

Save Your Breath:

Respiratory Health in Agriculture

2nd Edition



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DID YOU KNOW THERE ARE NUMEROUS RESPIRATORY HAZARDS IN AGRICULTURE THAT CAN IMPACT YOUR LUNGS?

This resource will help you to better understand respiratory hazards that exist in agriculture and assist you in applying a combination of controls to protect your respiratory health.

- Recognize respiratory hazards in Agriculture
- Prevent chronic lung disease
- Understand Hierarchy of Control
- Understand respiratory protection selection
- Respiratory health on the Farm

**RESPIRATORY DISEASES
DUE TO AGRICULTURAL
EXPOSURES ARE
PREVENTABLE!**

An average person can go...

Weeks without food, days without water, but only minutes without breathing.

Take Care of Your Respiratory Health!

Respiratory health is important in the agricultural industry as the exposures to hazards can be very high.

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UNDERSTANDING The Respiratory System

The Respiratory System: You inhale about 20,000 litres of air every 24 hours. If you are doing hard strenuous physical work you can inhale up to 10,000 litres of air within 8 hours. Your lungs work hard every day! There are defense mechanisms in place to clean the air you breathe but some of these may be bypassed when you work strenuously.

What happens when you breathe?

- Air is inhaled through the nose.
- Small bones and cartilage cause the air to swirl.
- Air enters the throat which then divides into 2 tubes, the esophagus and the windpipe (trachea). The esophagus carries food and drink to the stomach.
- The windpipe divides into 2 tubes called bronchi. The bronchi each enter the lungs and divide into smaller tubes called bronchioles. These bronchioles end in tiny little air sacs called alveoli (approximately 300 million!) with walls thin enough to allow gases to be absorbed and released from the blood stream.

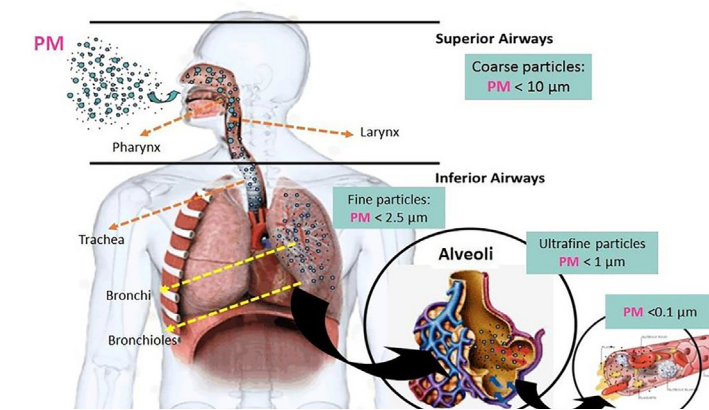
Your normal defense mechanisms:

- Nasal hairs filter out large particles.
- Mucus traps some of the particles found in dust, fumes and smoke.
- Some vapours and mists may be dissolved in the mucus.
- A sneeze is a reflex action that rids your nose of irritating substances.
- Tiny hair like structures sweep mucus to the back of the throat where you swallow it and any substances dissolved in it.
- A cough is a reflex action that rids your windpipe and bronchi of mucus and dissolved or attached substances.

PARTICLE SIZE Why does it matter?

Particles in the air can be all shapes and sizes. Size matters because it is closely related to how deep the particles can enter into your respiratory system.

When talking about particles, many health and safety specialists refer to them as “dusts”:









General Nuisance Dust: This type of dust is made up of very large particles that typically fall to the floor and surrounding surfaces. This dust is easy to see and can often make places look “dirty”. However, most of these particles are not inhaled into the respiratory system.

Inhalable Dust: This type of dust is small enough to be inhaled into the nose and throat areas. Most of these particles are filtered out via the normal defense mechanisms. However, they can still cause irritation.

Respirable Dust: These particles are so small, they can be inhaled deep into the lungs where they will stay or be absorbed by the body.

DID YOU KNOW? Many hazardous particles are not visible to the human eye. These particles can easily bypass defenses and end up deep into your lungs, where they can then be carried to all parts of your body.

What are the Respiratory Hazards in Agriculture?

HAZARD	EXAMPLE	HEALTH IMPACT
 <p>DUSTS</p>	<p>Loading/unloading and shoveling grain. Grinding feed, hauling bales, feeding animals. Operating and cleaning of farm equipment.</p>	<p>Symptoms such as cough, phlegm and shortness of breath, and allergies/asthma, and have also been linked with lowered breathing capacity.</p>
 <p>MOLDS & FUNGI</p>	<p>Cleaning out bins with moldy grain. Moldy feed or hay.</p>	<p>Allergic reactions, asthma, airway or throat irritation & non-specific symptoms like headache and poor appetite. Rarer conditions include Organic Dust Toxic Syndrome and Farmer's Lung.</p>
 <p>GASES</p>	<p>Silo gases (Nitrogen dioxide). Running motors in confined areas (Carbon monoxide). Animals and manure pits (Ammonia, Hydrogen Sulfide- H₂S and methane).</p>	<p>Can cause immediate and delayed reactions, and sometimes both. Specific types of symptoms depend on gas. Some can be fatal with brief exposures.</p>
 <p>METAL FUMES</p>	<p>Welding and other metal fume exposures.</p>	<p>Respiratory, eye and throat irritation, cough, wheeze, asthma, as well as flu-like condition known as metal fume fever in some circumstances. Long term exposure is associated with respiratory decline, bronchitis and loss of smell.</p>
 <p>CHEMICALS</p>	<p>Inhalation during preparation or application of herbicides, insecticides, pesticides and anhydrous ammonia. Disinfectants used during power washing in animal housing buildings.</p>	<p>Symptoms vary with the type of chemical. Mild (eye and airway irritation) to severe (suffocation from swelling of the airways).</p>
 <p>ZOONOTIC DISEASES</p>	<p>Sources of disease are viruses and bacteria. Some include: Hantavirus, Anthrax, Brucellosis and Influenza.</p>	<p>Symptoms vary with type of Zoonotic disease. See page 16 of this publication for more information.</p>

RESPIRATORY DISEASES THAT CAN RESULT FROM AGRICULTURAL EXPOSURES



THESE RECOMMENDATIONS ARE IMPORTANT AND HELP PREVENT ALL OF THE RESPIRATORY DISEASES BELOW

- Store grain at recommended moisture content levels to reduce the growth of mold spores.
- Ventilate animal housing areas to decrease the accumulation of ammonia and other gases.
- Identify high dust hazards around the farmstead and reduce dust exposure by cleaning these areas.
- When cleaning a barn or stable, lightly water areas to reduce the risk for airborne dust.
- Examine your feeding system to identify ways to decrease the release of airborne dust.
- Wear an NIOSH Approved properly fitted N-95 or N-100 disposable particulate respirator (or a reusable elastomeric respirator with P100 cartridges) when completing work tasks (e.g., cleaning, harvesting, grain handling, etc.) to protect yourself from dust, bacteria, fungi, insects, and animal products.

Numerous studies have demonstrated a significantly increased risk of respiratory health concerns among farmers and farm workers.

Respiratory Diseases due to Agricultural Exposures are PREVENTABLE!

