**Department of Mines, Industry Regulation and Safety Code of Practice (COP) – Safe Storage of Solid Ammonium Nitrate (4th Edition)**

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| --- | --- |
| **Company Name:**  |  |
| Location of Proposed/Existing Storage or Handling Facility: |  |

 **Details of proposed/existing storage of solid ammonium nitrate**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class/Division** | **UN No** | **Name of Dangerous Goods** | **Quantity (t)** | **Description of Storage (IBC, bulk loose pile etc)** | **ID Number (if applicable)** |
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**Compliance Check – DMIRS COP – Safe Storage of Solid Ammonium Nitrate (4th Edition)**

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| --- | --- | --- | --- | --- |
| **SECTION 1 INTRODUCTION** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| 1.1 SCOPE | 2 |  |  |  |
| 1.2 APPLICATION | 2 |  |  |  |
| 1.2.1 Where this code applies | 2 | Applies to the storage of solid AN in division 5.1. |  |  |
| 1.2.2 Where this code does not apply | 2 | Does not apply to:1. Less than 1t
2. Rural DG locations
3. Transfers between ship and berth, or to and from vehicles stationed at berth
4. AN containing Class 1 or Class 9 substances, or UN 2426
5. Non-DG classified AN
6. The transport of DG
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| **SECTION 2 HAZARD AND RISK CONTROL MEASURES** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| 2.1 HAZARDS OF AN | 4 |  |  |  |
| 2.1.1 The hazards of AN | 4 |  |  |  |
| 2.1.2 The explosion hazard | 4 |  |  |  |
| 2.1.3 Toxic gas and explosion chemistry in AN | 5 |  |  |  |
| 2.2 REQUIRED RISK CONTROL MEASURES | 5 | 1. Remove combustible materials and sources of ignition from vicinity.
2. Prevent incompatible material mixing with AN.
3. Prevent unauthorised access.
4. Do not confine decomposing molten AN.
5. Implement safety distances:
	1. from exposed sites and protected works,
	2. between stacks to prevent sympathetic detonation.
6. Prepare site-specific emergency plan, conduct evacuation drills, and ensure maintenance of firefighting equipment as per relevant AS.
 |  |  |

| **SECTION 3 STORE DESIGN AND CONSTRUCTION** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| --- | --- | --- | --- | --- |
| 3.1 TYPES OF STORES AND GENERAL REQUIREMENTS | 6 | AN may be stored in:1. open-air storage of IBCs
2. freight container storage of IBCs or loose bulk
3. dedicated, stand-alone building storage which includes dome structures for packages, IBCs or loose bulk
4. storage attached to, or within, a non-AN dedicated building for packages or IBCs
5. silos and bins of loose bulk
6. blasting explosive magazines of packages
 |  |  |
| 3.1.1 General considerations | 6 | The presence of reactive or hot ground should be considered. |  |  |
| 3.1.2 Lightning protection | 6 | Protected the storage against lightning strike as specified in AS/NZS 1768. |  |  |
| * 1. OPEN-AIR STORAGE
 | 7 | * Provide adequate protection from the weather.
* Prevent accumulation of rainwater.
* The ground should slope away so that any molten AN flows away from the surrounding structures or storages.
 |  |  |
| 3.2.1 AN Security requirements | 7 | See the SSAN Regulations and the *Ammonium Nitrate Guidance Note No. 2 Storage* (COAG, 2004). |  |  |
| 3.3 FREIGHT CONTAINER STORAGE | 7 | * Freight container may be used for dedicated storage of AN provided it is constructed in accordance with AS/NZS 3711.1 *Freight containers, Part 1 – Classification, dimensions and ratings*.
* Should not contain any wood lining or have a wooden floor.
* Should be stacked no more than 2 containers high and 2 containers deep.
* Stack size should not exceed 500 t.
* Max. stack size as required by table 4.1.
* Each stack has to be separated by 10 m.
* Separated sufficiently to allow safe access to both sides of stack by usual handling equipment, at least 10m apart.
 |  |  |
| 3.4 BUILDING STORAGE | 7 | 1. Provide adequate ventilation.
 |  |  |
| 1. Store the AN on a level that has immediate ground access from outside the building.
 |  |  |
| 1. Construct the entire building from non-combustible material, with the floor made of concrete or other suitable material.
 |  |  |
| 1. Ensure any materials or fittings used in the construction do not contain zinc, copper or other incompatibles unless suitably protected. Mild steel may require suitable protection to prevent corrosion by AN.
 |  |  |
| 1. Design the AN store and its surrounds so that, in the event of fire, molten AN does not become confined. Any molten AN should flow clear of storages, buildings and combustible materials, and be retained on the site.
 |  |  |
| 1. Design and construct so that spilt AN can be easily detected and cleaned up.
 |  |  |
| 1. Do not store AN in a cabinet or similar enclosed and confined manner.
 |  |  |
| 1. Keep the entire building dry and free from water seepage.
 |  |  |
| 1. Provide additional securing devices for ceiling lighting to prevent a hot light from falling on top of the AN.
 |  |  |
| 1. Where there is a risk of corrosion from AN, ensure electrical equipment has a rating of not less than IP65 in accordance with AS 60529.
 |  |  |
| 1. Where an AN store of 10 t or less is attached to another building or located inside a building that is not dedicated to the storage of AN, isolate the store by a horizontal distance of at least 5 m that is left clear.
 |  |  |
| 1. If an AN store is located inside a building, at least one wall of the store should be an external wall of the building so this wall is constructed to allow:
	1. natural ventilation and the escape of potential decomposition gases
	2. molten AN to flow clear of the building in the event of a fire
	3. firefighting using water jets from outside of the building.
 |  |  |
| * 1. SILO AND BIN STORAGE
 | 10 | 1. Construct from non-combustible, corrosion-resistant materials.
 |  |  |
| 1. Ensure materials or fittings that could come into contact with AN do not contain zinc, copper or other incompatibles unless suitably protected. Mild steel requires suitable protection to prevent corrosion by AN.
 |  |  |
| 1. Galvanised steel should be protected from direct contact with AN.
 |  |  |
| 1. Design and construct so it is capable of resisting all foreseeable forces to which it may be exposed.
 |  |  |
| 1. Ensure empty container structure can withstand wind and seismic forces.
 |  |  |
| 1. Construct area beneath the AN silo or bin from concrete or suitable material.
 |  |  |
| 1. Ensure electrical equipment has a rating of not less than IP65 in accordance with the IP Code.
 |  |  |
| 1. Design and construct to prevent the ingress of water and allows for the release of gases in the event of a fire.
 |  |  |
| 1. Positioned so that, in the event of a fire, molten AN cannot enter any enclosure, and will flow clear of all other storage areas, buildings and combustible materials, and be retained on the site.
 |  |  |
| 1. Ensure silo is stand-alone AN storage, not located inside or attached to buildings.
 |  |  |
| 1. Silo should be protected from damage by traffic.
 |  |  |
| 1. AN in silo should be separated by at least 10 m from the next silo. The max. aggregated quantity should not exceed 500 t.
 |  |  |
| 3.6 MAGAZINE STORAGE | 10 | AN stored in a blasting explosive magazine must comply with the Dangerous Goods Safety (Explosives) Regulations 2007. |  |  |

