Workplace Safety and Health Manual for the Saskatchewan Pork Industry
Sask Pork acknowledges the Manitoba Pork Council and are grateful for allowing us to adapt their manual for use in Saskatchewan.

The original manual was developed in partnership with:

Manitoba Labour, Workplace Safety and Health Division
Elite Swine Inc.
The Puratone Corporation
Assiniboine Community College
Centre for Agricultural Medicine, University of Saskatchewan
Department of Public Health Services, University of Alberta
and industry stakeholders

Thank you!

Information and recommendations contained in this publication are believed to be reliable. Sask Pork does not guarantee the accuracy or sufficiency of subject material, nor can it accept responsibility for the completeness of information.

For more information, refer to the Technical Modules on Healthy and Safe Practices in Pork Production on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction

Readers should refer to the Saskatchewan Occupational Health and Safety Regulations, 1996 for legal requirements.
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Introduction

Safety and Health Manual Background

Thousands of Saskatchewan residents are employed directly in the production of pork. This means that workers can be exposed, on a daily basis, to safety and health risks that are unique to the hog barn environment. These risks can include slips and falls while working with large animals. Gases and dust produced in the barn environment can threaten your short-term and long-term health. Noise levels, chemicals used for barn disinfection, veterinary product usage and diseases that are transmissible from pigs to humans are some of the other threats potentially found in the hog barn environment.

Fortunately, these risks can be minimized and eliminated easily. For example, protecting your hearing during feeding time is as easy as wearing earplugs. More serious are the cases each year where farmers die after entering a manure pit or tank. While these instances are extremely tragic, the life-saving solution is as simple as not entering the tank in the first place.

The Workplace Safety and Health Manual for the Saskatchewan Pork Industry is meant to make all those involved in primary pork production aware of the safety and health risks that are unique to the pork production environment. Through awareness of these risks you can protect yourself, your co-workers, your employees and your family from unnecessary pain and distress.
Everyone in the workplace shares in the responsibility to make the workplace healthy and safe. However, the greater the authority a person has, the greater their responsibility. Owners and employers must become familiar with the laws that apply to the pork production industry. Occupational health committees and occupational health and safety representatives also have important roles in maintaining a healthy and safe workplace. For specific information contact Saskatchewan Labour, Occupational Health and Safety Division at (306) 787-4496 or 1-800-567-7233, or on the web at: www.labour.gov.sk.ca

Responsibilities of the Employer

*It is the employer’s responsibility to make him or herself aware of the regulations that apply to the safe operation of the facility.*

Generally speaking, the employer is responsible for providing a safe workplace. This means that the employer is responsible for providing personal protective equipment, information and training with respect to safety and health issues.
Employers…how safety conscious are you?

☐ Do I know the laws that apply to my barn with respect to safety and health standards?

☐ Do I maintain my equipment, machinery, tools and the facility?

☐ Do I see to the proper use of equipment, machinery and tools?

☐ Do I provide appropriate personal protective equipment, and enforce its use?

☐ Do I provide training for the use of personal protective equipment, and make sure it is well-maintained and properly stored?

☐ Do I ensure that facility hazards are identified and labelled (particularly confined spaces)?

☐ Do I provide first aid training and first aid kits in the barn?

☐ Do I display emergency phone numbers?

☐ Have I developed an emergency plan, and trained my staff in steps to take in case of an emergency?

Remember, employers are responsible for making themselves aware of what is required of them by current acts and regulations.
Make your workplace a safer environment.

When developing effective training programs for your employees, you will likely need more information than is provided in this manual. Contact Saskatchewan Labour, Occupational Health and Safety Division at (306) 787-4496 when you begin developing employee training programs.

Responsibilities of the Employee

It is the responsibility of the employee to follow the safety and health policies as outlined by the employer. The employee must use the protective equipment provided by the employer. The employee must use tools, equipment, machinery and facilities in the manner for which they were designed and as the employer instructed.
Employees...how safety conscious are you?

☐ Do I use machinery and tools in the manner instructed by my employer?

☐ Do I report damage to equipment, facilities, tools and machinery to my employer or supervisor immediately?

☐ Do I use the personal protective equipment supplied by my employer?

☐ Do I use the provided protective equipment in the manner instructed by my employer?

☐ Where facility hazards are identified, do I pay attention to the warning on the label?

☐ Have I taken a first aid course, and do I know where the first aid kits are located in the barn?

☐ Do I know where emergency phone numbers are listed?

☐ Do I know the facility's emergency plan for dealing with injuries and accidents?

Employees, do your part to make your workplace safer.

Employees are responsible for following the safety and health instructions provided by the employer, and for using all equipment, machinery, tools and the facility in the manner for which it was designed.
How do I use this manual

Keep this manual in your barn where you and your employees can read it. Use this manual as a reference to help you identify potential safety and health hazards in your facilities. Once you have identified the risks unique to your facilities you can use the information in the manual to begin addressing and minimizing these risks.

Use the manual as a reference only. This manual is not intended to replace applicable acts, regulations and guidelines that govern workplace safety and health in Saskatchewan.

Language Barriers to Effective Safety and Health Training

Saskatchewan’s pork industry is attracting increasing numbers of workers from abroad. Language and literacy differences among workers mean that safety education may have to be tailored to each individual working in the barn. Make sure all workers understand your safety and health policies, regardless of language and literacy challenges.
Safety and Health Research Updates

The hog industry is changing rapidly: in general, workers are spending more time in barns as the size of operations increase and there continues to be a shift from family-run operations to employer-employee relationships. Universities and research institutions across Canada are examining the short-term and long-term health effects of full-time, career employment in the pork industry. For additional information and research relating to health effects on barn workers please contact Sask Pork at (306) 244-7752.
In Canada, during the period of 1990-2000, the leading cause of hospitalized agricultural injuries was animal related trauma, which accounted for 18.7%. Pigs caused 63 of those hospitalizations. More worker injuries occur during direct pig contact than any other part of hog production. Studies have shown that back and neck injuries and slips and falls seem to be the most common concern for animal handling related injuries. Less frequent, but equally important injuries include bites, kicks, cuts, abrasions and needle sticks.

