



# Grain fire management

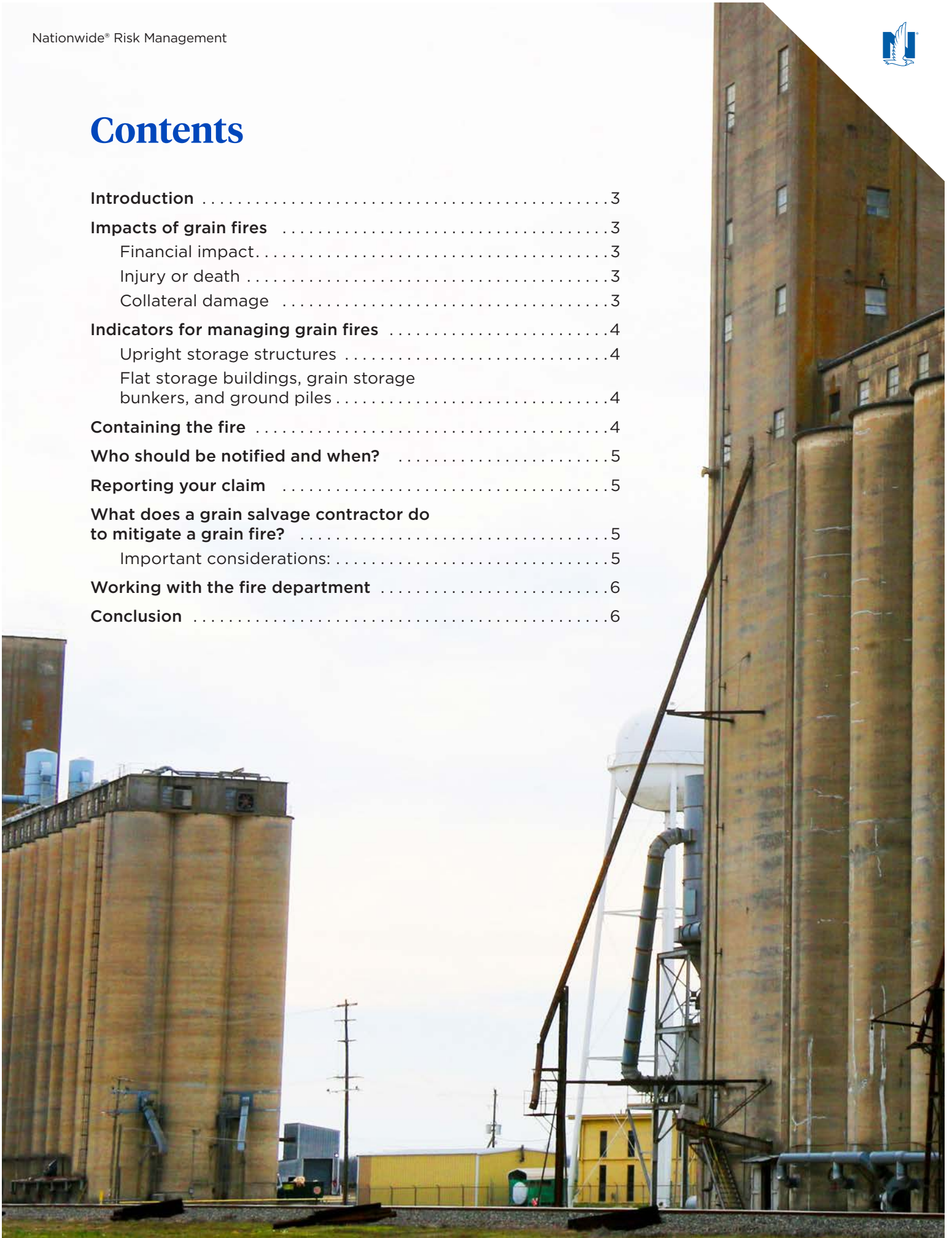
## **Strategies for risk mitigation and safety**

Stored grain fires pose significant risks to both farm and commercial grain operations, potentially leading to extensive damage and financial loss. This white paper by Nationwide Agribusiness Risk Management offers a comprehensive guide on effectively managing grain fires to preserve salvage value, ensure worker safety, and help maintain the integrity of storage facilities.