Many respiratory diseases take years to develop and the symptoms are not immediately apparent.

FARMER'S LUNG

Farmer's lung, or farmer's hypersensitivity pneumonitis (FHP), is a non-infectious allergic disease that affects normal lung function. It results from the inhalation of mold spores from moldy hay, straw, or grain. Symptoms usually begin four to six hours after exposure to mold spores and can include increased coughing, coughs that bring up mucus, fever, chills, shortness of breath, discomfort in the lungs, and a tightness and/or pain in the chest. Symptoms may become most severe from 12 to 48 hours after exposure.

UPPER AIRWAY RESPIRATORY DISEASES

Upper airway respiratory diseases are a spectrum of airway diseases associated with farming include rhinitis, sinusitis, and mucous membrane inflammation syndrome. Agents associated with allergic upper airway respiratory diseases include hay, grain dust, molds, storage mites and dander. Several components of organic dusts and some disinfectants and pesticides are irritants, and can cause non-allergic upper airways inflammation.

ORGANIC DUST TOXIC SYNDROME (ODTS)

This is also called **grain fever, toxic alveolitis, or pulmonary mycotoxicosis**. ODTS is an acute inflammatory reaction in the airways and small air spaces of the lungs which is caused by exposure to very large amounts of organic dust (e.g. grain dust, barns, etc). The onset of ODTS can occur four to six hours after exposure, and symptoms may include cough, fever, chills, fatigue, muscle pain, and loss of appetite. Usually, the person recovers quickly from ODTS (usually within 36 hours) without the need for treatment.

BRONCHITIS

Bronchitis can be **acute or chronic**, and includes symptoms of cough with or without mucus, sore throat and soreness in the chest. Bronchitis affects farm production workers exposed to organic dust containing allergens and microbial matter including alive microorganisms and viruses, endotoxins and other factors like irritant gases such as ammonia and disinfectants.

ASTHMA

Asthma symptoms can include episodes of wheezing, chest tightness, shortness of breath and coughing. Some of the triggering agents associated with asthma in agriculture include grain dust, bacteria and fungi, insects, pesticides, animal products, pollen, tobacco leaves, chemicals and wood smoke.

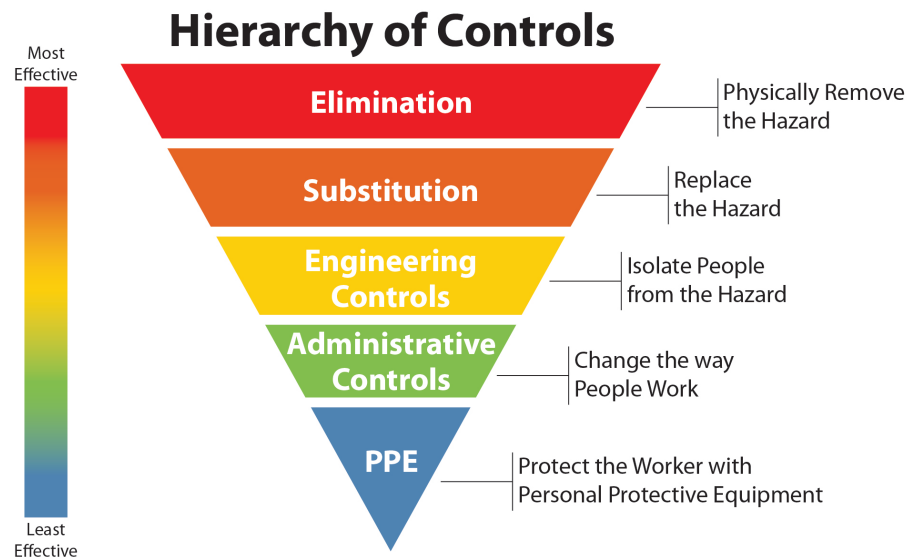
ALLERGENS

Allergens are defined as agents capable of inducing an exaggerated immune response thereby provoking allergic reactions in sensitized subjects. In farming, examples of agents that have been shown to cause allergic reactions include animal dander, pollens, insect fragments, storage mites and fungal molds. These agents can cause allergic respiratory diseases in farm workers.

How to Reduce your Exposure to Respiratory Hazards



The "Hierarchy of Control" outlines a series of control measures ranking them in order of effectiveness. Remember controlling hazards and risk can include a combination of the following measures.



- ✓ Identify the hazard.
- ✓ Determine the risk.
- ✓ Follow the Hierarchy of Controls to reduce the hazardous exposure if possible.
- ✓ If substitution, engineering controls, and administrative controls are not an option or effective, use appropriate personal protective equipment.

IT IS IMPORTANT THAT PRODUCERS ASK THEMSELVES THESE QUESTIONS WHEN EXPOSED TO HAZARDS ON THE FARM.

ASK YOURSELF THESE QUESTIONS

- 01** **ELIMINATION:** Can the hazard be eliminated? Making the decision to eliminate an exposure such as not growing a specific crop on your farm, not using a certain herbicide, or eliminating specific animal productions that impact your health.
- 02** **SUBSTITUTION:** Is there a different product or process that I can do on my farm to decrease the risk to my health? Substitution is about making choices to control hazards but choosing an alternate product. For example, a less toxic chemical may be used rather than one with a high hazard rating.
- 03** **ENGINEERING/ DESIGN:** Consider how a process, building, or machine can be altered to reduce the risk by creating a physical barrier around the hazard. Examples include: Ventilation systems, using remote controls to operate equipment, installing safety switches, and installing guards.
- 04** **SAFE WORK PRACTICE:** Is there a different way you can perform a task to reduce the health hazard? For example, there is better ventilation for most farmers when they are able to weld outdoors.
- 05** **PERSONAL PROTECTIVE EQUIPMENT (PPE):** PPE is the last line of defense. All other controls should be attempted, and PPE when possible should be used in combination with the above controls. For example, use a P100 respirator in combination with good ventilation (engineering/design) when in an area where you suspect mouse droppings and there is a risk of Hantavirus.

How do I know which type of Respirator to Use?

There are two types of respirators available:



Half-Face Reusable Respirator

1 Air Purifying Respirators

These respirators work by removing gases, vapors and aerosols (droplets and solid particles) or a combination of contaminants from the air through the use of filters, cartridges, or canisters.

Examples:
N95 disposable respirator, Half face reusable respirator, Full face reusable respirator, PAPR, SCBA

2 Air Supplying Respirators

These respirators provide clean breathing air from a source independent of the work area.

Examples:
Self Contained Breathing Apparatus (SCBA), Supplied Air respirators (SARs), and a combination of SARs/SCBAs



Self-Contained Breathing Apparatus (SCBA)

The appropriate respirator for a particular situation will depend on the environmental contaminant(s).

Use certified masks and filters only. These masks will display the National Institute for Occupational Safety and Health (NIOSH) certification emblem. Do not use masks without this certification or with efficiency ratings less than N95.