Proper animal handling is one of the most important factors in the well being of humans and animals. Pigs are intelligent and perceptive. The attitudes of workers are key for fostering safe work practices when working with pigs.

**Facts**

- Understanding pig behaviour helps facilitate easy handling
- Knowing the facility setup will make animal movement easier
- Knowing your whereabouts relative to the pig will allow for safer animal movement
- Floors slippery from water, urine, and manure are hazards for both pigs and people
- Keeping alleyways clear assists in trouble-free, stress-free pig movement, which in turn helps keep the work place safe
- Chase boards and shaker paddles are the most effective tools for moving pigs
Animal Handling Basics

- Pigs’ vision is nearly 360°
- Perimeter around pig is called the *flight zone*
- If a worker enters a pig’s flight zone the animal will move
- Direction of pig movement is determined by handler’s position relative to the *point of balance*

- Alley should be distraction free to allow animals to move without stopping
- Pigs tend to move from dark to light (but not too bright) areas
• Pigs are herd animals and like to follow each other

• Isolated pigs without visual contact of other pigs will become excited and stressed

Area Specific Concerns

Breeding
• Tasks being performed put you in close contact with the pigs
• The pigs are very large
• Work space may be tight
• Boars are unpredictable - always keep a chase board between yourself and the boar

Processing
• Common injuries include punctures, cuts and needle sticks
• Repetitive work leads to loss of focus from fatigue
• Repetitive motion injuries
• Lower back strain from standing on concrete floors

Weaning
• Minimal injuries during this phase
• Weaning stresses sows which can lead to aggressive behaviour
• Back injuries may occur at this time from improper lifting techniques

Nursery
• Injuries can occur during sorting
• Lifting can cause back injuries

Finisher
• Loading and unloading is where most injuries occur
• Animals in transit are stressed and must be unloaded carefully
What does this mean for me?

• Know the temperament of the animals you are working with – are they easily stressed (i.e., gilts), or quiet and calm?

• Set up the barn for animal movement before beginning to move the animals – place gates in proper positions

• Practice good housekeeping – keep alleys and halls clear of clutter and distraction

• Keep light consistent – if loading at night, install a light in the trailer; if loading during times of bright sunlight, block the light from shining in

• Avoid overuse of muscles and joints when doing repetitive tasks by varying your activities - this will help prevent repetitive strain injuries

• Enter each pen daily and always handle animals considerately - pigs that trust people move more quietly and cooperatively
• Use proper moving equipment - chase boards and shaker paddles are the most effective way of moving pigs

• Practice good posture and lifting techniques - lift with your legs, not with your back

• Take advantage of herding instincts and move animals in small, manageable groups - groups move better by pushing the leader, rather than pushing the whole group from behind

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### Recommended group sizes for moving pigs:

<table>
<thead>
<tr>
<th>Movement Type</th>
<th>Group Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering Nursery</td>
<td>20</td>
</tr>
<tr>
<td>Entering Finishing</td>
<td>10</td>
</tr>
<tr>
<td>Leaving Finisher</td>
<td>6</td>
</tr>
<tr>
<td>Breeding Stock</td>
<td>4 - 6</td>
</tr>
</tbody>
</table>

---

**What type of animal moving equipment should I use?**

• Use chase boards that are properly sized for the alley in which you are moving the animal

• Use positive behaviours and gestures when moving pigs (i.e., pats and rubs)

• Avoid using slappers, buzzers and electric prods. These are stressors which cause unpredictable behaviour

• Use paddles or brooms as small versions of chase boards to get sows out of crates
• Slappers are appropriate tools for moving pigs only if used to make noise by hitting the wall, or other surface. Today’s lean pigs are more susceptible to bruising and stress - these can affect your bottom line.

Proper animal handling not only makes the workplace safer for you, it increases pig productivity and your bottom line!

For more information, refer to the Technical Module: Animal Handling Hazards, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
You Have Two Ears…Protect Them!

Noise is a serious concern in the agricultural community and pork production is no exception. Research demonstrates greater hearing loss in the farming community when compared to age-matched counter-parts that were not part of the farming community.

*Noise induced hearing loss* can be the result of exposure to continuous or intermittent harmful noise levels, without proper hearing protection.

**How much is too much?**

- Repeated exposure to average daily noise levels of 85 dBA or greater can cause hearing loss
- For every 3 dBA increase in noise level the safe maximum daily exposure level time is halved

<table>
<thead>
<tr>
<th>Noise Level (dBA)</th>
<th>Maximum Exposure Time (hrs)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>8</td>
</tr>
<tr>
<td>88</td>
<td>4</td>
</tr>
<tr>
<td>91</td>
<td>2</td>
</tr>
<tr>
<td>94</td>
<td>1</td>
</tr>
<tr>
<td>97</td>
<td>0.5</td>
</tr>
<tr>
<td>100</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*Safe maximum daily exposure time without hearing protection
Adapted from Saskatchewan Labour, Occupational Health and Safety Division
**Facts**

- Noise induced hearing loss is very serious because it is painless and often goes unnoticed until a substantial amount of loss has already occurred. Once lost, it can never be regained.
- If you have to raise your voice to be heard over background noise at a distance of 1 metre from your partner, the noise level is probably loud enough to damage your hearing.
- Difficulty hearing well at the end of the day or in crowds likely indicates hearing loss is occurring.

**What does this mean for me?**

- Step back from the source of noise when discussing matters with co-workers
- Always use proper hearing protection when working in noise hazard areas. A short sudden squeal may cause damage.

