 591. Process Safety Management of Highly Hazardous Chemicals also provides methods for hazard identification practices on the farm. Employers are to perform an initial process hazard analysis (hazard evaluation) on processes covered by this standard. The process hazard analysis shall be appropriate to the complexity of the process and is to identify, evaluate, and control the hazards involved in the process. Employers are to determine and document the priority

order for conducting process hazard analyses based on a rationale which includes such considerations as extent of the process hazards, number of potentially affected employees, age of the process, and operating history of the process.

These provisions establish the minimum requirements for preventing or minimizing the consequences of catastrophic releases and cover toxic, reactive, flammable, or explosive chemicals above threshold quantities. Examples of threshold quantities include: anhydrous ammonia - 10,000 lbs., chlorine - 1,500 lbs., and nitrogen dioxide - 250 lbs.

Community Right to Know provisions of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III of the Emergency Planning and Community Right-to-Know Act (EPCRA) require certain hazard identification and community reporting requirements. (See MIOSHA Right to Know Hazard Communication Compliance Guidance and Michigan State University Extension publication Emergency Planning for the Farm in the Appendix)

Prepare a list of known health hazards in the workplace

As a first step, the employer should prepare a current list of all pesticides, chemical and biological substances, physical agents, as well as lists of work design hazards, food and bio security issues, as well as harassment and other stress problems at the workplace. To prepare or update a list:

1. Check current product labels and material safety data sheets (MSDSs) to identify substances covered under the Hazardous Communication Standard, EPA Worker Protection Standard, SARA Title III, or that present another type of hazard not covered by these standards
2. Each pesticide, chemical and biological substance controlled under the Hazardous Communication Standard or the EPA Worker Protection Standard in the workplace must have appropriate container labels
3. Current MSDSs or pesticide labels must be readily available to the workers
4. Look at container labels and MSDSs for specific hazard warnings and symbols (such as the skull and cross bones, National Fire Prevention Association markings, food or feed restrictions, and environmental warnings)
5. Determine other products of concern to worker's health such as dust, mold, or plant materials created or disturbed during farming operations that are not covered by supplier or industry based MSDS (there are industry bases MSDS for certain feed dusts)
6. Conduct inspections to identify equipment defects, such as material containers and pipes that are not properly labeled or leak, guards and shields, open, damaged or improperly used electrical equipment
7. Slip and fall issues, elevated work surfaces
8. Review inspection and accident reports, complaint files, shop plans, first aid records, product literature and other internal documents
9. Monitor the workplace as applicable (measuring noise, temperatures, concentrations of airborne chemicals and dust, etc)

Review work practices and processes

Floor plans, facility and farm maps may show for example, that certain points in the production process release chemicals or other contaminates such as dusts into the air or work area. Sloping land, for example, may allow for rain or irrigation activities to cause minor flooding of work areas and electrical control facilities.

Also check maps for emergency response access points (areas where rescue vehicles can regularly gain access) and location labeling to be used to direct first responders to an accident site.

Check for work design problems that may cause back injury, hearing loss, and

other ergonomic hazards. Look for the work tasks associated with accidents, complaints and ill health in each area.

Interview workers, supervisors and managers

Interview workers, supervisors and managers during inspections. Ask them what hazards they work with and what work-related health problems they know about. Remember to deal with the concerns of workers at any time they are raised, not just during inspections.

Talk to vendors and suppliers if you need more information about a specific product, tool, or piece of equipment.

Use your five senses

Some substances and physical agents can be detected with your five senses. For example, dusts and fumes sometimes form a haze. Vibration and temperature can be felt. An abnormal taste may be a sign of airborne chemicals. Some substances have a distinct color, visual appearance or odor.

Odor is a common warning property. Be careful to check the substance's odor threshold in the *Physical Properties* section of its MSDS. Only use odor to detect a substance if it can be smelled at levels below hazardous concentrations.

Unfortunately, many hazardous agents and conditions cannot be detected with the senses such as carbon monoxide (CO). Others, such as hydrogen sulfide (H_2S) gas, are often dangerous when strong enough to be detected by smell. Using your senses is not always a safe way of detecting hazards.

Quick health hazard identification checklist.