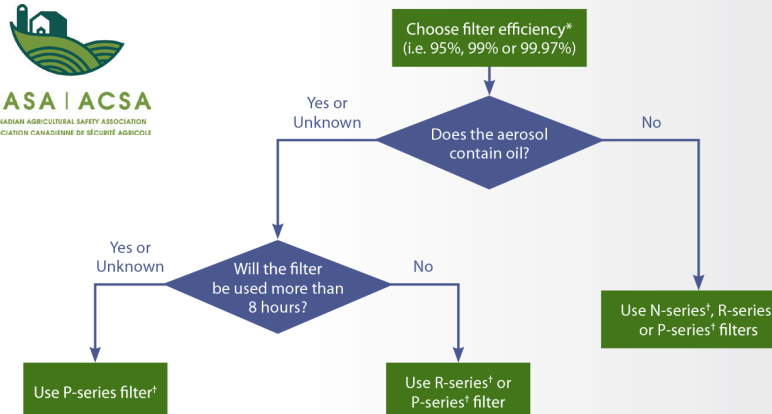
Scan this code for detailed guide on SCBA



SCAN ME

What do the letters N, R and P mean on a respirator rating?

- ▶ **N** series = **N**ot resistant to oil
- ▶ **R** series = **R**esistant to oil (can be used once with oil based exposures)
- ▶ **P** series = **P**roof (can be used more than once with oil based exposures)






There are 3 levels of filter efficiency: 95%, 99% and 99.97%



The higher the number, the larger percentage of particulates the filter will remove.

Ensure that you know how to put on and take off a respirator as well as how to conduct a seal check. You should fit check a respirator every time you use it, as well as inspect it for damage or worn parts.



MASKS AND RESPIRATORS USED IN AGRICULTURE

MASKS	ASSIGNED PROTECTION FACTOR	EXAMPLE USES AND BENEFITS
1-STRAP MASK 	PROTECTION FACTOR 0	Example Uses: One strap masks are NOT the same as N95 masks, nor are they respirators. Although readily available, we do not recommend the use of these masks , since they are often mistaken for an N95 respirator. Benefits: NA.
CLOTH FACE COVERINGS 	PROTECTION FACTOR 0	Example Uses: Cloth face coverings are NOT the same as N95 masks, nor are they respirators. These are appropriate for limiting transmission of large aerosols or droplets, such as droplets containing influenza or coronavirus. Cloth masks do not provide an airtight fit across the face, so it is important to choose masks that have 2 or more layers of washable, breathable fabric, completely cover your nose and mouth, fit snugly against the sides of your face and don't have gaps, have a nose wire to prevent air from leaking out of the top of the mask. Benefits: Can prevent disease by limiting transmission of large droplets and aerosols. Cloth face coverings are low-cost and easy to purchase.
SURGICAL MASK 	PROTECTION FACTOR 0	Example Uses: Surgical masks are NOT the same as N95 masks, nor are they respirators. These are more appropriate for limiting transmission of large aerosols or droplets, such as droplets containing influenza or coronavirus. For example, surgical masks are used by large animal veterinarians when assisting with deliveries, since it helps shield fecal matter and other biological materials. Wear disposable masks with a proper fit over your nose and mouth to prevent leaks, multiple layers of non-woven material and a nose wire. Do NOT wear disposable masks with gaps around the sides of the face or nose or a mask with wet or dirty material. Benefits: Can prevent disease by limiting transmission of large droplets and aerosols. Surgical masks are low-cost and easy to purchase.

For updated information, please check the CDC website regularly during times of pandemics and other public health situations.
<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html>

AIR PURIFYING RESPIRATORS	ASSIGNED PROTECTION FACTOR	EXAMPLE USES AND BENEFITS
N95 	PROTECTION FACTOR 10	Example Uses: Cleaning out grain bins, working with hay, in dusty livestock buildings, in livestock buildings where biosecurity is prioritized, shop work (grinding, cutting), power washing, pesticide handling (if label specifies). Benefits: N95s are easy to use and easy to put on and take off. There are fewer sizes to fit. You can simply throw them away and get a new one when dirty or saturated. Like cloth face coverings and surgical masks, they can also reduce transmission of influenza-type viruses, which is helpful for biosecurity issues.
N95 WITH VALVE 	PROTECTION FACTOR 10	Example Uses: Cleaning out grain bins, working with hay, in dusty livestock buildings, shop work (grinding, cutting), power washing, pesticide handling (if label specifies). Benefits: N95s with valves are easy to use and easy to put on and take off. There are fewer sizes to fit. You can simply throw them away and get a new one when dirty or saturated. Some people believe they are more comfortable due to the reduced pressure of the exhalation through the valve. Please note that the N95 with valve is not recommended for biosecurity reasons, since the valve allows the departure of expired particles.

RESPIRATORS USED IN AGRICULTURE

AIR PURIFYING	ASSIGNED PROTECTION FACTOR	EXAMPLE USES AND BENEFITS
HALF FACE REUSABLE RESPIRATOR 	PROTECTION FACTOR 10	Example Uses: The uses of this type of respirator will depend on what type of filter is paired with the respirator. For example, there are filters and cartridges for organic dusts such as grain, feed, and hay; pesticides; paints and paint fumes; disinfectants and cleaning chemicals; and anhydrous ammonia. Benefits: If fitted properly, the half face particulate filtering respirator provides a tight seal around the face. It is reusable since all parts can be washed, dried, and put back together. Agricultural workers performing a variety of tasks may appreciate this type of respirator since it is so versatile.
FULL FACE REUSABLE RESPIRATOR 	PROTECTION FACTOR 50	Example Uses: The uses of this type of respirator will depend on what type of filter is paired with the respirator. For example, there are filters and cartridges for organic dusts such as grain, feed, and hay; pesticides; paints and paint fumes; disinfectants and cleaning chemicals; and anhydrous ammonia. Benefits: If fitted properly, the full-face particulate filtering respirator provides a tight seal around the face. It is reusable since all parts can be washed, dried, and put back together. Agricultural workers performing a variety of tasks may appreciate this type of respirator since it is so versatile. This type of respirator also has built in eye-protection and is great for handling agrochemicals. Workers handling pesticides may prefer using a single respirator instead of having to pair a respirator with splash-resistant goggles.

AIR PURIFYING & AIR SUPPLIED RESPIRATORS	ASSIGNED PROTECTION FACTOR	EXAMPLE USES AND BENEFITS
POWERED AIR-PURIFYING RESPIRATOR (PAPR) 	PROTECTION FACTOR 25 - 1000	Example Uses: Same as the N95 style masks. Cleaning out grain bins, working with hay, in dusty livestock buildings, shop work (grinding, cutting), power washing, pesticide handling (if label specifies). Benefits: Although this type of respirator is costly and requires more training for use, it is the only type that can be used with a beard or other types of facial hair. In addition, some workers prefer to use it in hot environments because the blower provides comfort. <small>NOTE: the protection factor of 25-1000 depends on the type of facepiece. Loose fitting facepiece PAPR's have a lower protection factor than tight fitting.</small>
SELF-CONTAINED BREATHING APPARATUS (SCBA) 	PROTECTION FACTOR 1000	Example Uses: Inside confined spaces (storage bins, tanks) that may be oxygen deficient, areas (such as manure storage) with high levels of hydrogen sulfide present. Benefits: Although this type of respirator is costly and requires more training for use, it is the only type that can be used in agricultural situations where airborne hazards are immediately threatening to life. That is why it is often used in emergency rescue situations.