<table>
<thead>
<tr>
<th>SOURCE OF NOISE</th>
<th>dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine barn nursery</td>
<td>66-69</td>
</tr>
<tr>
<td>John Deere 8560</td>
<td>76.5</td>
</tr>
<tr>
<td>Ventilation fan - Chore Time 18RLX</td>
<td>77</td>
</tr>
<tr>
<td>Hammermill</td>
<td>94</td>
</tr>
<tr>
<td>Swine barn gestation</td>
<td>95-104</td>
</tr>
<tr>
<td>Chainsaw</td>
<td>115</td>
</tr>
<tr>
<td>Swine in confinement at feeding</td>
<td>121-133</td>
</tr>
<tr>
<td>12 Gauge shot gun</td>
<td>135-139</td>
</tr>
</tbody>
</table>

*Adapted from Centre for Agricultural Medicine, 1997.*
What about hearing loss?

• First tones lost are those above normal speech tones
• Significant hearing impairment has occurred by the time your ability to hear normal conversation is affected
• Noise exposed workers should be provided with an opportunity to have an audiometric (hearing) test at least once every two years

When exposure to loud noises is occurring, take all possible steps to reduce the noise or isolate the worker.

What to look for in hearing protection

A choice of hearing protection should be provided. People should select hearing protection according to their individual needs. Factors to consider include:

• Noise Reduction Rating (NRR) - look for protection that offers a 29-31 dBA reduction in noise level
• Comfort - properly fitted ear plugs are more likely to be worn consistently
• Noise level in the workplace - certain areas require more protection
• The need to wear other equipment for the work environment - choose hearing protection that is compatible with other protective equipment being used
• It is important that hearing protection is well-fitted

What types of hearing protection are there?

Ear Plugs

• rubber or plastic
• inserted into ear canal
• should fit well
• ideally fitted by audiologist
• cotton plugs are not effective in reducing damaging sound levels

Ear Muffs

• worn over the external part of ear
• can be taken off quickly and put on as needed
• ideal where loud noise is intermittent
Failure to completely insert the earplug into the ear canal can actually cause amplification of the noise, rather than decreasing it.

Are you noise knowledgeable?

1) The farming community tends to be more hearing impaired than the non-farming community at similar ages.
   a) True
   b) False

2) Match the sources of noise with the appropriate noise levels:
   1. Confined pigs at feeding A. 95 – 104 dBA
   2. Gestation barn B. 94 dBA
   3. Nursery barn C. 66 – 69 dBA
   4. Chainsaw D. 115 dBA
   5. Hammermill E. 121 - 133 dBA

3) Pork production technicians working in breeding and gestation may be exposed to unsafe noise levels for most of the day.
   a) True
   b) False

For more information, refer to the Technical Module: Noise Hazards and the resource on Personal Protective Equipment, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction

Also available is Noise in the Workplace available at www.labour.gov.sk.ca/safety/pamphlets/noise-workplace.htm

1) Answers: Questions 1 and 3 are both true.
2) Answers: 1. 121 - 133 dBA, 2. 96 - 104 dBA, 3. 66 - 69 dBA, 4. 115 dBA, 5. 94 dBA.
What are WHMIS and MSDS?

Definitions and Resources

**WHMIS** stands for Workplace Hazardous Materials Information System. WHMIS is a Canadian system that was developed to provide information about safe handling and storage of hazardous materials.

**MSDS** stands for Material Safety Data Sheets, which are described below.

**Controlled products** include any products which fall within the hazard criteria as presented in the *Controlled Product Regulation* of Health Canada’s *Hazardous Products Act*. Most hazardous products are controlled products and subject to WHMIS regulation, meaning the three components of WHMIS must be satisfied.

*A number of products are exempt from the WHMIS regulation as they are covered under other legislation. Also, labelling requirements may vary. It is important that you determine which rules apply to the products you are using. Consult the appropriate Acts and Regulations:*

Three Components of WHMIS

1) Labels

Controlled products come with *supplier labels*. This label identifies the product and the manufacturer, displays the chemical hazard symbol and may include first aid measures, referral to the appropriate MSDS, risk phrases and precautionary measures.

The employer must use a *workplace label* if controlled product is transferred from a bulk container to a smaller container. This label identifies the product, provides risks and precautionary statements and refers to the appropriate MSDS.

*Labels alert the user to the hazards of the product and the precautions that should be taken when using it.*

The employer is responsible for providing on-site WHMIS training about the handling and use of the products used on that site.
2) Material Safety Data Sheets

MSDS are available for any controlled product that you receive. These data sheets should be made immediately accessible to all workers who handle controlled products. The MSDS includes information on:

- hazardous ingredients
- preparation information
- product information
- physical data
- fire or explosive hazards
- reactivity data
- toxicological properties
- preventive measures
- first aid measures

3) Worker Education

The employee must receive instruction regarding the information on:

- supplier labels, workplace labels, and MSDS
- procedures for the safe use, storage, handling and disposal of controlled products
- procedures to be followed in case of an emergency involving a controlled product.

General information on WHMIS training is available from Saskatchewan Labour, Occupational Health and Safety Division. Call 1-800-567-7233 in Regina or 1-800-667-5023 in Saskatoon for specific training dates.

WHMIS Classifications

WHMIS classifications are more than just symbol recognition (see next page). The employer must make Material Safety Data Sheets (MSDS) available and immediately accessible for each controlled product in the barn’s inventory. All staff must receive training in understanding the MSDS and in the use of any specialized equipment identified on the MSDS, including personal protective equipment. Employees must also be aware of first aid procedures to follow in case of accidental exposure.
**Class A: Compressed Gases**
- Pose an explosive danger because these gases are contained under pressure. May cause container to explode if heated in a fire or subjected to impact forces.

**Class B: Flammable and Combustible Materials**
- Material that will burn or may burst into flame spontaneously in air, or release a flammable gas on contact with water vapour. May cause fire when exposed to heat, sparks, flames, or as a result of friction.

**Class C: Oxidizing Materials**
- Pose a fire and/or explosion risk in the presence of flammable or combustible material. May react violently or cause an explosion when contacting combustible materials.
Class D1: Poisonous and Infectious Materials
- Materials causing immediate and serious toxic effects. May be fatal or cause permanent damage if inhaled, swallowed, or entered into the body through skin contact.

