Rapid Lesson Sharing

Event Type: Linseed Oil-Soaked Rag Near Miss

Date: March 31, 2026

Location: Superior National Forest, Kawishiwi Ranger District; Minnesota

How this Unit Learned from and Took Positive Actions After this Linseed Oil-Soaked Rag Near Miss

A Justrite 21-gallon oily waste can.

On March 31, 2026, preseason tool maintenance was carried out on the Kawishiwi Ranger District. At 1530, after conditioning wooden-handled tools, an oil-soaked linseed rag was disposed of in a Justrite 21-gallon oily waste can in the Kawishiwi Ranger Station's wood and paint shop.

Forty-eight hours later, a burning smell was noticed coming from the shop. Upon inspection, smoke was seen coming from the Justrite rag can. The can was immediately moved outside through the shop's side doors. Opening the can there revealed one to three rags smoldering amongst another dozen dry rags.

The air-handling ductwork was already operating in the shop that morning. It quickly cleared the air of any residual smell and smoke. An impromptu safety conversation happened between crew members and the District Safety Coordinator.

Top – The Justrite rag can moved outside the building with the contents dumped out.

Bottom – The contents separated, revealing smoldering rags, rubber gloves, paper towels and plastic.

Lessons

What Worked

The rag was disposed of in a fire-resistant metal container rather than the garbage can. The air-handling system was operational and being used. Personnel were present to recognize an issue and quickly removed the threat. This rag can was replaced two years ago. During the annual safety inspection, the plastic can was identified as non-compliant and was replaced with a Justrite metal safety can.

System Improvement

Clearly label the Justrite can "No linseed rags. No rag disposal service provided." Don't put waste in the rag can—no paper towels, rubber gloves or plastic.

The Critical Danger of Linseed Oil Materials

This link provides detailed information about linseed oil, its dangers, and how to properly deal with linseed-oil soaked rags: https://engineerfix.com/how-to-safely-dispose-of-linseed-oil-and-oily-rags/.

In short, Linseed oil is a natural product derived from the flax seeds. It is commonly used for protecting and sealing wood because it can penetrate wood fibers and enhances the natural beauty of the wood grain.

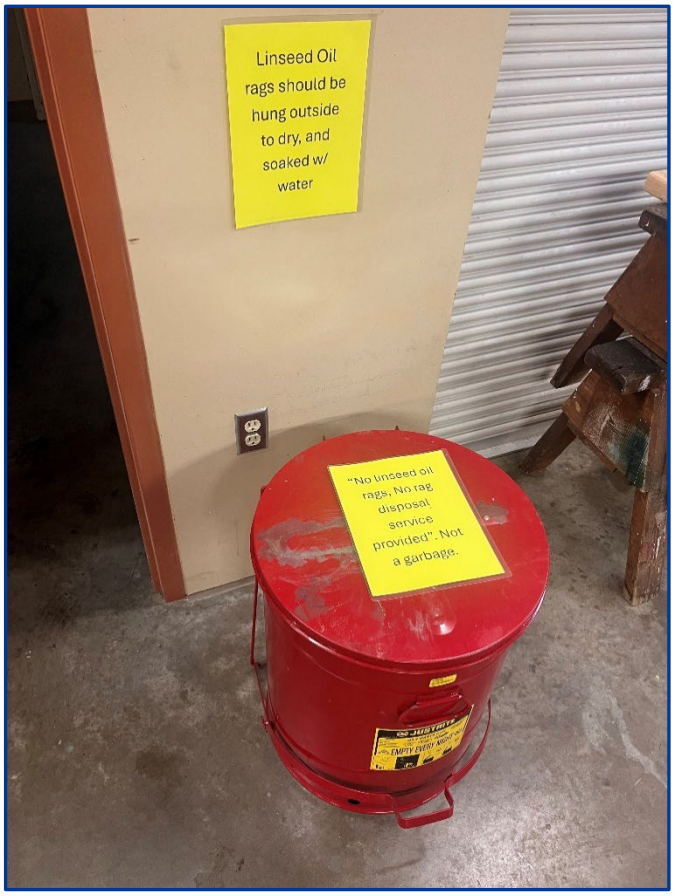
Although linseed oil is extremely common and easy to use – apply with a rag or brush – it is critical to safely clean up and dispose of materials afterwards.

Linseed oil is classified as a “drying oil” because it hardens into a solid film upon exposure to air, a process known as polymerization.

The chemical reaction responsible for this hardening is oxidation, in which the oil reacts with the oxygen in the atmosphere. This oxidation is an exothermic reaction meaning it produces heat as a byproduct of the reaction. As firefighters, we deal with the exothermic oxidation of organic materials every time we light or extinguish fire. Unlike flaming combustion, when linseed oil is applied thinly to a surface, the heat from oxidation is benignly dissipated into the surrounding air.

However, when this same oil saturates a porous material such as a cotton rag, paper towel, or steel wool, the situation changes significantly.

The fibers of the cloth create much higher surface area for the oxidation reaction. If the material is crumpled or piled, the layers act as insulation, trapping the heat during the exothermic reaction. In the right conditions this can lead to thermal runaway, where increasing temperature speeds up the chemical process creating even more heat. If the temperature reaches the material’s ignition point—which can be around 250°F—the rags will ignite without external ignition source.



The Justrite rag can back in place in the Kawishiwi Ranger Station’s wood and paint shop—with the new “no linseed oil rags” signs posted.

This particular danger applies specifically to the oil-soaked materials, not to the liquid oil in its original container.

How to Safely Dispose of Oil-Soaked Rags

Now that we understand why oil-soaked rags represent a particular danger, how do we safely dispose of them after use? Here are the steps that the unit took after this near miss incident:

- Inform and educate employees how to correctly dispose of oily rags.
- Provide another fireproof can outside of the building.
- Provide a wire “clothesline-like” line outside of the shop to airdry rags.
- Make a metal bucket available to fill with water for rag submersion.

When you are ready to dispose of a used rag, hang it on the dedicated clothesline or lay it flat on a nonflammable surface, like gravel or concrete. Once the rags are dry and hard, submerge them in the water bucket. Wring out the excess water.

Place these rags in the second metal can. Once you are ready to remove the rags from the site, take them to a hazardous waste disposal facility, such as a household hazardous waste drop-off site that some counties provide free of charge. Do not throw the rags away in regular trash containers, even after they have gone through the drying and submerging process.

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