# Contents

<b>Introduction</b> .....	3
<b>Impacts of grain fires</b> .....	3
Financial impact .....	3
Injury or death .....	3
Collateral damage .....	3
<b>Indicators for managing grain fires</b> .....	4
Upright storage structures .....	4
Flat storage buildings, grain storage bunkers, and ground piles .....	4
<b>Containing the fire</b> .....	4
<b>Who should be notified and when?</b> .....	5
<b>Reporting your claim</b> .....	5
<b>What does a grain salvage contractor do to mitigate a grain fire?</b> .....	5
Important considerations: .....	5
<b>Working with the fire department</b> .....	6
<b>Conclusion</b> .....	6





## Introduction

Stored grain fires pose a significant risk to both farm and commercial grain operations. When a fire ignites in stored grain, it can cause extensive damage to both the grain and the storage facility. An improper response can lead to the complete loss of the grain, the storage structure, or both.

This document aims to educate those in the grain industry on how to effectively respond to a fire within a grain structure. A proper response can help preserve the salvage value of the grain, ensure worker safety, and maintain the integrity of the storage facility. Since each grain structure and operation is unique, so are grain fires. These strategies may be adapted, as deemed appropriate, by qualified individuals who are familiar with the specific circumstances at the site during the time of the fire.

## Impacts of grain fires

### Financial impact

Running a grain operation or family grain farm involves receiving, moving, drying, blending, and storing grain until it's time to sell for revenue. However, when a grain fire happens, everything grinds to a halt. The usual flow and movement of grain stops, preventing normal revenue generation. Grain might need to be handled less efficiently, stored in less ideal conditions, or even sent to another location until the facility is back to normal. This results in decreased revenue and increased expenses until normal operations resume.

Property and casualty insurance may provide coverage for some of the costs. However, there may be uninsured costs (soft costs) that owners and operators should also consider, such as:

- Management and employees diverted from their main duties to handle the fire.
- Equipment costs not directly related to the fire.
- Lost revenue from incoming and outgoing grain.
- Moving other grain away from the facility until it's operational again.
- Overall downtime while the facility and equipment are being rebuilt.
- Potential fines from rail lines or ports if they need to be closed due to the fire.
- Losses related to a grain fire could lead to higher insurance rates.

### Injury or death

Grain fires can pose serious risks, potentially causing injury or even death to those on-site and anyone responding to the fire or helping rebuild the facility afterward. Factors contributing to injury or death include explosions, flash fires, burns, suffocation, smoke inhalation, falling debris, hazardous atmospheres, structural collapse, shifting grain, or falls from heights.

Farmers or grain operations personnel might rush into a burning structure to put out the fire or rescue others without checking the air quality. Grain fires can significantly affect oxygen (O<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), and carbon monoxide (CO) levels inside the structure. Entering without proper personal protective equipment (PPE) can lead to being overcome by a lack of oxygen or too much carbon dioxide, both of which can be deadly. Never enter a grain structure (with or without a fire) without first understanding the hazards and taking the necessary safety precautions.

### Collateral damage

A grain fire can cause internal and/or external collateral damage to the structure where the fire occurs and nearby structures and equipment. This damage can result from excessive heat, fire, smoke, or the impact of a collapsing structure.

Stock in surrounding structures can be affected, with common issues being heat damage, smoke damage, and debris in the grain. Grain operations near other businesses, like food producers or propane companies, can be negatively impacted by smoke or fire.

Collateral damage can also include loss of customers, damage to your reputation, and loss of support from the community or financial organizations, which can sometimes be more damaging than the monetary loss from the fire.





## Indicators for managing grain fires

Understanding how to manage a grain fire starts with recognizing the signs that indicate what's happening inside the storage structure. Here are some of the most common indicators to watch for in both upright storage structures (like steel bins and concrete silos) and flat storage buildings, grain storage bunkers, and ground piles.