Class D2: Materials Causing Other Toxic Effects
- A poisonous substance that may not be immediately dangerous to health. May cause death or permanent damage as a result of repeated exposures over time. May be a sensitizer (produce chemical allergies), cause cancer, birth defects, or sterility.

Class D3: Biohazardous Infectious Materials
- May cause a serious disease resulting in illness or death.
Class E: Corrosive Materials
- Causes eye or skin tissue damage upon contact. May be harmful if inhaled.

Class F: Dangerously Reactive Materials
- Is very unstable. May react with water to release a toxic gas. May explode as a result of shock, friction or increase in temperature. May explode if heated when in a closed container. Undergoes vigorous polymerization or decomposition.

For more information, refer to the Technical Module: Chemical Hazards available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
Air Quality in the Hog Barn

Livestock reared in confinement produce heat, moisture and manure. Both the manure and the animals in the production units produce gases. Feed, manure, animals and bedding all contribute to dust production in the barn. The atmosphere in livestock buildings, particularly where ventilation is limited, can adversely affect human health.

Although production agriculture is currently not inspected as frequently as other industries, the standards for exposure to airborne contaminants are the same. It is important to maintain as low a level of contaminants as possible.

The mixture and level of these contaminants in a swine barn depend on:

- class and number of animals confined
- style of building and type of ventilation and heating systems
- type of feed and feed handling system
- type and frequency of waste disposal
- time of year
- overall cleanliness of the unit

Workers may not notice ill effects from airborne contaminants immediately. Symptoms develop over time and include coughing, wheezing, and the development of allergies and chronic bronchitis.

Dust: What is it?

Dust – solid particles of a wide range of sizes that may be either settled or airborne. Dust in the swine barn can consist of:

- particles of ammonia
- feed particles
- swine or rodent fecal dust
- minerals
- ash
- pollen
- grain mites
- insect parts
- shed skin cells
- bacteria
- mould
- infectious agents
Facts

- Up to 85% of dust in swine barns is **respirable dust**, so small it can be inhaled into the lungs. Larger particles constitute the **inhaled dust** component, which is filtered out before reaching the lungs.

- 70 – 90% of barn dust is organic. Organic dust is biologically active, meaning our respiratory defense system will react (causes coughing, mucus production, and possible allergic reaction).

- Highest levels of dust occur during feeding, feed grinding and animal movement.

- Dust is especially concentrated in winter.

- Dust is always present in the atmosphere.

How much is too much?

- Levels of respirable dust should not exceed 3 milligrams/cubic metre (mg/m³) in other industries, but it is recommended that barn dust should not exceed **0.23 mg/m³** due to its biologically active nature. Levels of total dusts should not exceed 10 mg/m³.

- By the time dust levels reach 10 – 20 mg/m³ a definite haze is visible.

What does this mean for me?

- Wear appropriate protective equipment at all times, taking special care during feeding, animal moving, and in cold temperatures.

- In winter, levels of respirable dust may be at least 3 times higher than the maximum level tolerable.

- Some people are more sensitive and will have difficulties at dust levels lower than this maximum.
1) Reactions to dust can be immediate or delayed:

- Immediate symptoms include eye irritation, nasal stuffiness, runny nose and itchy throat
- Delayed symptoms can include headache, nausea or vomiting, fever, unproductive coughing and difficulty breathing

2) There are 3 types of health effects:

(i) Temporary damage:
- Symptoms will disappear rapidly when the person is no longer exposed to dust

(ii) Insidious damage:
- Development of bronchitis or occupational asthma after long term exposure to dust
- Not as severe as an allergic reaction
- Respiratory system may recover entirely when no longer exposed to dust
- Symptoms include coughing, shortness of breath and decreased pulmonary capacity

(iii) Permanent lung damage:
- Damage that occurs when continuously exposed to dusty environments for long periods of time without proper protection, may develop even without signs of obvious allergic reaction
- Tissues are permanently affected leading to decreased respiratory capacity
- Irreversible

For more information, refer to the Technical Module: Dust Hazards, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
Gases

There are 5 gases produced in pork production units - three from manure storage pits (ammonia, methane, hydrogen sulfide), one from animals breathing (carbon dioxide), and one from the burning of fossil fuels (carbon monoxide). These gases are irritants at low concentrations, but at higher concentrations can be deadly.

Facts

- Increased levels of toxicity occur during gutter flushing, pit agitation and emptying
- Gas levels are reduced by frequent emptying of pits
- An air space of 30 cm should be allowed in manure pits for storage of gases
- Dangerous levels of gases build up quickly when ventilation fans are off – either by accident or in the event of a power failure
What does this mean for me?

• **Assume that the manure pit and surrounding areas are Immediately Dangerous to Life and Health (IDLH).** Monitor gas levels on a continual basis - ask about colorimetric detection tubes, personal alarms and carbon monoxide detectors at your nearest safety equipment supply company.

• All facilities should have an *Emergency Response Plan* to follow should levels of toxic gas become dangerous. See the chapter - “Developing Your Emergency Response Plan” in this manual.

• Be sure **you know and can implement** the emergency response plan.

• **Maximize ventilation when emptying pits - even in cold weather**

• Empty pits at a time when “bad” air will be replaced with fresh air before workers re-enter the barn.

• Agitate pits only after one half of the contents have been pumped out.

• Begin agitating slowly and gradually increase agitator speed.

• Empty pits frequently - never allow pits to fill completely.

• Gas levels are higher in winter because of decreased ventilation.

• Gases that are dangerous to the worker are also dangerous to the animals.