The Importance of Respirator Fit Testing, User Seal Checks and Maintenance

RESPIRATOR FIT TESTING

There are two basic types of fit testing, qualitative and quantitative. A fit test should be ideally conducted by qualified personnel before an individual wears a respirator in a hazardous environment.



QUANTITATIVE FIT TEST

The quantitative fit test (QNFT) method can be used for any tight-fitting respirator and involves a machine that is used to measure the amount of leakage into the face piece. In this scenario, the respirator's face piece is attached to a probe that is connected to the machine by a hose. Particles are counted outside and inside the respirator to determine if the respirator has an acceptable fit.

QUALITATIVE FIT TEST

The qualitative fit test (QLFT) method relies on senses, such as taste and smell, which provides a pass or fail result based on the wearer detecting a test agent. This is a pass/fail method that relies on whether you detect leakage of the test substance into your face piece.



Fit Testing each model of respirator used for agricultural tasks is important!

- Everyone has unique face sizes and shapes. Ensure you are trying to fit the correct size of respirator for your face.
- Everyone's face structure is a bit different, just because you wear a size XL t-shirt doesn't mean your face piece size is XL.
- Respirators that do not fit correctly allow hazardous particles to leak into the facepiece.

USER SEAL CHECKS

Don't confuse a fit test with a user seal check. Once you have identified a respirator that fits you, a "user seal check" can be performed to make sure the respirator is positioned correctly on the face or if it needs adjusted.

FOLLOW THESE SIMPLE STEPS TO PERFORM YOUR USER SEAL CHECK FOR A DISPOSABLE RESPIRATOR.

1. Cover front of the respirator with both hands taking care not to disturb its fit.
2. When using a non-valved respirator, exhale sharply. If the respirator bulges slightly and no air leaks are detected between the face and the respirator, a proper seal has been obtained. Then work may proceed. If you cannot achieve a proper seal, do not enter the contaminated area.
3. When using a valved respirator, inhale sharply. The respirator should collapse slightly indicating a proper seal has been obtained. Then work may proceed. If you cannot achieve a proper seal, do not enter the contaminated area.

[read more... >](#)

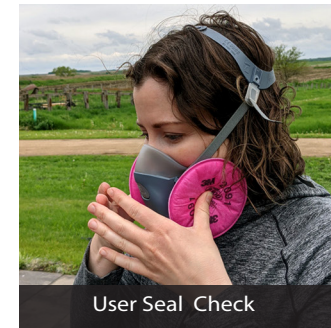


Develop a habit of seal checking your respirator every time you put on your respirator and through out the day as needed.

The **right** respirator with the **right** fit is important!

FOLLOW THESE SIMPLE STEPS TO PERFORM YOUR USER SEAL CHECK FOR A REUSABLE RESPIRATOR.

1. Put the respirator on and adjust straps to a comfortable position.
2. Be careful not to disturb the position of the respirator during the fit check.
3. **Positive** Pressure Check:
 - a. Exhale gently. Breathe out and hold for 10 seconds.
 - b. If the facepiece bulges slightly and no air leaks are detecting between your face and the facepiece, a proper seal has been obtained.



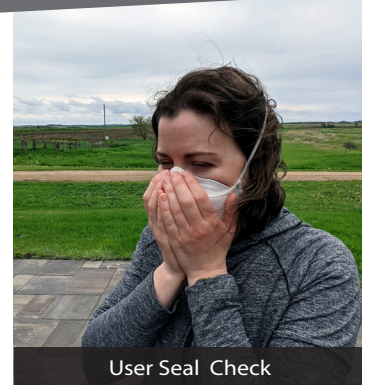
User Seal Check



Positive Pressure Check



Negative Pressure Check



User Seal Check

THINGS THAT CAN IMPACT THE WAY YOUR RESPIRATOR FITS

Facial hair can affect your seal, which affects your level of protection, so it is important to be clean shaven to achieve the best possible fit. Other things that can impact the way your respirator fits are changes in body weight, an injury to your face, crack in seal on the respirator or a damaged respirator. These can all alter your ability to achieve a seal that will provide your best protection.

4. **Negative** Pressure Check:
 - a. For particulate filters (disc style) place your thumbs onto the center portion of the filters. For cartridges place palms of hands to cove the cartridge or open area of the filter.
 - b. Place hands over cartridges. Breathe in gently. If you feel the facepiece collapse slightly and pull closer to your face with no leaks between your face and the facepiece, a proper seal has been obtained.
5. If there is a leak, readjust the respirator on your face and tighten up the straps.
6. Try the *User Seal Check* again.
7. If there is still a leak, try a new respirator size or brand since you may need a different respirator to achieve a proper fit.

MAINTENANCE OF RESPIRATORS

If your respirator can be re-used, develop a habit of cleaning all the parts after use. Clean with soap and water and dry before storing. Do not put your reusable respirator in the dishwasher. There is a shelf life for respirators and the use-by date can be found on the storage box.

Respirators must be stored properly, or they may not function properly.

UV rays may damage the respirator and extreme temperatures lead to degraded parts. Store respirators indoors where the temperature stays between 0-30°C or 32-85°F.

Like most safety equipment, the sun's UV rays may damage your respirator. It is best stored indoors.

Protect the respirators from dust, contamination, and humidity by storing in sturdy, dust-free containers, like a plastic bag or the bag provided by the manufacturer.

Keep the respirator in a location where it is not crushed by heavier equipment or items.

RESPIRATOR STORAGE - Motion Graphic



This video provides information on proper storage and care of respirators. Scan this QR code to watch it or visit: youtube.com/watch?v=V3GK4ru96vg



WHEN DO I KNOW WHEN TO REPLACE MY RESPIRATOR OR FILTER?

- Replace a mask or filter when it is visibly dirty or damaged or when you experience difficulty breathing through it.
- Replace respirator cartridges when you can smell or taste chemical/dusts while or after using the respirator, or according to the manufacturer's recommendations.



Respirator Selection Quick Reference Guide

In agriculture, you may encounter hazardous particles in the air while you are working. A respirator can protect you from breathing in these particles.

To select and use the appropriate respirator:

- ✓ Identify the hazard
- ✓ Understand the hazard and reduce exposure
- ✓ Select the appropriate respirator
- ✓ Use NIOSH approved respirators
- ✓ Have your respirator fit tested
- ✓ Do a user seal check

NIOSH Approved: A respirator must be certified by the National Institute for Occupational Health and Safety (NIOSH) and worn properly to provide appropriate protection. NIOSH's classification ratings describe the ability of the device to protect the wearer from dust and liquid droplets in the air.

Disposable Respirators

Generally single use but repurposing may be appropriate in some situations.

N95 filtering facepiece respirators are the most common types of disposable respirators. They are used in agriculture for working with hay, handling grain, in livestock housing, with infected livestock, and while welding or shop work. They are also recommended for use when working with moldy materials. Certain types of pesticide labels will recommend the use of N95 respirators.

