



**NSW
Resources
Regulator**

TARGETED INTERVENTION PROGRAM REPORT

STORAGE OF SECURITY SENSITIVE AMMONIUM NITRATE

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Executive summary

In response to the catastrophic explosion of stored ammonium nitrate in Beirut on 4 August 2020, the NSW Resources Regulator conducted a targeted intervention program (TIP) on storage facilities of Security Sensitive Ammonium Nitrate (SSAN) located at NSW coal and metalliferous mines.

From August 2020 to March 2021 a total of 38 storage facilities were assessed, with key areas of assessment during the TIP including:

- Legislative compliance
- Risk assessments
- Emergency planning
- Storage facility standard
- Training
- Licensing
- Schedule 11 notifications
- Fire protection.

Although general compliance was observed during the assessments, a range of non-compliances and concerns were identified. As a result of the TIP, a total of 46 notices were issued, including 30 x S191 improvement notices and 17 x S23 notices of concern.

This report summarises the assessment findings from the targeted intervention program and provides guidance material to assist in compliance to applicable legislation, standards and codes of practice.

Introduction

In February 2016, the NSW Resources Regulator published its [Incident Prevention Strategy](#). A key component of the strategy is the introduction and implementation of a risk-based intervention framework. The framework identifies and confirms risk profiles, verifies risk control measures and allocates resources based on risk priority.

The implementation of the strategy included the development of two operational approaches to regulatory activity. These are:

- targeted assessment programs (TAP): a planned, proactive program that assesses the overall effectiveness of an operator's attempt to control critical risk
- targeted interventions: a response to a specific incident, series of incidents or other intelligence, which assesses how effectively relevant risks are being controlled (see below for further detail).

Background

Targeted interventions provide a systematic response to a critical risk. They can be applied across all sectors of the mining industry. The need to undertake an intervention will be identified through:

- a series of events
- a single significant event, such as a catastrophic failure or fatality
- a change in the operation's risk profile
- data that suggests an emerging issue.

Targeted interventions are typically undertaken by a team of inspectors. The interventions provide an assessment of the:

- operational and management plans and supporting documentation
- implementation of plans and procedures
- effectiveness of control measures
- operator's compliance with relevant legislative provisions.

Scope

Assessments of licenced storage facilities were undertaken at coal and metalliferous mines between August 2020 and March 2021. The following criteria was assessed at each facility:

- ability to produce an explosives security plan for the safe and secure storage of SSAN which identified all the control measures to safely store explosives and SSAN on site
- ensure risk assessments were up to date, consider current storage and handling practices, and that all identified controls have been properly implemented
- confirm fire-fighting capability and infrastructure within SSAN secure storage was appropriate to successfully extinguish a fire at its early stages
- verify that separation distances were calculated on maximum potential storage quantities with accurate classification and identification of associated and protected works, including vulnerable facilities within the zone identified as potentially affected
- confirm site hazardous chemicals manifests were accurate and had been supplied to the relevant authorities, including the Regulator and Fire Rescue NSW as required
- confirm site emergency response plans had been supplied to Fire Rescue NSW and emergency information was installed and maintained in the correct manner and location.

Key findings and guidance

Legislative compliance

Finding

A small number of sites demonstrated a lack of understanding of accountabilities and the applicable legislation, standards and codes for the safe storage of SSAN.

Guidance

Legislative requirements are imposed on both the mine operator and the licence holder, which may or may not be the same person conducting a business or undertaking (PCBU). Where mutual obligations exist between a mine operator and an explosives licence holder on the same mine site, the mine operator will have accountability to ensure legislative compliance. The Mine Operator must consider the

risks arising from having a licenced storage facility on the mine site and must also consider the implications for their emergency plan. Refer to the mine operators' legislative obligations under:

- WHS (MPS) Regulation, Cl26(6) Explosives Control Plan
- WHS (MPS) regulation, Cl31 Explosives and Explosive Precursors.

The holder of the licence to store must comply with conditions of the licence.

It is important to note that SSAN stored or transported at a mine site is identified as both a hazardous chemical (an oxidising agent) or an explosives precursor under separate legislation. The applicable legislation, standards and codes are listed below:

- As an Explosives Precursor (SSAN)
 - WHS (MPS) Act and Regulation
 - Explosives Act and Regulation.
- When co-stored at the same facility
 - AS 2187.1 (when co-stored with explosives at the same facility)
 - AEISG UN3375 Code of Practice (when co-stored with ANE at the same facility).
- As a Hazardous Chemical
 - AS 4326
 - ADG Code
 - WHS Act and Regulation
 - Chapter 7 and schedules 6 to 13 (hazardous chemical)
 - SSAN as an oxidising solid for the purposes of Schedule 11.

