Spontaneous Ignition of Hay

Hay fires are a leading cause of barn and storage building fires every year. These fires, due to the heavy fire load within these buildings, usually result in a total loss of the building and its contents.

Spontaneous ignition of hay is likely due to excessive moisture in the stored hay. In order to prevent spontaneous ignition proper harvesting procedures and storage practices must be followed.

Causes

The presence of excessive moisture allows bacteria and other microorganisms to grow. The process of the bacteria and microorganism growth creates heat in the stored hay and this heating process starts to dry out the surface of the hay in the surrounding area. This heat can kill most bacteria and microorganisms. However, if there are bacteria present that can live at higher heat levels, they will continue the process of heating up the hay to temperatures at which, when mixed with the right oxygen content, it can spontaneously ignite. Most hay fires arise in the first six weeks after baling. This is most likely because the hay was not cured properly after it was cut.

Prevention

The best method to prevent spontaneous ignition is the most obvious. Remove the excessive moisture. The ideal moisture content is between 15%-20%. Hay should be cured to moisture content below this level before it is stored. Using specialized equipment, such as conditioners, can help to remove excessive moisture and dry the hay faster.

Hay stored for longer than six weeks still has the potential to get wet which could allow this process to happen at any time. Hay storage barns or buildings should be weather tight and sealed such that excessive moisture will not get into the structure.

If hay is to be stored outside it should be covered with plastic or another material that will prevent moisture from getting inside. If the bale is uncovered, store them individually. Do not stack them together and allow air to circulate around the bales to aid in the drying process. Do not place the bales directly on the ground. Storing the bale on gravel or storing the bale on objects will prevent ground moisture from penetrating the bale and will also allow air to circulate on the underside of the bale.

Heating of hay

During the first six weeks of storage, the temperature of the bales or stacks should be monitored at least twice daily. A probe and thermometer should be used to monitor the temperature inside the bale or stack of hay. The temperature should be taken at the center of the bale or stack. The probe should be driven into the bale or stack and the thermometer lowered into the probe. The thermometer should be left inside the probe for 10-15 minutes.

Refer to the table on the next page as a guide for temperature readings.

Spontaneous Ignition of Hay, *continued*

Temperature interpretations

Below 130 degrees F	Continue to observe daily.
130-140 degrees F	Temperature unstable - could go up or down. Recheck in a few hours.
150-175 degrees F	Temperature likely only going to go up. Move the hay to provide additional air circulation and wet it down to aid in cooling. Continue to monitor temperature regularly.
> 175 degrees F	Fire is imminent or may already be present a short distance from the probe. Call fire department. Do not move hay any further as additional exposure to air could ignite the hay.

Controlling a Fire

Once temperatures reach more than 175 degrees F, do not move the hay. Exposure to additional oxygen could result in the fire quickly growing out of control. If there are flammable objects nearby (such as fuel tanks), evacuate the area immediately. Allow the fire department to do their job. When they say they have the fire under control and think the hay can be moved, move it to a safe location away from any buildings or other combustible materials.

Summary

Excessive moisture is the biggest problem in the spontaneous ignition of hay. Moisture during cutting time in the Midwest can be a challenge due to regular rain events and natural humidity levels in the region. Weather should be monitored to determine ideal cutting times to allow the hay to cure properly before it is baled or stacked. Within the first six weeks, the hay temperatures should be monitored at least twice daily. Storage areas should be kept dry and adequate ventilation should be provided.