Disposable Respirator Examples						
Uses	Organic Dust, Mold, Livestock, Poultry, Hogs, Cattle, Hay, Grain, Woodworking, Pesticide Handling (refer to label), Zoonotic Disease Prevention					Welding Soldering Metal Fumes
Benefits	<ul style="list-style-type: none"> • Least expensive • Easy to use • Durable 	<ul style="list-style-type: none"> • Exhalation valve • Small face shape • Indiv. packaged 	<ul style="list-style-type: none"> • Exhalation valve • Good for long periods of wear • Good for large face shapes 	<ul style="list-style-type: none"> • Exhalation valve • Good for use with oil mist • Good seal 	<ul style="list-style-type: none"> • Exhalation valve • Good straps • Longer use • Good seal • 100% efficient 	<ul style="list-style-type: none"> • Exhalation valve • Economical option for welders • Flame resistant per modified ASTM D2859
<p>Particulate Filter Types: NIOSH-approved filters are rated as N95, R95, P95, N99, R99, P99, N100, R100 or P100. The number 95, 99 or 100 (99.97%) indicates the percent NIOSH filtration efficiency. N Series: Used in particulate environments free of oil aerosols. R Series: Used for oil and non-oil particles with time use limitations specified by NIOSH. P Series: Used for oil and non-oil particles with time use limitations specified by manufacturer.</p> <p>Exhalation valves are designed to improve breathability by releasing hot, humid exhaled breath quickly, helping to reduce heat build-up and moisture inside the facepiece. This can help prevent fogging of glasses. An exhalation valve can also permit the exhalation of viruses and should not be worn for protection during a pandemic.</p>						

Non-Respirator

These mask types are not certified by NIOSH for use as a respirator and will not provide protection from occupational or agricultural hazards. They are only effective for nuisance dusts and can help prevent the spread of viruses.



Reusable Respirators

Reusable Respirators are cost effective options that offer protection from hazardous gases, vapors, and particles found in many agricultural environments.

Half Facepiece
Different sizes available, can add cartridges.



Full Facepiece
Includes eye protection and provides more protection.



Cartridge Options

P100 Pink or White		Organic Dust, Grain, Feed, Hogs, Poultry, Welding, Mold, Woodworking, Shopwork
Particulate Pre-Filter		Can be used with the gas cartridges below to also filter particulates.
Organic Vapor Black		Pesticides, Paints Use Pre-Filter/Filter Cover
Ammonia Green		Anhydrous Ammonia (rescue or exit situations), Hogs, Poultry Use Pre-Filter/Filter Cover
Organic Vapor Acid Gas Yellow		Paints, Disinfectants, Bleach Use Pre-Filter/Filter Cover
Multi Gas Olive		Paints, Disinfectants, Bleach Use Pre-Filter/Filter Cover

Remember: Always refer to safety data sheets or supplier labels for a recommended cartridge. Schedule times to change your cartridges based on a) the outdate on the product label, b) when it becomes difficult to breathe, or c) when you can taste or smell the hazard.

Advanced Respirators

Powered Air Purified Respirator (PAPR):

Use for cleaning out grain bins, working with hay, in dusty livestock buildings, shop work (grinding, cutting), power washing, pesticide handling (with cartridges if label specifies). Can be used with a beard or medical condition such as asthma, claustrophobia, heart, or lung conditions.



Self Contained Breathing Apparatus (SCBA):

Use in confined spaces that may be low in oxygen such as storage bins, tankers, and manure pits with high levels of hydrogen sulfide. An SCBA should be used in situations where airborne hazards are immediately dangerous to life and health.



Assigned Protection Factor

The assigned protection factor (APF) describes the decrease of harmful substances in inhaled air. It is used to describe how well a respirator can protect someone. The higher the number the higher the APF. The protection factor is only valid if the respirator fits the wearer and is being used properly.



Respirator Fit Test: Everyone has a unique face size and shape. A fit test should be conducted by qualified personnel before an individual wears the respirator in a hazardous environment.

User Seal Check: Do not confuse a fit test with a user seal check. Once you have identified a fitting respirator, a "seal check" should be performed each time you wear the respirator to make sure it is properly on the face and adjust as needed.

DUSTS & CHEMICALS:

Organic Dust, Mold, Pesticides, Fumigants

Understanding where dusts, chemicals and gases are found on the farm and what



- Application of pre- or post-emergent pesticides; loading or cleaning pesticide tanks, mixing pesticides.
- Since there are multiple pesticide products, manufacturers are required to include information about proper personal protective equipment (PPE) on the pesticide label. This includes the suggested respiratory protection.
- Even if respiratory protection is not specified on the label, the worker may use an N95 filtering face-piece respirator during pesticide handling tasks.
- Agricultural workers handling pesticides should be trained specifically on health and safety for the specific compounds that they are working on.



- It is important for workers to be looking at the pesticide labels.
 - How do I check the labels?
- For more information, please scan the QR code below



- Grain handling tasks (cleaning out storage, loading/unloading); working with hay; working inside of animal housing buildings
- N95 filtering face-piece respirator, Half/Full Face Particulate Filtering Respirator, or PAPR.
- Remember, particulate filtering respirators are not effective with most facial hair styles (beards, goatees). If the worker wishes to maintain facial hair, then a PAPR style respirator is best.
- Just because you cannot see organic dust, does not mean it isn't there. It is best to develop a habit of always wearing a particulate filtering respirator when performing specific tasks—rather than looking for visible dust.



- Grain handling tasks (cleaning out storage, loading/unloading) when working with moldy product, shoveling moldy hay, flood response (cleaning out items with water damage)
- N95 filtering face-piece respirator, Half/Full Face Particulate Filtering Respirator, or PAPR.
- Just because you cannot see mold or mildew, does not mean it isn't there. Mold and mildew are often associated with a "musty" smell. It is best to always wear a respirator when handling materials that have experienced water damage.

GASES:

H2S, Anhydrous Ammonia, Welding

types of respirators should be used will assist in protecting yourself and others!



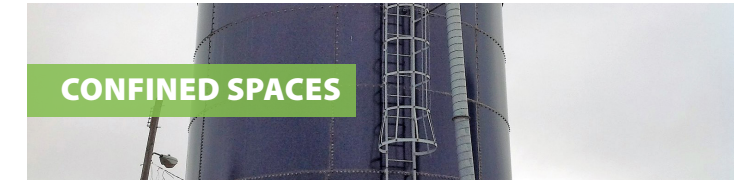
- Welding is often done when performing maintenance on agricultural equipment, repairing storage bins, or as a hobby.
- The type of respiratory protection worn while welding will depend on the types of welding being performed. For most fumes produced by basic welding of iron or steel-- an N95 welding particulate mask, or Half/Full Face Particulate Filtering Respirator with a particular/organic vapor filter should be worn.

For more information, please scan this QR code >



- Example: Fertilizer that is a toxic and highly corrosive gas and needs to be treated with care.
- Anhydrous ammonia is a dangerous good under Canadian regulations. It bears the number 2.3 (8) - 2.3 means it's a toxic gas while the (8) indicates it's corrosive - and anyone handling or transporting it must hold a valid training certificate. Ag-retailers are required to ask to see the certificate when delivering a nurse tank.
- Many workers cleaning out or performing maintenance on anhydrous tanks are at risk for ammonia exposure. Workers should be adequately trained specifically on the hazards of working with this chemical and able to recognize the signs and symptoms of early exposure.
- The Half face or Full face Particulate Filtering Respirator may be provided for escape purposes only. These respirator should be fitted with the appropriate ammonia cartridge.
- Farmers can take training on the safe handling, use and transportation of anhydrous ammonia fertilizer for free at the **Fertilizer Canada Website**.