Risk assessments

Finding

All storage facilities had a licence to store or licence to manufacture, security plan and emergency plan in place. However, some security plans lacked acknowledgment of who to contact if SSAN could not be accounted for. Further to this, the security risk assessment did not identify all reasonably foreseeable scenarios (for example, sabotage or theft was not always considered).

Guidance

SSAN used for blasting purposes in mining is a Security Sensitive Dangerous Substance (SSDS) in Schedule 1 of the Explosives Regulation 2013, and a security plan must be developed and complied with in accordance with the Explosives Regulation CI70. Requirements for SSAN stores are also outlined in AS 4326 - Section 9 and are assessed as part of the licence to store.

Available Resources

- [SafeWork NSW Security plan for storage and handling of explosives and/ or security sensitive dangerous substances](#)
- [National code of practice for chemicals of security concern](#)
- Australian Standards HB167:2006 Security Risk Management.

Emergency plan

Finding

Some sites had not identified all emergency risks regarding SSAN in the site's emergency plan.

Guidance

There are specific requirements for emergency planning where SSAN is stored. There are also specific requirements to consult with emergency services and supply the emergency plan relating to the SSAN storage to emergency services plus consider recommendations made by them.

While there are multiple emergency plan requirements across various regulations and standards that apply to SSAN storage, it is acceptable to consolidate these requirements in one plan, provided the content of the plan addresses all the requirements. The mine operator should ensure that where storage facilities are operated by a contractor, that these requirements are met.

Where AN is co-stored with ANE, it is recommended that Section 6 of the AEISG UN3375 Code of Practice be utilised to assess factors such as ‘no warning’ and ‘with warning’ explosions, sympathetic initiation, aggregated explosion, separation mounding and credible evacuation to conduct a holistic assessment of an installation.

In addition to emergency planning requirements outlined in AS 4326 - Section 11, emergency planning related to the storage of SSAN on mine sites must also comply with the requirements in the applicable legislation below.

Applicable Legislation

- WHS Regulation, Cl361 (Hazardous Chemicals), Cl43 (General)
- Explosives Regulation, Cl90 (where >50T SSAN is stored)
- WHS (MPS) Regulation, Cl88.

Resources

- www.fire.nsw.gov.au (search “Lodge an emergency plan”)
- AEISG UN3375 Code of Practice.

Finding

Most mine operators had prepared an emergency plan which is a legislative requirement. However, a small number of mine sites had not consulted or lodged a copy of the plan with Fire and Rescue NSW where a manifest quantity of dangerous goods had been identified. The plan was also missing from a prominent position at the entrance of the mine, along with outdated or missing Hazchem signage and placarding. This was evident in the emergency information boxes that had absent and/or missing information.

Guidance

License holders storing greater than 10 tonnes of SSAN are required to supply their emergency plans to Fire and Rescue NSW and revise the plan if recommendations are received back from that agency (see WHS Regulation, Cl 361). For mines with greater than 50 tonnes of SSAN, in addition to the above, are also required to provide the emergency plan to the NSW Rural Fire Service (for mines in Rural Fire Districts). The arrangements, including any changes, must be communicated to people engaged at the mine who may be exposed to risk as a result of an emergency along with people in adjacent premises if they may likewise be affected (See Explosives Regulation, Cl 90). Fire and Rescue NSW is the primary emergency service organisation with responsibilities to hazardous chemicals in NSW. Details and requirements regarding the submission of emergency plans can be found on Fire and Rescue NSW’s website as detailed in the previous section.

In addition to supplying the emergency plan as outlined above, mine operators must consult with the primary emergency services for the area and local council when preparing an emergency plan (See WHS (MPS) Regulation, Cl 89). This is a particularly important process for emergency plans involving SSAN storage due to the chemical and physical properties and potential consequences arising from emergencies.

Resources

[NSW Resources Regulator - Fact sheet - Consultation requirements for mines in emergency planning](#)

Storage facility standard

Finding

Most facilities had clear warning placards and well maintained and tidy facilities, designed to minimise exposure risks. However, a small number of facilities had inadequate, missing, outdated, incorrect, weathered or illegible labelling on equipment within the facility.

Guidance

Prevention of the contamination of SSAN is a key requirement, as is the prevention of fire and external impact. These conditions may lead to an uncontrolled fire and/or explosion, resulting in severe consequences. Safe storage requirements for SSAN are addressed in AS 4326, in particular Section 9.

As a hazardous chemical, bulk SSAN stored at a licenced facility is required to have specific types of signage and have emergency information established at locations agreed to by relevant emergency services. These requirements are primarily for emergency responders to be aware of potential hazards involved when responding to an incident. This includes outer placarding at the entry to the site, establishment of emergency services information packs at locations determined in agreement with Fire Rescue NSW, and bulk store placarding of the SSAN. See resources listed below for further information.