- ☐ **What chemical substances are produced, used, handled, stored or shipped in the workplace?**
- ☐ **Are any vapors, gases, dusts, mists or fumes present (including chemical by-products of work processes)?**
- ☐ **Are biological substances (such as bacteria, viruses, parasites, dusts, molds and fungi) present in the workplace, the ventilation systems and other components of the physical plant or work area?**
- ☐ **Are physical agents (energy sources strong enough to harm the body, such as electric currents, heat, light, vibration, noise and radiation) present?**
- ☐ **Are temperature extremes present?**
- ☐ **Do ergonomic hazards exist—such as work requiring lifting, awkward posture, repetitive motions, excessive muscular force or computer use?**
- ☐ **Could any work processes, tools or equipment cause health hazards (such as back injuries, soft tissue injuries, whole body vibration, hearing loss, infections and so forth)?**
- ☐ **Could departures from safe work practices cause illnesses?**
- ☐ **Can any potential health hazards be detected with the senses (smell, taste, touch, hearing and sight)?**
- ☐ **Is harassment present in the workplace?**
- ☐ **Are there any complaints from workers about workplace related health problems?**

How can health hazards be assessed?

Once a health hazard is identified, the risk it poses to workers must be assessed. Suppliers and consultants can help the employer do this by using monitoring equipment to assess exposure levels and by determining the probability and severity of any potential exposure.

There are many different monitors for detecting and assessing health hazards. Some, such as air monitors, sample the work environment at specific places for specific chemical hazards or can be worn to establish Time Weighted Average (TWA) exposure levels.

Determine if the level exceeds the MIOSHA standard for Maximum Allowable Concentrations (MAC) under MIOSHA Part 700 Agriculture 9see Appendix). Other monitors measure the levels of noise, vibration and so on. Advice on how to interpret monitoring results can be obtained from equipment suppliers, consultants and government agencies.

Chemical hazards

If possible, use monitoring equipment to determine exactly what the exposure levels for health hazards are in the workplace and at workstations. For pesticide applications, the product label specifies Restricted Entry Intervals (REI). The REI is designed to reduce the risk to workers doing hand labor tasks in treated areas to acceptable levels.

Different hazards, such as animal health care products and stray voltage, require different monitoring techniques and equipment. The employer may decide to bring in experts to do the monitoring.

Once an exposure level is determined, compare it with standards set by the organization, industry, or government standard or industry consensus standards. Review MSDSs as well as industry and product literature for advice. (See Part 700 Agriculture in the Appendix to this section for the regulations relating to chemical Maximum Allowable Concentration (MAC) limits).

Biological hazards

Some biological hazards can be detected by monitoring. However, the risk of catching an illness can usually be assessed by applying knowledge of the disease involved, including how it spreads and infects people or livestock.

Biological safety data sheets provide useful information such as survival characteristics of the microorganism outside of the body, how it is transmitted and how likely workers are to contract the disease. The Public Health Agency of Canada maintains a listing biological hazards with MSDS assessments of those hazards at http://www.phac-aspc.gc.ca/msds-ftss/

Illness, such as asthma, can be caused by chemical, biological, and physical hazards. Asthma caused by agricultural activities is on the rise. Many resources are available on the internet.

Physical health hazards

Physical health hazards are sources of energy strong enough to cause harm. They include noise, vibration, heat or cold and radiation.

Noise – Common noise sources include equipment, animals, work processes, compressors, ventilation systems and power tools. Generally, if ordinary conversation cannot be understood at normal distances, noise levels are too loud. Hazard identification techniques, such as inspections, monitoring and conversations with workers will usually detect noise concerns.

Vibration – Vibration is a rapid *back and forth* or *up and down* motion that may affect all or part of the body. It can gradually damage nerves and circulation

systems in limbs and affect internal organs. Standard hazard identification techniques can detect what jobs expose workers to vibration. Monitoring and assessing vibration usually requires technical specialists, but, if your hands or feet become numb when using a piece of equipment you likely are being subjected to substantial vibration.

Heat and cold – The health effects of too much heat include heat cramps, heat exhaustion and heat stroke. Cold can produce frostbite and hypothermia. As well as causing serious health problems, heat and cold stress disorders can reduce performance and increase the risk of accidents.

Agricultural regulations require the employer assure heat stress is monitored where workers use personal protective equipment and to provide adequate drinking water for field tasks. Review indoor and outdoor conditions and inform workers what measures can be used by them to protect themselves from heat and cold stress disorders. Consider temperature/humidity maximum and minimum levels where operations will stop or where special precautions will be taken.