• Methane is explosive at concentrations above 5% by volume of air. Hydrogen sulfide is explosive at concentrations as low as 4.3%. **Do not smoke in barns!**

• Use caution when operating gas-powered equipment indoors unless the engine can be placed outside, away from air intakes. Symptoms of CO poisoning include headache, dizziness, confusion and staggering. **Even in barns, fatal CO levels from a small engine can be reached in as little as 30 minutes!**
### Table 5. Prevalent Barn Gases

<table>
<thead>
<tr>
<th>GAS</th>
<th>CHARACTERISTICS</th>
<th>SOURCE</th>
<th>Saskatchewan 8-hour contamination limit*</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Dioxide (CO₂)</strong></td>
<td>Colourless and odorless; heavier than air; non flammable</td>
<td>Animal Respiration</td>
<td>5,000 ppm</td>
<td>Non-toxic, but elevated levels will displace oxygen in the air to act as an asphyxiant</td>
</tr>
<tr>
<td><strong>Carbon Monoxide (CO)</strong></td>
<td>Colourless, odourless, toxic</td>
<td>Fossil fuel burning (operation of gasoline engines)</td>
<td>25 ppm</td>
<td>Asphyxiant; toxic concentrations quickly absorbed; may cause illness in humans and pigs - small pigs and fetuses at greatest risk</td>
</tr>
<tr>
<td><strong>Ammonia (NH₃)</strong></td>
<td>Pungent; recognizable by acrid smell; colourless; lighter than air; flammable</td>
<td>Bacteria that live in faeces and urine</td>
<td>25 ppm</td>
<td>Most prevalent of all barn gases - irritates mucous membranes of eyes, nose and upper respiratory tract; long periods of exposure may cause respiratory disease</td>
</tr>
<tr>
<td><strong>Methane (CH₄)</strong></td>
<td>Highly flammable; lighter than air; colourless; odorless; explosive limits 5% - 15% concentration in air</td>
<td>Manure pits</td>
<td>N/A</td>
<td>Highly explosive (no open flames, sparks or smoking); reacts violently with oxygen - caution when using an oxyacetylene torch in barn</td>
</tr>
<tr>
<td><strong>Hydrogen Sulfide (H₂S)</strong></td>
<td>Rotten egg smell at low concentrations; highly toxic; numbs smell at high concentrations; flammable at 4% concentration in air</td>
<td>Breakdown of manure in areas where there is no oxygen (silos, manure pits)</td>
<td>10 ppm</td>
<td>Causes paralysis of olfactory system (smell) at 200 ppm; FATAL - 700 ppm can cause unconsciousness or death in 1 - 3 breaths; You should never be exposed to 20 ppm without an SCBA</td>
</tr>
</tbody>
</table>

*Saskatchewan 8-hour contamination limits are Time Weighted Averages (TWA):*

For more information, refer to the Technical Module: *Gas Hazards*, available on the Saskatchewan Labour website at [www.labour.gov.sk.ca/safety/porkproduction](http://www.labour.gov.sk.ca/safety/porkproduction)
Barn Gases - Know Your Limits

Fill in the blanks using information from the previous pages:

1. _______________________________ smells like rotten eggs.

2. A concentration of ______________ ppm of H₂S gas will cause unconsciousness or death.

3. At least ______________ of air space should be allowed for gas storage in the manure pit so that gas will not drift into the barn area.

4. ________________________ and _____________________ are asphyxiants (suffocators).

5. _______________________ is produced from hogs breathing, while _______________________, ____________________, and ______________ are produced from the manure in the pits.

6. _______________________ and _____________________ are flammable.

7. ________________ is an irritant to the respiratory system and long periods of exposure may cause respiratory disease.

How do I protect myself from dust and gases?

A wide variety of respiratory protection devices are available. Use the device that is suited for your work environment or you will not be protected. Any respiratory protection device, whether it be for dust, chemicals, or oxygen deficient/toxic environments, must be approved by a recognized agency such as the National Institute for Occupational Safety and Health (NIOSH). Follow the instructions on the package for fitting and intended use.

For more information, refer to the resource on: Personal Protective Equipment, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction

Disposable respirators: (dust/mist masks)

- most common defense against respirable dust
- satisfactory only if well-fitted
- suitable when working in a feed mill area, during feeding or during animal movement
- protect the wearer beyond normal dust exposure limits
- most offer no protection against gases or fumes
- some have an exhalation valve, which improves comfort

Chemical cartridge respirators: (dust, certain gases and organic vapors)

- may have disposable or replacement-type face pieces
- cartridges are replaced when the filter is exhausted
- different types of cartridges are available to protect from different contaminants - select the cartridge that is appropriate for your situation, using as indicated on the package
- none of the tight-fitting respirators (disposable, chemical cartridge respirators, gas masks) are effective for bearded people - beards prevent a proper seal
Powered air purifying respirator: (excessive dust levels or pesticides)
- consists of battery-powered fan unit, a helmet and face mask, and a replaceable filter or chemical cartridge
- the fan assembly forces air through the filter to the breathing zone of the wearer
- much easier to breathe because no effort is required to draw air through the filter
- powered by battery strapped to wearers’ backs or waists, or by an adapter from vehicle batteries
- can be used by people with beards or glasses
- select the cartridge or filter that is appropriate for your situation - otherwise you will not be protected.

Gas Masks: (high concentrations of toxic gases)
- more effective than chemical cartridge respirators against high concentrations of toxic gases
- chemical filter in mask removes toxic vapors and particles
- replaceable canisters that are larger volume than chemical cartridges so may be used for longer periods of time
- fit of the mask is important for effectiveness
- usually have a full face piece with an attached hose leading to a canister mounted on the wearer’s belt

The above devices DO NOT WORK in oxygen deficient environments! Supplied Air Respirators must be used if oxygen is limited in your work environment, or if toxic gases such as H₂S are likely to be present.
**Supplied-air respirators:** (for use in oxygen-deficient areas)

- good for use in oxygen limited areas like manure pits, silos or bins containing high-moisture grain
- two types - hose mask with blower and emergency air supply, or the Self-Contained Breathing Apparatus (SCBA)
- when using SCBA the wearer carries a portable supply of air that is independent of the environment
- only the positive pressure SCBA is suitable in environments containing high levels of toxic gases, such as H₂S
- SCBA equipment is expensive and requires training for proper use

**Gas and Dust Monitoring Equipment**

A number of safety equipment suppliers offer a wide variety of gas monitoring and detection equipment, ranging from sophisticated electronic devices to small, inexpensive colorimetric detection tubes. Personal alarms, worn on work clothing, are available that will alert employees if the air quality in the work environment becomes compromised.