Legislation and Resources

- WHS Regulation, Cl347, Cl349 & Cl350
- AS 4326 (section 10.3), including security related signage

Finding

It was identified at a small number of facilities that combustibles (for example, diesel) were stored near the storage of both Ammonium Nitrate (AN) and Ammonium Nitrate Emulsion (ANE). This created the potential for contamination with diesel and AN to inadvertently form a class 1 explosive.

This also included a lack of a consistent standard with regards to vegetation and carbonaceous material around the facilities storing SSAN.

Guidance

Storage of SSAN in conjunction with other dangerous goods and materials is addressed in AS 4326. In particular Section 9 of AS 4326, which deals with the specific requirements for Ammonium Nitrate. Diesel is a key consideration in this section, as it is often co-stored with SSAN at licenced facilities for vehicle refuelling or explosive manufacturing purposes. Inadvertent contamination of SSAN with diesel may result in the sensitisation of AN and the formation of an explosive substance classified as 1.1D (ADG Code, above 0.2% combustible material).

Diesel stores must be adequately banded to prevent any leaks or spills from reaching SSAN stores and as per AS 4326 Section 9.3.1 (b), a minimum clearance of 5 metres must be maintained around any store of SSAN of combustible material, including diesel storage. Note, the storage of diesel includes diesel stored in a pipe for transferring or refuelling purposes.

Finding

Separation distances had not been correctly calculated based on TNT equivalencies for when SSAN was co-stored with ANE. Hence, they were unable to provide maximum potential calculations based on actual storage quantities. In some cases, incorrect quantities have been used which provided incorrect separation distances. In addition, there was also a lack of understanding of the use of protected works class A and B as defined in AS2187.1 Storage.

Guidance

Where SSAN is stored in conjunction with explosives, the store shall be segregated in accordance with AS 2187.1. Definitions for protected works and vulnerable facilities can be found in AS 2187.0.

Where SSAN is stored with ANE, the store should be separated in accordance with AEISG UN3375 Code of Practice. Section 6 of the AEISG UN3375 Code of Practice details a methodical approach for assessment of separation distances.

Note: There is currently no requirement with respect to the required separation distances of SSAN to protected works and vulnerable facilities when not co-stored with ANE and/or explosives in NSW. However, guidance does exist within the following documents which can be used to assist a risk-based approach for the safe separation of SSAN from protected works and vulnerable facilities:

- Hazardous Industry Planning Advisory Paper (HIPAP) No.4
- SAFEX GPG: Storage of Solid TGAN

- Queensland Explosives Inspectorate Explosives Information Bulletin No.53
- Western Australian Code of Practice safe storage of solid Ammonium Nitrate Fourth Edition.

Training

Finding

Adequate information, training and instruction had been provided to workers except for a small number of mines where training packages had either not been developed or not delivered to relevant workers. This primarily involved the security plans for the safe storage of SSAN.

Guidance

Refer to CI70 of the Explosives Regulations 2013 for storage facility licence holder obligations.

Where an emergency plan incorporates evacuation as a control, it is important that this is tested and demonstrated to be effective for the mine site and for neighbouring areas if applicable.

Licensing

Finding

It was identified that some facilities were manufacturing explosives without the appropriate licence and transporting explosives in unlicensed vehicles. There were also some minor inconsistencies with incorrect quantities when compared to the permitted quantities on explosive licences.

Guidance

SafeWork NSW is the regulatory authority for the purposes of the *Explosives Act 2003*. SafeWork NSW also grants explosive and blasting licences. The NSW Resources Regulator is also a regulatory authority under CI 6 of the Regulation in relation to:

- the examination and inspection of explosives or explosive precursors
- notification of loss of explosives or explosive precursors
- notification of serious incidents
- the investigation of breaches of the Act, this Regulation and licences under the Act
- the appointment of inspectors under the Act in relation to mining workplaces.

Note: The NSW Resources Regulator conducts field assessments of licensed facilities located on mine sites on behalf of SafeWork NSW. For specific licencing requirements, mine operators should contact SafeWork NSW in the first instance. The NSW Resources Regulator is the regulatory authority on mine sites for the purposes of WHS Act and the WHS (MPS) Act.

Schedule 11 notifications

Finding

Most mine operators had adequately identified the Schedule 11 manifest quantities and placarding for the quantities associated with the SSAN used on site and assessed the health and safety risks. However, a few mine operators had not notified the Regulator of the correct quantities of Schedule 11 chemicals.

Guidance

Mine sites should ensure there is a complete and up-to-date register of all chemicals available on their site along with an adequate assessment of the risks to health and safety of workers who use them. A review should be undertaken against the Schedule 11 manifest quantities to verify the correct amount and where exceeded, reported via the Regulator portal.

Fire protection

Finding

There was a lack of consistent understanding for fire protection requirements for SSAN stores at mine sites.