### Upright storage structures

#### Smoke:

- If you see smoke coming from an aeration fan, vent, or wall opening, it's a strong sign that there's a fire or at least smoldering grain inside.
- Note that you might not see the fire by just looking at the grain's surface.
- In concrete storage structures, smoke from one silo can travel through the entire system and escape from multiple points, making it tricky to pinpoint the fire's exact location.

#### Smell:

- A sour or smoky smell from the aeration system's exhaust points can indicate out-of-condition grain, suggesting a fire or smoldering core.
- Any unusual smells should prompt immediate attention and further inspection.

#### Rising temperatures:

- Temperature cable systems can alert you to hot spots within the grain. High or rising temperatures in a specific area often mean grain is starting to smolder.
- If you notice a sour or smoky smell along with rising temperatures, take extra care.

#### Elevated CO levels:

- Monitoring carbon monoxide (CO) levels can help detect grain going out of condition and predict hot spots. High CO levels often appear before temperature increases, making CO monitoring an early warning system.

### Flat storage buildings, grain storage bunkers, and ground piles

#### Smoke:

- Visible smoke or fire from an aeration fan, roof vent, or the surface of the pile indicates fire within the grain. Remember, fire can be present even without visible smoke.

#### Smell:

- A sour or smoky smell from the aeration system's exhaust points can signal out-of-condition grain and a potential fire or smoldering core. This is especially true for outside bunkers where aeration fans hold down tarps.

#### Thermal imaging:

- Using a thermal imaging camera attached to a drone can help identify hot spots by detecting elevated surface temperatures. This method works best with un-tarped piles but can also be used with care in large flat storage buildings or tarp-covered bunkers/piles.



## Containing the fire

Once you identify that a fire is in progress or about to start, it's crucial to take proactive steps to contain it and limit its spread. Grain fires burn extremely hot and slowly. Here are some steps that facility personnel can often complete before first responders or grain salvage contractors arrive:

- **Turn off utilities** as needed.
- **Shut off the air supply** to the fire.
- **Cover all aeration ducts and fan openings.**
- **Avoid sealing the structure** in a way that causes pressure to build inside.
- **Remember that water and foam** may not always be effective solutions.

By following these steps, you can help manage the fire and minimize damage until professional help arrives.



## Who should be notified and when?

The next steps depend on the urgency of the situation.

Urgent situations	Non-urgent situations
<ul style="list-style-type: none"> <li>• Initiate the facility’s emergency action plan.</li> <li>• Dial 911 and get first responders on the way.</li> <li>• Account for all workers and assess the need for possible rescue or treatment of injuries.</li> <li>• As soon as reasonably possible, report your claim to Nationwide.</li> </ul>	<ul style="list-style-type: none"> <li>• After taking containment actions, if a fire is evident, contact your agent or Nationwide directly to report your claim.</li> <li>• It may also be beneficial to notify the local fire chief and a grain salvage contractor to put them on alert before it becomes an emergency.</li> </ul>

## Reporting your claim

Whether reporting the claim to your agent or directly to Nationwide, **prompt reporting** is beneficial to initiate the claims handling process and it allows our knowledgeable claims professionals the chance to provide important instructions to mitigate further damage. This not only can save you money, but also time in getting your operation back to normal as quickly as possible.

When reporting the claim, provide clear and accurate details, including why you believe a fire is present and any mitigation steps taken. Your insurance contract may require mitigation steps be taken to meet the Duties in the Event of Loss or Damage conditions of your policy. In addition, life safety can quickly become a serious concern.

As a leading farm and agribusiness insurance provider, Nationwide has experience in handling stored grain fires and is on your side to provide the support and resources you may need—including but not limited to grain salvage contractors, demolition contractors, or engineers experienced with grain fires.