Radiation – Radiation is made up of moving particles or waves of energy. It is divided into two groups: (1) *Ionizing radiation*; and (2) *Non-ionizing radiation*.

Ionizing radiation is given off by decaying radioactive elements, such as uranium. Specialized monitoring equipment is used to measure and assess radiation exposures. Radiation workers are also required to wear badges that measure the radiation dose they receive.

Non-ionizing radiation includes:

- Ultraviolet radiation given off by sun lamps and welding equipment and can burn the skin and cause eye damage
- Infrared radiation (radiated heat) used in cooking and warming equipment in food processing and industrial packaging
- Lasers producing concentrated beams of light, used in a variety of commercial, medical, industrial purposes and now agricultural procedures, must be properly set up and adequately shielded to prevent damage to the eyes or skin of workers
- Microwave and high radio frequency radiation used in cooking equipment, radar as well as in high-energy radio transmission and communications equipment, if not properly shielded, some equipment may injure the skin, eyes and other organs
- Long wave radiation used in radio and other communications equipment can heat the entire body

Assessment of radiation hazards is often a specialized area. If there are radiation sources on your operation, such as extensive welding, seek information from equipment suppliers to identify risks to determine suitable worker protections. Remember, a welding helmet with a single lense grade will not protect your eyes from different types of welding processes.

Physical demands (ergonomic hazards)

Hazards can exist in the design of the workplace, the workstation, tools and equipment and the workflow. Ergonomics is concerned with identifying and controlling these hazards by reducing the physical, environmental and mental stresses associated with a job. It does this by trying to balance the capabilities of the worker with the demands of the job. Ideally, the job should fit the person's mental, physical and psychological characteristics.

Common problems caused by work design hazards include repetitive strain injuries (RSIs), cumulative trauma disorders (CTDs) and musculoskeletal injuries (MSIs), including back injuries. Ergonomic-related injuries are the fastest growing occupational health problem.

Hazard Identification Procedures

Examine these factors when assessing the risk of ergonomic hazards:

1. The posture a worker must use to do the job (stooping, bending and crouching)
    a. For example, in a static posture, such as when sitting or standing without a break, the muscles are held in a fixed position without movement
    b. Over time, work requiring a static posture can cause health problems such as complaints of back, shoulder and neck pain can indicate static posture problems
2. The muscular force (exertion) required (lifting, pulling, pushing, and twisting)
    a. Muscular force describes the amount of force required to do the work; consider the weight of the loads or tools involved; the fit of handgrips to the worker and the force required; the muscles used; and the adequacy of work gloves
    b. Poorly shaped, heavy or vibrating hand tools can encourage workers to grip the tool too hard, reducing blood flow to muscles and increasing fatigue, bulky or clumsy gloves can do the same thing
3. The number of repetitive motions needed (frequency, speed, duration and position)
    a. Doing the same job rapidly over and over again can cause injury
    b. Jobs that must be repeated in less than 30 seconds, such as setting transplants, are classed as highly repetitive
    c. Lack of work variation during shifts can prevent workers from being able to rest their muscles adequately
4. The physical condition of the person doing the job
5. Vibration of all or part of the body such as when using chainsaws, operating certain harvesting equipment, or using certain sorting equipment
6. Work organization factors such as where, when and how the work is done and at what pace
    a. Poorly designed tasks can force workers to do too much too fast can increase stress and reduce work efficiency, increase the risk of accidents, and decrease productivity
7. Work environment problems including vibration, heat, cold and contaminants in the atmosphere

Remember that these factors can interact with each other or with other safety hazards, worsening the situation. A good rule of thumb is: The more awkward or static the posture required by a job; the more excessive the force needed to do the work; and the more repetitive the tasks, then the greater will be the risk of injury.

Stress hazards

A newer form of workplace illness is caused by stresses in the workplace such as harassment and varying start shiftwork.

Workplace harassment – Harassment may seriously harm the health and well being of victims. It can also interfere with efficiency and productivity. Employers should consider establishing and implementing a policy to protect workers.