Guidance

There are specific fire protection requirements for SSAN due to its oxidising properties that support combustion, produce toxic fumes and potential explosion risks if it is involved in fire.

In addition to the fire protection requirements outlined in AS 4326 - Section 12, SSAN storage on mine sites should also comply with requirements in the following legislation to establish adequate controls regarding the risks associated with fire and explosion:

Legislation

- WHS Regulation, Cl359 (Fire protection and firefighting equipment)
- WHS (MPS) Regulation, Cl23 & Cl24 & Schedule 1 (Principal hazard management plans - Fire and explosion)
- WHS(MPS) Regulation, Cl88 & Schedule 7.

It is important to establish a fire protection strategy that does not encourage people to fight fires involving SSAN, where there is a risk of explosion or exposure to toxic gases. Prompt application of large quantities of water is the most effective means of fighting fires involving SSAN due to the cooling effect of water, which should be able to be done from a safe location or by remote application. Remote deluge systems should be considered during the risk evaluation. In addition to a fire suppression strategy, consideration should be given to the protection of SSAN stores from being exposed to the effects of nearby fires.

It is essential that the fire protection strategy is developed based on a risk assessment, including that required as a principal mining hazard. Evacuation of the areas surrounding the SSAN store will need to be considered in this process, and in these circumstances any reliance on evacuation of people from the area must be plausible and rigorously tested to guarantee its viability during an emergency.

In developing adequate fire protection controls, it is important that the risks, proposed strategies and equipment requirements are included in the consultation undertaken with Fire and Rescue NSW as detailed in this document.

Resources

- HIPAP No.2
- SAFEX GPG: Storage of Solid TGAN
- Western Australian Code of Practice safe storage of solid Ammonium Nitrate, Fourth Edition.

Notices issued

Of the 38 sites assessed under the inspection program, 28 separate mines received notices relating to the storage of SSAN, while some mines received notices in relation to other matters. For the purposes of this report, contraventions related to other matters have been removed from the analysis. The notices issued for SSAN were examined in detail and Table 2 below lists the notices issued by type and details.

Table 1: Notices issued for the targeted intervention program – SSAN

NOTICE TYPE	TOTAL ISSUED	NUMBER OF MINES*
s.195 prohibition notice	-	-
s.191 improvement notice	30	24
s.23 notice of concerns	17	13
Total	47	28

*Some mines may have received multiple notices, thus the total mines issued a notice may be fewer than notices issued

Of the combined 47 notices issued, there were some common themes which were apparent throughout the program. Table 3 summarises the type of contraventions encountered.

Table 3: Notices issued - prevalence of categories of concern

IDENTIFIED CONCERN CATEGORIES

Security plans did not adequately address all reasonably practicable risks (eg. theft/sabotage)

Labelling and demarcation of various storage tanks/silos was either missing, incorrect, or illegible

Poor management of vegetation and carbonaceous material around SSAN storage facilities

Diesel being stored and/or used directly underneath ammonium nitrate storage silos

Not all relevant workers had been provided information, training, and instruction regarding security plans and safe storage of SSAN

Fire & Rescue NSW not adequately consulted with regards to emergency plans, nor was it positioned appropriately at the mine

Schedule 11 manifest of hazardous chemicals not notified to the Resources Regulator

Separation distances had not been correctly calculated based on TNT equivalencies for both AN and ANE

Conditions of the licence to store were not fully understood by the people responsible, particularly with reference to the AEISG code of practice for ammonium nitrate emulsions, suspensions, or gels.

Additional resources

DATE PUBLISHED		
Jul 2021	Fact sheet	Planned Inspection Program – Explosives – Metalliferous operations and Tier 1 quarries
Mar 2021	Fact sheet	Planned Inspection Program – Explosives – Coal operations
Mar 2021	Fact sheet	Schedule 11 Hazardous chemical notifications for mine and petroleum sites
Sep 2020	Position paper	Hazardous Chemicals at Mines and Petroleum sites in NSW
Jan 2020	Guideline	Fire safety guideline – Technical information – Hazardous chemicals manifest

Next steps

We will continue to assess and monitor the management of SSAN across NSW coal and metalliferous mines through planned inspections and targeted interventions. The goal: to ensure compliance to applicable legislation, standards, guides and codes of practice, as well as verify that effective control measures are implemented.

When identifying and implementing control measures, mine operators are reminded to follow the hierarchy of controls to ensure health and safety risks are minimised so far as is reasonably practicable.

Results of these inspections will be monitored to gauge industry performance and identify high-risk practices which require further assessment or intervention. Mine operators are encouraged to review the outcomes of this report and determine areas of potential improvement that may be applicable to their own operations.

Issued by

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Further information

For more information on safety assessment programs, the findings outlined in this report, or other mine safety information, please contact the NSW Resources Regulator:

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