

Sulphur Risk Management Standard

Purpose

To establish the minimum requirements to safely control the critical risks associated with Sulphur and Sulphur products.

Essential Life Saving Rules

People

- ✓ People are trained and understand the risk of Sulphur dust and SO₂ to their health and the environment.

Plant

- ✓ Sulphur fires and dust explosions are considered when operating mobile and fixed plant.

Process

- ✓ Processes consider the risk of sulphur fires and controls are put in place that follow the hierarchy of controls to ensure minimum impact occurs on our workers health and the environment.

Planning & Risk Assessment

A risk assessment has been conducted to identify and assess the critical risks associated with handling & storage of Sulphur and Sulphur related products. The assessment determined the following critical risks and controls.

Critical Risk Factors

- A sulphur fire generates a toxic gas called Sulphur Dioxide (SO₂)
- Heat generated by friction of plant and equipment can ignite sulphur dust
- Competent loader drivers handling Sulphur
- Intrinsically safe equipment to be used near Sulphur products
- Effective management & control of sulphur fires should they occur
- Manage the storage of Sulphur 90 to ensure it is stored in a dry environment
- Manage "Hot work" around Sulphur products and Sulphur dust
- Prevention of unauthorized access and possible unsafe interaction with Sulphur
- To ensure workers understand the risks associated with Sulphur

Summary of Critical Controls

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- The use of compressed air to move/remove sulphur or Sulphur 90 dust or any other method of cleaning which may raise a dust cloud is prohibited.
- No smoking areas in place on all sites specifically in areas where sulphur is stored or handled.
- Use of spark resistant (intrinsically safe) equipment in areas that store or handle sulphur or Sulphur 90.
- Provide information for emergency services, signage etc.
- Consideration of other cutting/grinding processes to minimise hot work. Dedicated hot work areas should be sulphur free.
- Site security needs to be considered in the risk assessment to prevent unauthorised access and possible unsafe interaction with sulphur.

Work Environment, Equipment & Activities

- SO₂ sensors to be mounted wherever elemental sulphur or Bulk Sulphur 90 is stored.
- The intake of elemental Sulphur into storage sheds is managed to eliminate the risk of overfilling sheds or conveyors.
- Sulphur 90 must be stored in a dry environment as moisture can break down the product which then in turn forms dust.
- Sulphur products cannot be passed through screw conveyors and may only be processed through a bucket elevator when the elemental sulphur content is less than 40% of the mix.

People & Training

- Induction for employees, contractors and carriers regarding the potential risks associated with handling Sulphur and Sulphur 90 mixes.

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Documentation

- The management of change process must be followed prior to making site changes that could increase the risks or impact on the effectiveness of Sulphur control measures.
- A Sulphur Management SOP must be developed for each site. It should include:
 - A site drawing outlining the storage areas of bulk and bagged sulphur products
 - The storage and handling requirements for the site
 - How Sulphur 90 is added to mixes
 - Plant and equipment limitations such as bucket elevators
 - Site security to prevent unauthorized site access
 - Smoking / non-smoking areas

Sulphuric Acid Plants and Works Despatch Plants.