To assess the risk of harassment, the employer can:

- ☐ Check to ensure the harassment policy has been implemented
- ☐ Check for signs the policy is not taken seriously
- ☐ Look for and respond to complaints or concerns from workers

Shiftwork – Shiftworkers have irregular patterns of eating, sleeping, working and socializing that may lead to health and

social problems. Shiftwork can also reduce performance and attentiveness. In turn, this may increase the risk of accidents and injuries. Similar concerns occur during the long hours of planting and harvesting. The employer and workers can work together to identify and control these hazards. Cooperation is essential to:

1. Assess the risks to the worker's health and safety posed by the work; and
2. Inform the worker about the nature and extent of the risks and how to eliminate or reduce them

Employers should be sensitive to stress caused by such things as workload, the pace of work and so forth.

Identifying and assessing safety hazards

A safety hazard is anything that could cause an injury. Unlike the harm caused by many occupational illnesses, an injury caused by a safety hazard (such as a cut or fracture) is usually obvious. Safety hazards cause harm when workplace controls are not adequate. Some examples of agricultural safety hazards include:

- Slipping/tripping hazards (such as electrical cords across floors)
- Uneven work surfaces
- Fire and explosion hazards
- Moving parts of machinery, tools and equipment (such as pinch and nip points)
- Large equipment hookup
- By-pass starting of tractors
- Work at height (such as work done on scaffolds or ladders)
- Ejection of material (such as from grinding operations)
- Pressure systems (such as steam boilers and pipes, hydraulic systems)
- material transport systems (such a auger and elevators)
- Fueling equipment
- Electrical system failures
- Contact with elevated or buried utilities (gas and electric lines)
- Vehicles (such as forklifts and trucks)
- Lifting and other manual handling operations
- Materials falling from height, rolling, shifting or caving-in
- Unsafe use of explosives
- Violence
- Hazards posed by working alone or in isolated workplaces

Standard identification methods can be used on safety hazards. In addition, you can complete a job safety analysis (JSA) performed on each dangerous job. A JSA involves breaking down each job into its steps and analyzing the hazards present at each step. Product literature, industry publications and regulations are useful starting points for developing JSAs. Many health and safety publications contain examples of various formats for JSA forms as well as detailed instructions on how to perform a JSA. See www.michigan.gov/cet for MIOSHA's Job Safety Analysis booklet that explains what a job safety analysis is and contains guidelines for conducting your own step-by-step analysis.

UNDERSTANDING RISK ASSESSMENT

What is probability?

Probability is the chance that a hazard will cause harm. In safety risk management systems, probability is often categorized as:

- Frequent (workers are frequently at risk)
- Probable (the hazard is likely to cause harm)
- Occasional (workers are occasionally at risk)
- Remote (the hazard could cause harm, but is very unlikely to do so)
- Improbable (the hazard is unlikely to ever cause harm)

Other systems provide similar discussions. The probability or likelihood of an accident occurring is evaluated, the potential consequences are calculated or estimated, and based on these two factors, the risks are assigned priority for risk control through the use of a risk rating.

Rating systems, such as the CARVER system, can be used to assist operations to identify critical areas where resources and time are better spent.

The CARVER scoring methodology is commonly used by the Department of Homeland Security to assess critical preparedness issues.

Each letter of the CARVER evaluation model stands for one component; Criticality, Accessibility, Recuperability, Vulnerability, Effect, and Recognizability. The letter S is added for Shock where the model is used for terrorist or food security risk modeling. This evaluation is normally represented in table form. The table has a number of rows, each row being labeled with one “node” (i.e. task, activity, step or component).

In order to undertake risk assessment, it is first necessary to understand the nature of risk.

What is severity?

Severity is the seriousness of the harm that could result from contact with a hazard. It is described as:

- Catastrophic (death and/or severe destruction)
- Critical (serious injury and/or property damage)
- Marginal (minor injury and/or property damage)
- Negligible (no injury and/or property damage)

Note: We are focusing on injury and property damage. You can add food safety, bio security, environment impact, market impact or any other risk category to the model as necessary.

What is a risk?

Risk describes the odds that a hazard will cause harm. It refers to the probability and severity of potential accidents and dangerous occurrences (and so called “near misses”). Risk management is a technique used to identify and control risk caused by hazards.

What is risk analysis?