For more information, please scan this QR code >



- Examples: Storage tanks, silos grain bins, pits
- Never enter a confined space without first checking the air quality for dangerous gases and oxygen levels. Work with a buddy. Scan the QR code below for details on monitoring procedures.
- Prior to entering a confined space prepare for a sudden lack of oxygen and identify an exit route.
- Most jurisdictions have regulations around confined space entry.
- If hazardous gases are present in the air, the space should be ventilated until safe.
- If you are working in areas where the air quality is lacking oxygen or contains gases that are immediately threatening to your health (such as rescue situations), you should be using a Self-Contained Breathing Apparatus (SCBA).

For more information, please scan this QR code >



- Examples: Manure storage (pits, lagoons), manure pumping, pressure washing, gas-fired heaters or dryers (in combustion by-products)
- Many workers performing tasks at risk for H2S exposure wear gas monitors. There are many affordable options for H2S monitors. These may be clipped on the shirt, or lapel. When the levels become higher than expected and dangerous, the monitor will alarm the wearer, so they can leave the area or take necessary steps to lowering the levels. Steps to lowering H2S may include stopping the pumping or increasing ventilation to the area.
- If you are working in areas where H2S is immediately threatening to your health or involved in an H2S rescue, you should be using Self-Contained Breathing Apparatus (SCBA).

For more information, please scan this QR code >



ZOONOTIC DISEASES: PREVENTING THE SPREAD



Zoonotic diseases are a broad category of pathogenic diseases that can be spread between animals and humans. Zoonotic diseases are spread by coming in contact with saliva, urine, blood, feces and other bodily fluids from infected animals. Some zoonotic diseases, such as Hantavirus, Influenza and Anthrax may be spread through airborne particles. Many of the symptoms of these diseases are like that of flu in humans (e.g., upper respiratory issues, fever, joint pain).

It is important to contact your medical provider if you are feeling sick after a lot of potential contact with animals, especially if the animals are also ill. Controlling and preventing the spread the diseases can help to maintain the health of producers and keep your animals healthy.

HOW TO REDUCE THE SPREAD OF ZOONOTIC DISEASES

Washing the hands before and after handling or administering pharmaceuticals to animals, and promoting good hand hygiene with your staff.

Wearing PPE when suggested (coveralls, gowns, N95 masks/respirators, gloves, eye protection, footwear with toe protection). Some common procedures where PPE may be necessary would be while assisting with birthing, gathering diagnostic lab samples for your veterinarian, or disposing of the carcass of a suspected sick animal.

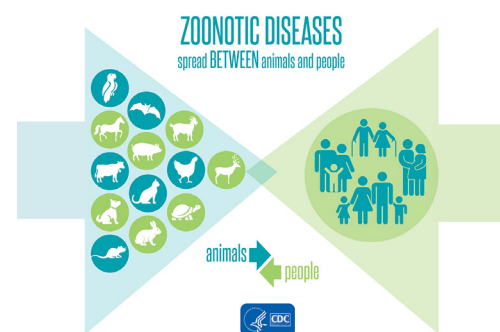
Posting good work practices and detailed operating procedures for animal handling and administering pharmaceuticals.

Using engineering controls, such as chutes and head gates, when performing invasive procedures on livestock.

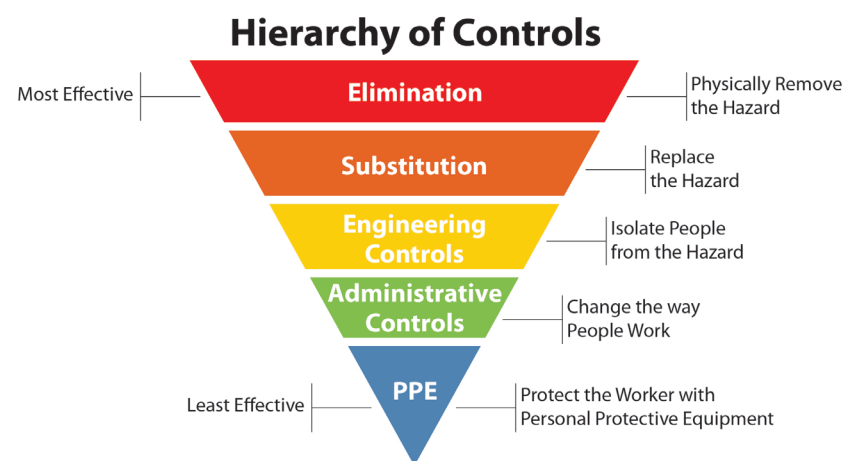
Knowing when to contact the veterinarian or your medical provider when signs or symptoms are observed in you or your animals.

Talking to your veterinarian or producer's association to learn when antibiotic use is necessary and when it may be substituted. Overuse of antibiotics may lead to antimicrobial resistant strains of disease. These diseases can become more difficult to treat if you are infected.

Promoting good animal and staff health, overall.



For specific details about the signs and symptoms of zoonotic diseases in humans and in livestock please scan the code below.



RESPIRATORY PROTECTION DURING A SHORTAGE OF PPE

Best Practices for the Agricultural Community



Situations like the COVID-19 (Coronavirus) pandemic can lead to a high demand for all types of respirators and other **personal protective equipment (PPE)**. Despite shortages, farmers and agricultural workers still need respiratory protection for many tasks in agriculture. Consider the following tips for conserving your respirator inventory while supplies are limited.

CONSERVING RESPIRATOR SUPPLIES: GUIDANCE ON REUSE

Two-Strap Disposable Respirator: N95, N100, P100 (Filtering Facepiece Respirator)

Reuse of two-strap disposable respirators is not recommended practice, but in a time of limited availability, it may need to be considered. This type of respirator should only be reused within the guidelines below:

- A disposable respirator can be worn more than once, but it cannot be shared with another person.
- Store respirator in a clean, dry place between uses.
- Conduct seal checks each time you put on or adjust the respirator.
- Do not attempt to clean the respirator with disinfectants, wipes, soap and water, or an air compressor.
- Avoid putting on, taking off or adjusting the mask with contaminated hands. Wash your hands before and after adjusting or removal.
- Discontinue use and throw away when it is splashed on, becomes dirty, becomes difficult to breathe, or when a seal cannot be obtained.

Reusable Respirators: Half-Facepiece, Full-Facepiece and Powered Air Purifying Respirators (Elastomeric Respirator)

- Clean and sanitize the respirator after each use. This type of respirator can be shared only if it is cleaned and sanitized properly.
- Store respirator in a clean, dry place between uses.
- Avoid putting on, taking off or adjusting the mask with contaminated hands. Wash your hands before and after adjusting or removing.
- Change P100 filters after 8 hours or 30 days whichever comes first. If there is a shortage, continue to wear the P100 filter until it becomes dirty or difficult to breathe comfortably.
- Change cartridges according to manufactures recommendations. If there is a shortage, change the cartridge when you can smell or taste what you are protecting yourself against.
- To prolong the life of the cartridge, add pre-filters to cartridges that don't have built-in pre-filters.
- Check and replace valves and head cradle as needed to ensure the respirator is in good working order.