- Formalise a plan to manage the intake of Elemental Sulphur into storage sheds to eliminate the risk of overfilling the shed and swamping conveyors.
- Install level sensors to automatically stop overfilling elemental sulphur storage sheds and reduce the risk of burying head/tail drums.
- Fixed SO₂ detector/s with a suitable alert (or alarm) system must be installed in each place where sulphur or where bulk Sulphur 90 is stored.
- Non sparking edges on loaders used with bulk elemental sulphur.
- Use of non-metallic hand tools to reduce metal on metal sparks.
- Mechanical sweepers are not to be used to sweep up sulphur.
- Ceramic sleeves are to be installed on mobile plant exhausts.
- Fire suppression must be available for all molten sulphur vessels. Competency in the use of this equipment must be identified and maintained.
- Mobile plant (including diggers) used in the bulk sulphur storage areas must always have an escape breathing kit in the vehicle to allow safe egress in the event of a fire.
- Escape RPE must be available in a suitable nearby place where elemental sulphur is stored.
- Where there is a risk of a sulphur fire, there must be adequate protective equipment – refer to page 4
- SOP developed for the handling of elemental Sulphur, Sulphur 90 and Sulphur 90 mixes. Staff competency of these SOPs must be identified and maintained.
- Sulphur products cannot be passed through a screw conveyor and may only be processed through a bucket elevator (with metal buckets, chains, and frames) when the elemental sulphur content is less than 40% of the mix.
- All conveyor belts used to carry sulphur are to be protected against the build-up of static electricity.
- Crushing or pulverising of elemental Sulphur or Sulphur 90 through hammer type mills is not permitted.
- Process hoses must be present near areas used to store or process sulphur; these hoses must have spray heads only. or have available a suitable product to smother any fire.
- Melter areas and bulk sulphur storage areas must be risk assessed against Explosive Atmospheres – combustible dust atmosphere standards by a suitably qualified person.
- Have in place a preventative maintenance plan that covers conveyor belt Maintenance to ensure risk of sulphur fires is reduced.
- Have a dedicated loader bucket with a non-sparking leading edge where sulphur is handled by loader or isolate Sulphur 90 from the risk of a spark.

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Stores/ Aero work/Lime/Sulphur 90.

- A designated area (identified on a map) for handling loose Sulphur 90 and the storage of S90 in bulk bags.
- Where practical, store S90 in bulk bags and dispense directly into the Loader bucket at time of use.
- Use of non-metallic hand tools to reduce sparks in sulphur 90 handling areas of the Store.
- Have available a stable product such as, Sulphur 90, Superphosphate or Lime to smother any fire.
- An SO₂ monitor with a suitable alert (or alarm) system is available in each place where loose sulphur 90 is stored.
- Mechanical sweepers are not to be used to sweep up sulphur.
- A non-sparking leading edge where sulphur 90 is handled in bulk by loader or isolate Sulphur 90 from the risk of a spark.
- SOP in place for handling sulphur 90 and Sulphur 90 mixes.
- Crushing or pulverising of Sulphur 90 through hammer type mills is not permitted.
- Sulphur products cannot be passed through a screw conveyor and may only be processed through a bucket elevator (with metal buckets, chains, and frames) when the elemental sulphur content is less than 40% of the mix.

New Storage and Intake Buildings.

When designing new plant or buildings to store or handle Sulphur, the Sulphur Code of Practice must be considered as part of the design process.

Emergency Response Plans

A documented emergency response plan must be in place at each site where Sulphur or Sulphur 90 is stored.

Fire Fighting.

It is important not to place yourself at risk when fighting a sulphur fire. If in any doubt remove yourself from the area and call 111 and let FENZ fight the fire. Only attempt to fight small fires that can easily be identified and easily smothered and/or hosed.

If using fire hoses or other types of hoses only fine water spray settings are to be used – to reduce risk of pushing the fire around.

Products such as sulphur, sulphur 90, superphosphate, lime, phosphate rock etc can be used to smother sulphur fires if added slowly to the fire. It is important to ensure there is always enough product available to smother a fire whilst sulphur and sulphur 90 are present on a site.

When putting out small fires it is best to place yourself upwind to remove yourself from any SO₂ fumes emitted.

Protective Equipment and Fire Fighting

RPE	Type	Mask Protection against STEL (WES)
½ Mask	SO ₂ filter	Up to 10x
Full Mask	SO ₂ filter	Up to 50x
PAPR (supplier air)	Jupiter, Versaflow etc	> 50x
Short-Term Exposure Limit (STEL) for SO ₂		0.25ppm or 0.66mg/m ³

Sulphur Fire PPE

Personal Protective Equipment	Stores	Lime	AW	Works
RPE - P2 (SO ₂) respirator min	√	√	√	√
Safety glasses				√
Gloves				√
Full Fire-Retardant Overalls				√