- No belly tanks are to be installed underneath trailers carrying AN.
- Electrical systems should be designed and maintained to minimise fires.
- The driver needs to monitor the temperatures of the wheel hubs, tyres and brakes to ensure they are not overheating. This can be done manually by using a portable thermal imaging camera or fitting temperature and pressure monitoring equipment.
- AN must be loaded and secured in accordance with the *Load Restraint Guide*.
- AN is not to be transported with other chemicals or combustibles. Although AN does not burn, it can intensify fires involving combustibles. Some chemicals are incompatible and can sensitise the AN or cause fires.
- Drivers are required to be security cleared and be secure nominees of the licence holder.
- The driver must be trained on AN safety and the requirements that are to be followed in the security plan and emergency plan.
- Drivers are to be trained in dealing with an emergency. They need to know what actions are to be taken, who is to be notified and when to establish an exclusion zone depending upon the emergency.
- Drivers should walk around their vehicle every time they stop for a break to check there are no safety or security issues (such as small fires or tampering with the load).
- Where possible prime movers should be refuelled when no AN is being transported.
- Determine the route to minimise the consequences posed by an incident. For example, rest stops and refuelling should occur at a remote roadhouse rather than a built up area for both safety and security reasons.

REPORTING INCIDENTS

Report incidents involving ammonium nitrate to the Department. Incidents may include injuries, fires, property damage, theft, attempted theft or unexplained loss of ammonium nitrate.

USEFUL RESOURCES

Department of Local Government, Industry Regulation and Safety

Safe use of solid ammonium nitrate: Code of practice

Dangerous Goods Road Transport Decoder App

Minimising the risk of tyre fires when transporting ammonium nitrate explosion risk goods: Code of practice

National Transport Commission

Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG)

Load Restraint Guide

Australian Explosives Industry And Safety Group

Storage and Handling of UN3375

This publication is available on request in other formats for people with special needs.

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GOVERNMENT OF WESTERN AUSTRALIA

Department of **Local Government, Industry Regulation and Safety**
Dangerous Goods Safety

WorkSafe Western Australia



Dangerous goods safety matters

Safe storage and transport of ammonium nitrate (AN)

WHAT IS AMMONIUM NITRATE?

Pure solid ammonium nitrate (AN) is very safe when stored and transported correctly.

Solid AN is a stable chemical and not liable to explode. It is not shock sensitive and requires a very strong initiating event for it to detonate. It does not burn, but when involved in a fire, it will release oxygen and intensify the fire. Because of this, AN is classified as a Division 5.1 oxidising substance. AN is also a precursor for manufacturing explosives and, hence, is a security sensitive ammonium nitrate (SSAN).

AN has a low melting point (169°C) and a low decomposition point (270°C), which is even lower with fuel contaminants. When molten, it becomes shock sensitive and can easily explode with a relatively small stimulus.

Many contaminants can react or combine with AN to make it more sensitive to detonation from impact, heat, fire, static or spontaneous-self heating. Contaminants that sensitise include some metals, combustible materials (oils, diesel, rags or paper), acids, chlorates, nitrites and pool chemicals.

Most explosions around the world have occurred when AN was involved in a fire. A warehouse fire or a vehicle fire can be in the order of 1000°C. A truck tyre fire explosion, a fuel tank explosion or an exploding aerosol can may be sufficient to trigger an explosion in molten AN.

Warning: Fires involving AN are not to be fought and evacuation measures must be initiated. Fires near AN, but not involving AN, can only be fought with water.



SAFE STORAGE

When storing AN, all efforts must be made to prevent fire and contamination. A thorough risk assessment must be conducted when storing AN to identify ways the product could become involved in a fire or become contaminated, and those ways eliminated. Adequate controls must be put in place to bring the hazards to an acceptable level.

Storing AN safely

The Department has published an approved code of practice on the safe storage of solid ammonium nitrate.

Some key points include:

- Large storages (> 10 T) must be stored in a locked, dedicated building away from other chemicals and combustible materials.
- The store is to be constructed from non-combustible materials with a sloping concrete floor, good ventilation and suitable electrics (rated to IP65).
- Stacks of AN are not to exceed 500 T and are to be kept at least 1.2 metres from the walls. Adequate separation between stacks prevents sympathetic detonation.
- Adequate separation from the store to housing, commercial premises and vulnerable facilities must be maintained.
- The stores are to be kept clean, free of rubbish with no combustibles such as pallets, rubber hoses or conveyor belting, aerosol cans, rags, etc. Good housekeeping practices must be in place.
- Adequate water-based fire protection, as well as dry chemical powder extinguishers for vehicle fires, must be available.
- Avoid all sources of ignition. Smoking and hot work in or around the store are not permitted. All electrics for lighting and other equipment inside the store should be rated to at least IP65.
- No machinery such as forklifts, front end loaders, road sweepers and trucks are to be left unattended inside the store. Vehicles are to be parked in a dedicated area at least 10 metres away. They are to be started outside the store and not to be turned off until they are outside the store again.
- It is preferable for vehicles to be loaded/unloaded outside the store. If loading/unloading inside the store, the vehicles need to cool down before entering. Never leave them unattended or for them to stay in the store longer than required. Trucks need to be checked for any tyre, brake or engine fires before entering the store.
- Only security cleared people, authorised by the licence holder or supervised by such people, are allowed access to the store.
- The store must be locked when unattended and adequate security measures (as per the risk assessment) must be put in place.
- Operators must be prepared for emergencies. Conduct mock exercises or desktop exercises for operators to be trained and well prepared for dealing with emergencies.

SAFE TRANSPORT

Transporting AN safely

The transport of AN is governed by the Australian Dangerous Goods Code (ADG Code). The Department has produced a DG Decoder App that can be downloaded onto a smart phone. The Decoder app summarises the ADG Code. Some of the requirements from the ADG Code and some practical points include:

- Vehicles must be in good mechanical condition and regularly serviced to minimise the likelihood of a fire starting.
- In addition to the fire extinguishers required under the ADG code, a fixed firefighting system (or equivalent) must be carried to suppress a wheel, brake or tyre fire. Refer to the Code of Practice on Minimising the risk of tyre fires when transporting ammonium nitrate explosion risk goods for more information.
- Trailer decking cannot be constructed from wood. Steel trays are preferred as they have a much higher melting point than aluminium trays. Aluminium trays will melt in an established fire and consequently the fire has direct contact with the AN. This is unlikely with steel trays.