The combination of identifying hazards and assessing their risk is called risk analysis. Risk analysis can help the farm owner and employer to set priorities. Risk is calculated by using the formula:

Risk = Probability x Severity

Several systems assign mathematical values to probability and severity to help calculate risk ratios for hazards. Normally, hazards with the highest risk that affect the most workers, property, or food safety should receive the greatest attention.

Assess the risk

Hazard Identification Procedures

Once a hazard is identified, determine its probability and severity. Assessment may involve some research and monitoring of actual work activities.

For example, you determine noise is a potential hazard on a large tractor. The next step would be to use monitoring techniques or equipment (noise meter/noise dosimeter) to find out how loud the noise is, where and when the noise is a problem, how long the noise is at an unacceptable level, and so on.

Look for any factors that could contribute to the hazard. For example, consider work processes, work area design, existing hazard controls, and related training procedures. In the case of the tractor noise hazard, the problem may be made worse by such things as metal on metal contact, equipment vibration, lack of insulation, loose of damaged mounts, operating in animal facility enclosures, improper control settings, worn out mufflers etc.

Assess the risk posed by each hazard. Ask these questions:

- How likely is the hazard to cause harm?
- Under what conditions is harm likely to occur?
- How quickly could an unsafe condition arise?
- What type of harm is involved?
- How many workers could be hurt?
- Is there a history of problems, accidents or dangerous occurrences resulting from this hazard?
- What monitoring is needed to evaluate the risk?
- What is the severity?

Set priorities

Priorities can be set by using the formula (Risk = Probability x Severity). Factors such as the limits of technology, fiscal resources and potential problems raised by hazard controls will have to be considered. The following table illustrates one way of assigning probability and severity values. Adapt it to suit your needs.

Hazard Priority Chart for Jack and Jill's Workplace

Probability factors are ranked in order of importance below:	**Severity** factors are ranked in order of importance below:	***Risk of harm =*** ***Probability X Severity***
➢ Frequent (workers are frequently at risk) ➢ Probable (hazard is likely to cause harm) ➢ Occasional (workers are occasionally at risk) ➢ Remote (the hazard could cause harm, but is very unlikely to do so) ➢ Improbable (the hazard is unlikely to ever cause harm)	➢ Catastrophic (death or severe destruction) ➢ Critical (serious injury or property damage) ➢ Marginal (minor injury or property damage) ➢ Negligible (no injury or property damage)	Set priorities by comparing probability and severity.

Items	Hazard	Probability	Severity	Overall Priority	Consequences
1	Cutting up scrapped bulk gasoline tanks that may contain explosive vapors.	Frequent	Catastrophic	First (Highest)	Work done frequently due to tank replacement drive undertaken by gas stations for environmental reasons. This presents a fire and explosion hazard that could cause serious injury to workers and destroy our workplace.
2	Guard on metal shearing press is malfunctioning on every shift.	Probable	Critical	Second	Press used during each shift. Fingers of operators can be placed in the danger zone when the guard malfunctions. Fingers could be amputated. Accident probable due to hours of exposure to hazard.
3	Improper disposal container for used needles in medical rooms.	Occasional	Critical	Third	Container handled occasionally. Staff nurse and two emergency medical technicians could receive puncture wounds and serious infections if condition is allowed to persist.
4	Staff moving office furniture and filing cabinets.	Remote	Marginal	Fourth	Rarely happens. Safety officer sprained her wrist last month while moving a filing cabinet. Movers to be hired next time.
5	Water supply stored in large underground tank outside of workplace.	Improbable	Negligible	Fifth (lowest)	Tank serviced by a contractor. Our workers never work in or near the tank. Tank will drain into a sewer if ruptured.

Communicate information

Workers and family members must know about the hazards in the workplace in order to protect themselves and guests coming on to the farm. Communicating hazard information and protective controls and practices to workers is one of the most important functions of this program. To do this, you can:

- ➢ Post information such as: warning signs; hazard labels; hazard identification summaries; the results of inspections; summaries of workplace monitoring; and incident investigations
- ➢ Provide health and safety information to all supervisors/workers
- ➢ Discuss hazards with workers, family members, supervisors and managers
- ➢ Hold meetings to discuss hazard issues
- ➢ Develop or arrange worker training and education
- ➢ Keep containers for pesticides, chemicals and biological substances properly labeled
- ➢ Keep material safety data sheets (MSDSs) and pesticide label files current
- ➢ Establish and maintain a Central Notification location that is readily available to workers during their entire work shift
- ➢ Keep workers who raise safety and preparedness concerns informed about the status of the investigation

