

PURPOSE/APPLICATION

To provide guidance for working around iron sulphide. Iron sulphide is a pyrophoric material. This means that it can spontaneously ignite when exposed to air. Iron sulphide is created when rust is present in an oxygen-free environment where hydrogen sulphide gas is present, or where the concentration of hydrogen sulphide (H₂S) exceeds that of oxygen.

When iron sulphide is subsequently exposed to air, it is oxidized back to iron oxide forming either sulfur or sulfur dioxide gas. This chemical reaction between iron sulphide and oxygen generates a considerable amount of heat. In fact, so much heat is released that individual particles of iron sulphide become incandescent and glow. This heat can ignite any nearby flammable materials.

Pyrophoric iron fires most commonly occur during shutdowns when equipment and piping are opened for inspection or maintenance. Spontaneous ignition of iron sulphide most commonly occurs with materials stored on the ground or while inside refinery equipment.

PPE

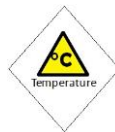
- CPES minimum requirements
- Gas monitors
- Respiratory protective equipment (As required)

TRAINING

- WHMIS
- Fit testing
- H₂S Alive

HAZARDS SOURCES & CONCERNS

- Personal injury
- H₂S
- Chemical Exposure
- Fires/Explosions
- NORM's

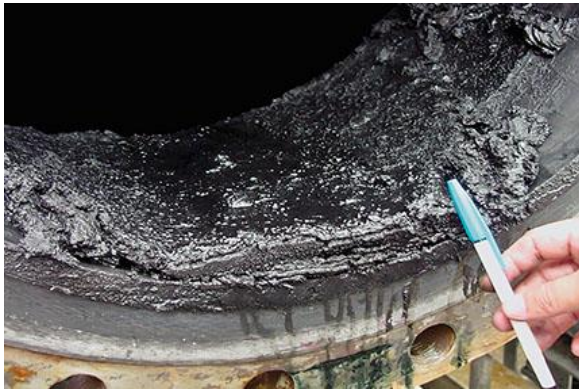


Example of dry filters spontaneously combusting

Common location of Iron Sulphide:

- Crude oil tanks
- Asphalt tanks
- Sour water tanks
- Vessels in sour service such as coke drums, distillation columns, inlet separators, pig receiver/senders
- Reactors
- Separators
- Marine tankers and barges
- Portable tanks and tote bins

Examples of Iron Sulphide found on filters, process equipment:



Avoiding or Controlling Iron Sulphides

- **Communication between CPES and Client/Owner** regarding iron sulphide hazards, and the mitigation strategy prior to starting work
- Replace components that contain sulfur compounds
- The most effective method to control iron sulphide is chemical neutralization. Before opening the equipment potassium permanganate solution (typically around a 1% solution), is circulated through the equipment
- Prevent the sulphide from contacting air. This can be achieved by maintaining a continuous layer of liquid, steam or inert gas between the material and the air. Inerting or flooding vessels with nitrogen gas is one such method
- Keeping the deposits and scale wet until it can be safely removed to a remote area and allowed to dry
- Maintain a constant air ventilation to ensure there is plenty of oxygen to allow the reaction to go to completion, preventing the formation of the pyrophoric intermediates
- Quickly move scale and potential pyrophoric deposits to a remote area and monitor in case ignition does occur

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