OTHER WAYS OF REDUCING RESPIRATORY EXPOSURES

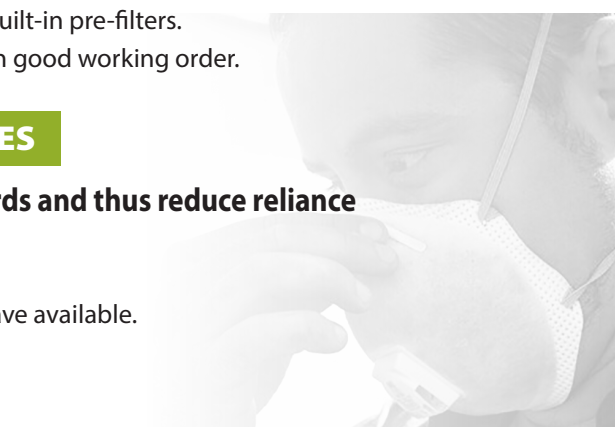
Consider alternative controls that reduce exposure to respiratory hazards and thus reduce reliance on PPE. Examples include:

- Eliminate the process/task that creates hazardous dusts or gases.
- Use an alternative pesticide product that requires less PPE or the PPE that you have available.
- Ventilate and control dust at its source to reduce exposure in confined spaces.
- Hire an applicator or other contractor who has the required PPE.

When applying pesticides, the label is still the law. You must wear the PPE required by the product labels. If the label required respirator is not available, consider using a respirator that provides greater respiratory protection.

KEY POINTS

- To conserve respirator supplies, disposable respirators (such as N95s) can be reused by the same person, in a limited fashion.
- Reusable respirators (such as half-facepiece respirators) can be reused after proper cleaning and sanitizing.
- Document any changes you make to respiratory protection for you and/or your employees, including changes in types of respirators used and employee training.



Consider the **Impact** of Smoking & Agricultural Hazards: **Cannabis, Vaping, Cigarettes**



FACT: SMOKING IS BAD FOR YOUR HEALTH!

The hazard multiplies significantly when you combine smoking with grain dusts and other chemical exposures.



CANNABIS

Whether it is tobacco or cannabis, both are bad for your lungs. Smoke from cannabis contains many of the same harmful chemicals that are found in tobacco smoke. Since those smoking cannabis tend to inhale more deeply than those smoking tobacco this leads to higher exposure to the chemicals found in cannabis smoke. Cannabis can have a number of effects that often vary between individuals and may impact your ability to work safely on the farm:

1. Impaired ability to drive or operate equipment safely

Cannabis causes slower reaction times and can impair coordination, and your ability to pay attention

2. Difficulty with memory and learning

Impaired thinking, concentration and decision making

VAPING

41%

In 2018, it was reported by the Canadian Government that 41% of Canadian youth use electronic cigarettes (e-cigarettes). Vaping is the act of inhaling and exhaling heated aerosol produced by e-cigarettes. E-cigarettes can be used to inhale both nicotine and cannabis. JUUL is the most popular brand of e-cigarette available. Most vaping devices consist of a mouthpiece, a battery, a heating element, and a chamber (often known as a tank). According to Dr. Szafron, assistant professor Public Health at the University of Saskatchewan, a regular cigarette is estimated to contain 12 milligrams of nicotine and 1 Juul pod alone contains over 50 milligrams. The Juul contains the equivalent nicotine of 20 cigarettes and can be easily consumed in a day posing a higher risk of developing an addiction.

Negative health effects of nicotine e-cigarettes:

- Nicotine use increases anxiety, heart rate, stress, and blood pressure.
- Nicotine reduces impulse control and can lead to a dependence.
- Vaping liquid with nicotine can be harmful if swallowed or absorbed into the skin.
- Exposure to nicotine during adolescence can lead to behavioural and cognitive problems as nicotine negatively affects the developing brain and effects memory, concentration, and mood.

For more information on the risks of vaping, please scan the canada.ca QR code on the right >



CIGARETTE SMOKING

All tobacco products and any other products that are smoked contain chemicals that are harmful to your health. No matter what form of tobacco product or other materials smoked, quitting is the best thing you can do for your health!



Did you know?

- Quitting smoking can save you \$5,840 per year (based on smoking a pack a day at \$16/pack)
- After quitting for just one day, your risk of having a heart attack decreases.
- If you quit smoking for one year your risk of dying from a heart attack is cut in half.

HELP ONLINE: Smokershelpline.ca

- Resources to help with the quitting process including 24/7 free access to supportive community and self-help programs, read inspiring stories about people who have overcome obstacles as they quit.
- Get tips to cope with cravings and download self-help guides.
- Call to speak one-on-one with a Quit Coach **1-877-513-5333**.
 - Offer advice on how to quit and help you come up with a personal quit plan, including follow-up calls if you are ready.
 - Just listen! If you need to talk about smoking.





Respiratory Health Clinics for Farmers

There are many hazards on the farm that may affect the respiratory health of farmers. These hazards may result in minor, short term illness or may progress to chronic symptoms, permanent disability or death. With awareness of these risks, illnesses are preventable!

The Agricultural Health and Safety Network, at the Canadian Centre for Health and Safety in Agriculture, provides testing to farmers during clinics held in local Saskatchewan RM communities. These clinics offer 1:1 (RN to farmer) health exams to establish baseline testing and address other health issues and information related to health risks in the industry.

If farmers have concerns about their health or exposures on the farm an agricultural health nurse can assist. The nurse will help the farmer determine what the exposure is, how to reduce it and how to select the right personal protective equipment for the job.

Clinic Goals:

- Increase awareness of health and safety risks associated with respiratory hazards on the farm.
- Establish a baseline health profile for the farmer to understand current health status.
- Identify effective methods of reducing exposure to respiratory hazards on the farm such as alternative work practices and selection of respirators.
- Identify farmers who have or are at risk for developing respiratory diseases associated with exposure to respiratory hazards.
- Refer farmers who have an abnormal respiratory test to their family physician or specialist.

Participants Will:

- Complete a respiratory health questionnaire.
- Measurement of height, weight and blood pressure.
- Review appropriate personal protection equipment for use on their farm.
- Perform a lung function (Spirometry) test, with results interpreted and copy of results.
- Personalized health teaching and if necessary, a referral for follow-up to their physician.

FACTORS AFFECTING LUNG FUNCTION TESTING:

Height: Tall people have larger lung volumes than shorter people. This does not mean shorter people have less efficient lungs.

Age: It is a normal aging process to have a slight, gradual reduction in lung function as you grow older.

Head/Chest cold: This may cause a temporary reduction in test results.

Smoking: Smokers, in general, have lower lung function than non-smokers.

Effort: It is important for you to make your maximum effort when inhaling and exhaling during the test. Less than your best effort could result in inaccurate test values.



It's important to know that this test is only a screening tool and that a diagnosis cannot be made on the basis of this test alone.

If the results fall outside the normal values, we may recommend that you see your doctor for follow-up, which would include a chest x-ray and more breathing tests similar to this one.