## What does a grain salvage contractor do to mitigate a grain fire?

A grain salvage contractor helps retain (or salvage) as much good grain as possible from a storage structure affected by fire. In most instances this means they will be making an effort to control, manage, and extinguish the fire, often coordinating with other necessary entities on-site (i.e. fire departments). In some cases, they also help market damaged grain to salvage its value. Here are some common tactics used by grain salvage contractors:

- **Identify** where the fire is occurring and approximate the size or scope of the fire.
- **Remove grain** (method is dependent on situation):
  - **Using existing systems:** The easiest way is often to use the existing reclaim system or vacuum grain from a hole cut at the center sump transition. However, pulling burning grain through the center of the bin or out reclaim equipment is generally not recommended.
  - **Off-center sumps:** If the center sump is plugged or there are reclaim problems, grain must be removed from off-center sumps. This is generally prohibited by the bin manufacturer and requires special measures and precautions.
  - **Sidewall holes:** If other methods aren’t viable, it may be necessary to cut holes in the sidewall to pull grain from the top. Contractors should take care to work from the top down, alternating sides to keep grain pressures even.

- **Separate the good grain from bad** as it is being removed from the structure. Ideally, there are three piles including:
  - Good, undamaged grain.
  - Grain with varying amounts of heat and fire damage or objectionable odors.
  - Bad grain with dark, hard chunks that may still be burning.

### Important considerations:

- As work is performed, remember the fire will continue to grow and worsen, and smoldering grain can ignite (re-kindle) when exposed to air.
- The only way to fully extinguish a grain fire is to remove all burning grain from the structure, effectively removing the fire from its fuel source.
- Water, foam, or inert gas injection generally only cool the fire instead of extinguishing it and are often used to control the spread of the fire. All methods have strengths and weaknesses and the method used to cool or slow a fire should be determined by an experienced individual on-site.

**Note:** These activities should only be performed by trained professionals. Grain operators or farmers should not attempt these actions without specific direction from a trained professional.

## Working with the fire department

When the fire department arrives at a site, they take control of the incident response according to standard protocols. It's crucial for everyone to understand that firefighters are trained to use water to extinguish fires. If a different response is needed, the fire department must be informed and understand why. This is why having an emergency action plan and prior training or site visits by the fire department to a grain facility are so valuable.

If the fire department is needed before a grain salvage contractor or consultant can arrive, discuss the following with the local fire department and/or fire chief:

- **Water limitations:** Ensure the fire department knows that no matter how much water they use, it is generally not possible to extinguish a fire in a grain storage structure or pile with water spray alone.
- **Grain dust explosions:** Make sure they understand that grain dust is explosive. Using water spray can suspend dust particles, increasing the risk of an explosion.
- **Primary objective is to control/prevent spread:** Inform the fire department their main goal is to control and prevent the spread of fire to adjacent structures—provided there are no injuries, fatalities, or disaster response needs.
- **Preferred method is to limit oxygen:** Remind everyone that the best way to fight a grain fire is to limit oxygen to the fire and control the site until a grain salvage contractor arrives to remove the fire from its fuel source.

## Conclusion

In conclusion, managing grain fires effectively requires a comprehensive understanding of the risks, indicators, and appropriate response strategies. Grain fires can have severe financial, safety, and collateral impacts, disrupting operations and causing significant losses. Recognizing early signs such as smoke, unusual smells, rising temperatures, and elevated CO levels is crucial for timely intervention. Containment measures, including shutting off utilities and air supply, are essential to limit fire spread until professional help arrives. Prompt notification to insurance companies and coordination with fire departments and grain salvage contractors can mitigate damage and expedite recovery. By adhering to these guidelines, grain operators can protect their assets, ensure worker safety, and maintain operational integrity in the face of fire-related challenges.

**Authors:** The Nationwide Grain Advisory Board consists of a team of agribusiness experts from within Nationwide and grain industry representatives from business operations (coops, grain manufacturers, salvage, and millwright), ag-focused universities, engineering, and the Iowa Institute for Cooperatives. Representing five Midwest states, this team contributed their knowledge to develop this document based on their many years of experience.



For assistance with risk management services or safety resources, contact us at [RMSolutions@nationwide.com](mailto:RMSolutions@nationwide.com) or 1-800-260-1356.

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