Consider using this equipment to characterize daily, weekly or seasonal changes in air quality in your barn. Use detection tubes to continuously monitor gas levels. Use this information to adjust your ventilation system to your benefit, the benefit of your employees and the health of your pigs.

For more information, refer to the resource on: *Air Sampling*, available on the Saskatchewan Labour website at [www.labour.gov.sk.ca/safety/porkproduction](http://www.labour.gov.sk.ca/safety/porkproduction)
Oil Sprinkling

Spraying a fine mist of canola, soybean, or mineral oil reduces the level of dust present in the air, and has been shown to significantly reduce the harmful effects of barn dust. Oil may be applied to pen and walkway floors using a backpack sprayer or a misting system. The cost of operating a misting system is less than $1.00/pig and the dust reduction is significant.

Care and Storage of Protective Equipment

Store all personal protective equipment in a clean, dust-free place. A clean, resealable plastic bag can also serve as a storage unit. Do not use disposable respirators that are dirty. Replace chemical cartridges and filters after the recommended number of hours of use, as soon as breathing ease is reduced, or if chemical odours are detected. Remember that high levels of hydrogen sulfide will numb your sense of smell!

The employer is responsible for providing all workers with training to use respiratory protection equipment, so that the worker is aware of its limitations, maintenance requirements and proper fit.
Special Concern: Confined Spaces

What is a confined space?

• Any space not intended or designed for continuous worker occupancy

• Any space which has a limited or restricted way of entering

• Any space in which there is a chance that normal levels of oxygen may be reduced, or some toxic or explosive gases may be accumulated or released

• Any space where mechanical hazards are present

Manure pits, grain bins, water wells and tanker trailers are all examples of confined spaces.
**Fact**

In the time it takes for you to take one breath of air, unprotected work in a confined space can kill you. *High levels of pit gases numb your sense of smell and cause unconsciousness in only 1 to 3 breaths!*

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**Recognizing confined spaces**

It is critical that workers recognize the danger associated with entering a confined space. *Always!* Many accidents happen when someone thinks, “I will be down there just for a second” – but they never come back.

- Post hazard signs on all manure pits and other confined spaces
- Provide access to serviceable parts from outside the pit
- Fit all openings to manure pits with substantial covers
- Be aware that dangerous gases may pool in corners

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**A must for all production units**

*Self-Contained Breathing Apparatus (SCBA) equipment is necessary for confined space entry.* This is specialized equipment and special training is required for its use. *If maintenance work is required in a manure pit or tank, please call in a professional.*
August 3, 2000 (Saskatoon Newsroom) - On Sept. 25, 1998, a morning manure crew discovered a silent manure truck near Lucky Lake that should have had a four-person crew. One man was found unconscious but alive in the truck’s cab. Three others were found dead in the tank. They had died from toxic levels of hydrogen sulfide gas, a substance commonly found in pig manure.

Investigators believe the first victim, a 39 year old man had experience working in confined spaces such as manure tanks, must have opened the manhole on top of the tank and looked in. The concentration of hydrogen sulfide was so strong that he was immediately knocked unconscious and fell into the tank. Two other men followed in an attempt to help the first, and both also succumbed immediately to the fumes. The fourth man also attempted to help, but was able to pull himself out before collapsing.

The manure truck was equipped with a breathing apparatus, but it was not used.

Never enter a confined space unprotected, even to attempt a rescue. If emergency entry into a pit is necessary for rescue, call your local fire department (number should be posted) or 911!

The manure pit is an extremely dangerous environment. Post hazard signs outside manure pits. To further decrease the need to enter a pit, locate serviceable parts so that they can be accessed from outside the pit.
IF you have the required equipment and training…

…the following is an example of an entry procedure for a manure storage pit. Be sure you know your barn’s procedure and most importantly, be sure to follow the procedure in the event entry into a confined space is required – even if it takes extra time to set up.

Plan the entry. Each unit should have a documented procedure for confined space entry. Practice the plan annually.

Use two “top men” - two observers who are trained in first aid, CPR and your farm’s rescue procedure and the use of the pit retrieval system. Maintain constant contact with the top men while working in the confined space.

Monitor gas levels on an on-going basis. H₂S levels are most important in manure storage pits.

Ventilate the pit and surrounding area continuously to replace stale, toxic air with fresh, oxygenated air.

Fireproof. Flame resistant coveralls are recommended because of fire and explosion risk. Electrical equipment taken into the confined space must have ground-fault circuit interrupters.

Use a Self-Contained Breathing Apparatus (SCBA) with a warning alarm or escape bottle. Put the SCBA on before entering the confined space, and never remove your mask when you are inside the confined space.

Rubber boots and gloves will help prevent bacterial contamination.

If pit is dark, use a reliable light source.

Always use a retrieval system when entering a pit – if something goes wrong while you are in the pit, your top men can pull you out.

For more information, refer to the Technical Module on: Working in Confined Spaces, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
General Safety

Often we ignore potential hazards because of poor habits, failure to believe warning labels, fatigue or boredom. Overall safety in a pork production unit can be improved by ensuring some simple tasks are done properly. These minor tasks, many of which are classified as housekeeping, are important for maintaining a safe work environment.

Daily hazards encountered

- wet floors
- obstacles to trip over
- broken pens and gates
- chemicals
- lifting heavy objects

What does this mean for me?

- Whenever possible, wash floors when people have the least amount of travel to do in that area - this prevents slipping and tripping over water hoses
- Always return tools, shovels and chase boards to their proper storage areas immediately after use - this prevents dangerous clutter
- Perform all repairs immediately
- **Always** wear proper protective equipment when handling chemicals - the employer is responsible for providing this equipment
- Read product information so you know **safe use** of all sanitation products and other chemicals
• **Always** practice proper lifting techniques

• Get help, or use a lifting device when moving very heavy objects, such as removing dead sows from crates

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**Safe Handling of Swine Injectables: Inject the Pig, not Yourself!**

Some of the medications you give to your pigs can also affect you if you accidentally inject yourself. Medications meant for your pigs can cause localized inflammation around the injection site, or a more severe reaction if you are allergic.