Develop, select and implement controls

Risk assessment is meaningless unless effective controls are developed and put in place. Control means eliminating the hazard or reducing its risk of harm to an acceptably safe level. An effective control must meet four standards:

1. It must adequately prevent the hazard from causing harm
2. It must protect everyone who could be harmed by the hazard
3. It must not create new hazards, or production and quality control problems (if it does, employees may be tempted to subvert it).
4. It must not create a hazard to the environment or public outside of the workplace

OPERATIONS:

Management

Many farm operations are vertically integrated where they perform tasks such as storage, packing and/or processing. Even if they don't perform these tasks they are being asked or required by the buyer of their products to develop and implement a food safety/security program.

Commercial businesses and some farm operations working with food are called "food establishments". Generally, these are establishments that work with food products that will directly enter the consumer products level. Any food handler working with fresh produce can be a food establishment for Food and Drug Administration (FDA) purposes.

FDA recommends that food establishment operators consider:

- Preparing for the possibility of tampering or other malicious, criminal, or terrorist actions
- Assigning responsibility for security to knowledgeable individual(s)
- Conducting an initial assessment of food security procedures and operations, which we recommend be kept confidential
- Having a security management strategy to prepare for and respond to tampering and other malicious, criminal, or terrorist actions, both threats and actual events, including identifying, segregating and securing affected product
- Planning for emergency evacuation, including preventing security breaches during evacuation
- Maintaining any floor or flow plan in a secure, off-site location
- Becoming familiar with the emergency response system in the community
- Making management aware of 24-hour contact information for local, state, and federal police/fire/rescue/health/homeland security agencies
- Making staff aware of who in management they should alert about potential food safety or security problems (24-hour contacts)
- Promoting food security awareness to encourage all staff to be alert to any signs of tampering or other malicious, criminal, or terrorist actions or areas that may be vulnerable to such actions, and reporting any findings to identified management (for example, providing training, instituting a system of rewards, building food safety and security into job performance standards)
- Having an internal communication system to inform and update staff about relevant security issues
- Having a strategy for communicating with the public (for example, identifying a media spokesperson, preparing generic press statements and background information, and coordinating press statements with appropriate authorities)

Supervision

- Providing an appropriate level of supervision to all staff, including cleaning and maintenance staff, contract workers, data entry and computer support staff, and especially, new staff
- Conducting routine security checks of the premises, including automated manufacturing lines, utilities and critical computer data systems (at a frequency appropriate to the operation) for signs of tampering or malicious, criminal, or terrorist actions or areas that may be vulnerable to such actions

Recall Strategy

- Identifying the person responsible, and a backup person
- Providing for proper handling and disposition of recalled product

Hazard Identification Procedures

- Identifying customer contacts, addresses and phone numbers

Investigation of suspicious activity

- Investigating threats or information about signs of tampering or other malicious, criminal, or terrorist actions
- Alerting appropriate law enforcement and public health authorities about any threats of or suspected tampering or other malicious, criminal, or terrorist actions

Evaluation program

- Evaluating the lessons learned from past tampering or other malicious, criminal, or terrorist actions and threats
- Reviewing and verifying, at least annually, the effectiveness of the security management program (for example, using knowledgeable in-house or third party staff to conduct tampering or other malicious, criminal, or terrorist action exercises and mock recalls and to challenge computer security systems), revising the program accordingly, and keeping this information confidential
- Performing random food security inspections of all appropriate areas of the facility (including receiving and warehousing, where applicable) using knowledgeable in-house or third party staff, and keeping this information confidential
- Verifying that security contractors are doing an appropriate job, when applicable

Appendix - Hazard Identification Procedures

Hazard Identification Report Form

Part 700 - Agriculture

MIOSHA - Right to Know Hazard Communication Compliance Guide

Emergency Planning for the Farm

Hazard Identification Report Form

Hazard Identification Record					
Work Task:		**Date Prepared:**	**Signed:**		
Work Type/Location	**Task/Activity/Work Process**	**Hazard**	**People/Product/ Facility at Risk**	**Current Controls (if any)**	**Comments**

Comments:

Part 700. Agriculture

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