RADON IN THE HOME

BREATHE
the lung association

Testing is Key for Preventing Lung Cancer

Radon is an invisible radioactive gas that comes from naturally occurring uranium in the ground. Gas containing radon enters the home through openings that contact soil. **Radon is the second leading cause of lung cancer.** An estimated 3,000+ people/year die from radon-induced lung cancer. In Canada, 7% of homes have high levels of radon over 200 Bq/m3.

1 IN 3 HOMES IN SASKATCHEWAN MAY HAVE DANGEROUS RADON LEVELS.

How to test for Radon

All homes contain a certain level of radon. The only way to know how much radon is present is to test your home.

The ways to test for radon are:

1. Hire a certified radon measurement professional
2. Purchase a do-it-yourself test kit

How to reduce Radon levels

Radon should be reduced if home levels exceed 200 Bq/m3. Testing should be done in the lowest level of the home that is used/occupied for 4+ hrs per day. Radon levels can be reduced by:

- Hiring a certified mitigation professional (lowers radon up to 90%)
- Sealing cracks and holes in the foundation (lowers radon by 13%)
- Soil depressurization and increased ventilation (lowers radon by 25 – 50%)

It is recommended that you conduct the test for 3 months during fall/winter. For more information visit: takeactionradon.ca or HomeRadonTest.ca



SCAN ME



"I'm the average girl and it happened to me. Radon exposure can be reduced in your home and you can prevent this happening to you."

- Kerri Tucker, radon-induced lung cancer survivor

For more information visit: myradonstory.ca



SCAN ME

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Obstructive Sleep Apnea (OSA)



Obstructive sleep apnea (OSA) is classified as a type of sleep disordered breathing which is a group of conditions that cause unusual breathing patterns and breathing disruption while sleeping. OSA causes abnormal sleep cycles and very poor quality of sleep, which can lead to excessive day-time sleepiness, difficulty concentrating, headaches, mood changes, and cognitive dysfunction.

What puts a person at risk of obstructive sleep apnea?

- **Excess weight** – Obesity increases neck circumference and fat deposits around the upper airway, causing the airway to collapse on itself and reduce airflow during sleep
- **Males** are 2-3 times more likely to have sleep apnea.
 - > Risk in women rises with excess weight, and after menopause
- **Age** – more common in older adults
- **Family history** of sleep apnea
- **Alcohol, sedative, or tranquilizer use** – Relaxes the muscles in your throat making it more likely for the upper airway to collapse on itself and reduce airflow during sleep
- **Smoking** – Smokers are 3 times more likely to develop sleep apnea
- **Nasal congestion** – Obstruction in the nasal passage can be from having a naturally narrow nasal passage or allergies
- **Medical conditions** – high blood pressure, Type 2 Diabetes, congestive heart failure and Parkinson's disease can increase the risk of obstructive sleep apnea

If you have some or all of the risk factors listed above, and wonder if you may have sleep apnea, contact your doctor or primary health provider. You may be referred to a sleep clinic, or be provided with a home test, for assessment.

UNTREATED SLEEP APNEA CAN INCREASE RISK OF:

- High blood pressure
- Heart problems
- Type 2 Diabetes
- Liver problems

How is obstructive sleep apnea treated?

Lifestyle modifications such as regular exercise, weight loss, and avoidance of alcohol, smoking, and sedatives can reduce the impacts of obstructive sleep apnea. Treatment for sleep apnea depends on the cause but commonly includes the use of Continuous Positive Airway Pressure or CPAP machines that apply a small amount of pressure as you breathe out to help keep your airway open while you sleep, preventing obstruction. In cases of sleep apnea that do not respond to treatment there are surgical options as well.



SIGNS OF SLEEP DISORDERED BREATHING OR OBSTRUCTIVE SLEEP APNEA

- **Snoring**
- **Observed periods of not breathing while asleep - this might be noticed by a bed partner**
- **Gasping for air while sleeping - this may or may not awaken you**
- **Dry mouth or headaches upon awakening**
- **Difficulty falling asleep or maintaining sleep**
- **Difficulty with concentration or memory while awake, including irritability**
- **Feeling excessively tired throughout the day or "dozing off" frequently**

Children's Respiratory Health: Asthma & Allergies

The farm is a great place for a child to grow up! Studies have shown that children one year and younger who live on farms are less likely to have respiratory allergies or asthma as older children. However, living on a farm does not protect all children from having allergies and asthma. Being both a home and a work environment the farm poses many challenges to families who have children with respiratory issues.



ASTHMA: A flare-up, commonly called an asthma episode, results in inflammation and bronchospasm of the lungs, and requires treatment.

HOW IS ASTHMA CONTROLLED?

You are in charge of controlling your asthma through **MEE**: Medication use, Education and Environmental Control.

Medication

1. Preventers - inhaled corticosteroids
2. Rescuers - inhaled bronchodilators
3. Combinations - preventer and rescuer medication together

>> Take as prescribed by your health professional.



Education

- a) Triggers of an asthma episode or allergies differ between children and most children will have more than one trigger. Know your own triggers and avoid them as much as possible.
- b) Know your medications and when to use preventer and rescue medication.
- c) Use an Asthma Action Plan so you know what to do when there is a flare-up. If you do not have an Asthma Action Plan, see your doctor or nurse practitioner.

Environment

- a) Common triggers for asthma and allergies are moldy places, grain dust, dust in animal pens, animal dander from dogs, cats, rabbits, horses, cows, pollens found in hay and some flowering crops, and pollens from flowering trees and plants.
- b) Bacteria in animal solid waste products, when broken down into smaller parts called endotoxin or lipopolysaccharides, can become airborne and cause irritation of the lungs leading to inflammation and bronchospasm.
- c) Diesel exhaust from tractors or trucks has been shown to trigger coughing and irritation.
- d) If you are around dust, animals or plants that are your known trigger, it is best to change clothing, wash hands and face or shower as soon as possible.
- e) If you can not avoid exposure, such as when dust is blowing during harvest and seeding, pollen season or stubble burning, stay indoors.

What do we know about asthma and allergies?

- Both asthma and allergies are conditions that are caused by the body's immune response to substances in the environment
- Both have a high heredity component and if not well controlled, result in intermittent flare-ups or episodes.
- Asthma symptoms during episodes include cough, wheeze, and phlegm. Rhinitis or hay fever due to allergies results in a runny nose, sneezing, and itchy watery eyes.
- There are two types of asthma:
 - 1) asthma that is associated with allergies (atopic asthma);
 - 2) Asthma associated with respiratory infections usually viruses.

More Information about asthma and allergies for both families and health professionals can be found at these websites:

Asthma Canada: www.asthma.ca

Lung Association of Saskatchewan:
www.lungsask.ca/lung-diseases

Acknowledgments



PARTENARIAT
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CASA | ACSA
CANADIAN AGRICULTURAL SAFETY ASSOCIATION
ASSOCIATION CANADIENNE DE SÉCURITÉ AGRICOLE



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The goal of the Canadian Centre for Health and Safety in Agriculture (CCHSA) is to carry out research, training, service and prevention for the farmers and rural people of Saskatchewan and Canada.