Some drugs can be absorbed through the skin. Wash well after handling medications. Pregnant women should take special care when handling hormones used for synchronization and induced farrowing, such as oxytocin and prostaglandins or afterbirth from sows treated with these products. These chemicals can cause spontaneous abortion and secondary reproductive complications in women.

**In the case of accidental injection:**

• Find and read the MSDS and package insert for the product
• Clean the area with water and antiseptic soap
• If a local reaction such as swelling or itching occurs, rest and elevate the affected area
• Seek prompt medical attention. Bring the package insert with you
• Phone a poison control hotline
How can I prevent needlestick injuries?

- Be cautious when recapping or removing a needle - scoop the cap from a surface, don’t use your hands to hold the cap when recapping
- Make sure the animal is properly restrained before giving the injection
- Use a tubing device to attach the needle to the syringe (i.e., Slapshot) - this makes giving the injection easier
- Dispose of used needles immediately in a puncture resistant sharps container
- Plan for safe handling and disposal of needles

Safe Handling of Hog Barn Sanitizers

Although many different products are used for disinfection of hog barns, only a few chemical classes are widely used. Products can contain formaldehyde, chlorine and other compounds. Check the label of the product you are using to determine the active ingredient, and **pay close attention to product warnings!**

- **Formaldehyde** gas is used as a fumigant. It produces irritating fumes, is explosive, and is carcinogenic. When fumigating with formaldehyde, the facility must be depopulated, sealed and thoroughly ventilated before re-entry. A much safer method to apply formaldehyde is to use a vapour phase disinfectant (eg., Profilm).
Many products contain hypo-chlorite that can release chlorine. Chlorine gas is an irritant to eyes and the respiratory tract. Mixing hypo-chlorite with amounts of acid cleaners or formaldehyde causes production of toxic gases.

Other classes of disinfectants, such as phenolics (eg. Virkon) have the potential to be toxic if handled improperly. Contact with skin and inhalation of fumes should be avoided during use of all classes of disinfectant.

Use a dust mask, safety goggles and rubber gloves when mixing and applying disinfectants.

Refer to the precautions listed on the label and the MSDS (Material Safety Data Sheets) of the product you are using, and follow those precautions!
Fire Prevention Protects Your Investment

The leading causes of fires in barns are:

- careless smoking
- faulty electrical system
- faulty heating equipment
- improper storage or use of flammable liquids

Assess your facilities for potential fire risk areas. These can include your electrical system, heaters, or areas where power tools, cleaning supplies, fuel and other flammable solvents are stored.

How can I be “Fire Safe”?

- Do not overload wiring. Inspect and replace old or defective wiring and chewed cords with new circuits or electrical cords
- Keep your barn clean - build up of dust, trash or spider webs in the electrical system is a fire hazard
- Remove trash and flammable materials from the area around motors and heaters
- Heat lamp cords should be short enough that they become unplugged if a lamp should fall to the ground
- Never permit smoking in barns or near flammable materials
- Ensure smoke detectors are functional, and inspect them regularly

For more information, refer to the Technical Modules on: Safety Hazards and Chemical Hazards, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
What should I do if a fire starts?

• Call 911 or your local fire department. Evacuate the building and close windows and doors as you exit.

• All workers should be aware of the location and proper use of fire extinguishers. *Fight the fire only if it remains small and only after calling the fire department.*

• Barns should have A.B.C.-rated extinguishers that are effective against electrical, petroleum or wood fires. *Never use water on electrical fires or petroleum fires - this will cause them to spread faster.*

P.A.S.S. stands for:
Pull the pin (or Press the lever);
Aim at the base of the fire;
Squeeze the handle;
Sweep from side to side.

*The real danger of fire is in the smoke, toxic gases and rapid loss of oxygen. If fire continues to spread, get out of the building immediately!*
Diseases that are transmissible from animals to humans are called **zoonoses**. Although it is very unlikely, influenza and salmonellosis can be transmitted from pigs to humans, as can the bacteria causing brucellosis, erysipelas and TB. Equally rare are cases where parasites from pigs infect humans who work with those animals.

Diseases may be transmitted through urine, faeces, blood and saliva. Handling of afterbirth, stillborns, abortions and dead pigs can also transmit disease. Diseases can be introduced to the human through open wounds, through ingestion or inhalation.

**What can I do to avoid zoonoses?**

- Wear gloves and a mask regularly - always when handling dead animals or rodents

- Wash hands thoroughly with hot, soapy water, and use an antiseptic soap after working with animals, especially before eating to avoid ingestion of disease agents

- Cuts and scrapes should be covered when working with animals - this will prevent disease agents from entering open wounds

- Keep facilities clean, dry and properly ventilated, and maintain a veterinarian-prescribed vaccination and de-worming program - this reduces the level of disease your pigs will carry

- Maintain a rodent-free barn - the infective dose of *Salmonella typhimurium* (human food poisoning) can be carried in just one mouse's faecal pellet. Also, be aware of the potential for Hanta Virus when cleaning up rodents and rodent droppings (i.e., sweeping) . Wear a mask and rubber or plastic gloves and wash and disinfect the area after clean-up. Use a respirator with one of the following NIOSH approval numbers: N100, R100 or P100.

For more information, refer to the Technical Module on: Infectious Disease Hazards and the resource: Infectious Disease Hazards Summary: Intensive Livestock, available on the Saskatchewan Labour website at www.labour.gov.sk.ca/safety/porkproduction
General Safety - How can I do my part?

Regular maintenance can help to keep a pork production unit a safe place to work. Weekly inspections should be scheduled into the work routine of the unit. This expenditure of 2-3 hours a week will go a long way in keeping workers safe and in preventing major equipment catastrophes.

What to do on routine maintenance inspections:

• Carry a grease gun, oilcan and some basic tools

• Inspect each room thoroughly. Be sure to check ceiling, flooring, walls, pen partitions, crates, feeders and waterers for any signs of wear or disrepair

• Fix minor problems immediately, before they become major problems

• Remember to look at door hinges, feed cart wheels, and other moving parts - keeping parts moving freely and noiselessly will make your job easier, and help keep animals calm

• Ensure there is an electrical lock-out so no one can accidently turn on a breaker while you are servicing electrical equipment

• Make note of major repairs that are required or soon will be required

• Return tools to the proper storage place

• Report repairs to a manager or supervisor

General inspections should be done by the manager on a regular basis such as once a week. Continuous inspections should be done by all staff as they work. Accident investigations are necessary if an accident does happen to prevent it from happening again.
Developing Your Emergency Response Plan

1. Your emergency response plan should be simple.

2. Procedures must be written by management and stored in a place accessible to all employees.

3. Draw a floor plan of your barn site. Include all buildings, stationary equipment, manure storage facilities, roadways, power lines, electrical panels, water sources, etc.

4. Identify and highlight all potential hazard areas described in this manual
   - Physical Hazards - e.g., high noise, dust, power tools, poor housekeeping
   - Chemical Hazards - e.g., detergents, vaccines and medications, toxic gases such as hydrogen sulfide
   - Biological Hazards - e.g., infectious material from sick or dead animals (sick pens, deadstock bin)
   - Psycho-Social Hazards - e.g., pressures which cause stress, worry, fatigue
   - Ergonomic Hazards - e.g., machinery or equipment design that does not fit the person using it, repetitive movement and monotonous work processes

5. Identify all exits

6. Identify position of all fire and safety equipment such as fire extinguishers, MSDS sheets, safety harnesses and lifelines, etc. Make sure this equipment is up-to-date and ready to use.

7. Have a list of names, telephone numbers and addresses of the company president, vice-president and manager/supervisor(s) and staff

8. List the person responsible for contacting family members in the event of an emergency. This person should have written authority to provide this information.

9. Post the following phone numbers beside each telephone:
   - police department
   - fire department
   - ambulance
   - hospital
   - mutual aid agreements with other municipalities (fire department, ambulance, etc.)
   - Saskatchewan Labour, Occupational Health and Safety Division.
10. Plan for every type of emergency whether illness, injury, fatality, loss of property or equipment. Identify all tasks that need to be performed. List all company names, addresses and telephone numbers that may be required to assist you with your emergency (for example: trucking companies, other swine facilities, etc.)
   - power failures
   - health emergencies
   - attack on a worker by an aggressive animal
   - fire or explosions
   - water line breakage
   - flood
   - electrocution
   - workers working alone
   - failure of worker to arrive safely at work or at home

11. Establish an evacuation procedure. For example, in the event that toxic gas levels become dangerous:
   - get out of the area
   - sound the alarm
   - put on a breathing apparatus (if you have one and are trained to use it)
   - rescue then revive the victim(s)
   - get medical attention

12. Have at least one person in the barn trained in CPR and first aid.

13. Develop a good checklist for doing barn inspections, looking for needed repairs and other potential hazards. Conduct inspection regularly.

14. Plan for safe storage of vital company records
   - insurance documents
   - animal records
   - bank records
   - payroll records
   - Workplace Safety and Health records

15. Discuss this plan with all employees, practice emergency procedures regularly and update your emergency response plan at least annually.
Additional Resources

Note: This is not a complete list of all safety-related resources.

First Aid Information and Training Services

Canadian Red Cross Society 1-888-307-7997
St. John Ambulance 1-888-273-0003 (Regina)
Heart and Stroke Foundation 1-888-473-4636 (outside Saskatoon)
(306) 244-2124 (inside Saskatoon)

Breath of Life First Aid/CPR (306) 254-4359 (Dalmeny)
Lisa Volgelsang 1-877-707-5738
Basic Plus First Aid (306) 254-4302 (Dalmeny)
First Aid for LIFE (306) 933-2472 (Saskatoon)
Sharalife First Aid (306) 222-2306
J&T First Aid (306) 347-1020 (Regina)
Selena Crossley (306) 359-1011
First Response Care (306) 922-1633 (Prince Albert)
Lifeline Safety Instructors Inc. 1-877-652-8989 (Saskatoon)
EMP Canada (Larry Sigfusson) (306) 242-8637 (Saskatoon)

Safety and Health Information

Saskatchewan Labour, Occupational Health and Safety Division
Regina, SK (306) 787-4496
1-800-567-7233
Saskatoon, SK (306) 933-5052
1-800-667-5023
Prince Albert, SK (306) 953-2946

Institute of Agricultural Rural and Environmental Health (IAREH)
Saskatoon, SK (306) 966-8286
http://iareh.usask.ca
Health Canada, Central Regional Office

Winnipeg, MB (204) 983-2846
www.hc-sc.gc.ca

Poison Control Hotline 1-866-454-1212 (Saskatoon)

Saskatchewan Lung Association (306) 343-9511 (Saskatoon)
1231 – 8th Street East 1-888-566-5864
Saskatoon, Saskatchewan
S7H 0S5
www.sk.lung.ca

Other websites of interest:

American Conference of Governmental Industrial Hygienists
www.ACGIH.org

American Industrial Hygiene Association
www.aiha.org/

Canadian Agricultural Safety Program
www.casa-acsa.ca

Canadian Lung Association
www.lung.ca

Canadian National Occupational Health and Safety Web Site
www.canoshweb.org

Commission de la santé et de la sécurité du travail
www.csst.qc.ca

Saskatchewan Labour Farm Safety
www.labour.gov.sk.ca/farmindex.htm

National Education Center for Agricultural Safety
www.nes.org/necas.htm

National Institute for Occupation Safety and Health
www.cdc.gov/niosh/homepage.html
References

American Conference of Governmental Industrial Hygienists Worldwide. 1999. 1999 TLVs® and BEIs® Based on the Documentations for Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices.