| **SECTION 4 STORE LOCATION AND SEPARATION DISTANCES** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
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| 4.1 SEPARATION DISTANCES | 11 | * Separation distances as per Table 4.1.
* For high population densities, guidance should be sought from HIPAP4 and the Chief Dangerous Goods Officer regarding consideration of societal risk.
 |  |  |
| 4.1.1 Separation distances from the boundary and from on-site protected works | 11 | * Quantities exceeding 10 t should be separated from the boundary and on-site protected works by at least 10m.
* Quantities between 1 and 10 t should be separated from the boundary and on-site protected works by at least 5m.
 |  |  |
| 4.1.2 Separation distances to off-site occupied buildings – Table 4.1 | 11 | Separation distances for quantities exceeding 1 t to off-site occupied buildings set out in Table 4.1:* Vulnerable facilities and critical infrastructure
* Residential buildings
* Commercial buildings
* Industrial plant and factories

Inter-stack distances for IBC as per Table 5.1 |  |  |
| 4.1.3 Separation distance on mine sites | 12 | Separation distances from mine site premises as per Table 4.1 column “industrial plant and factories”. |  |  |
| 4.2 STORAGE WITH HIGH EXPLOSIVES AND DETONATORS | 12 | * AN store must be separated from high explosives and detonators by min distances given in AS 2187.1.
* Mounding must comply with requirements of AS 2187.1.
* If stored with high explosives, AN storage must comply with the Explosives Regulations.
 |  |  |

| **SECTION 5 STORAGE REQUIREMENTS** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| --- | --- | --- | --- | --- |
| 5.1 GENERAL | 15 | AN should be stored:* adequately ventilated,
* away from possible sources of excessive heat, fire or explosion.
 |  |  |
| 5.1.1 Maximum stack size and inter-stack separation | 15 | * AN in packages, IBCs or as loose prill may be stored in max. stack sizes of 500 t.
* Stacks separated from each other in a manner that prevents sympathetic detonation (see Table 5.1)
 |  |  |
| 5.1.2 Stack height | 15 | * Stacking height should not exceed 3 IBC of AN or 3 pallets of AN packages.
* Stack stability maintained at all times.
 |  |  |
| 5.1.3 Clearance around stores | 16 | * Every AN store should have at least 5m clear area surrounding it with no vegetation, combustible materials, vehicles or non-associated equipment within this area.
* Trees should be cleared for at least 10m from the AN store.
* If location is in a high bushfire risk area, larger clearances of vegetation should be considered.
 |  |  |
| 5.1.4 Parking of AN vehicles | 16 | Vehicles loaded with AN should be parked no closer than 10m from the AN store. |  |  |
| 5.1.5 Operating procedures | 16 | * Appropriate operating procedures should be in place to cover all operations at the facility.
* Unused wooden pallets, empty bags and packaging should be removed promptly and kept at least 5m from the store.
* Do not allow Pallets etc. to become impregnated with AN.
 |  |  |
| 5.5.6 Preventing contamination |  | * Ensure appropriate measures are in place to prevent introduction of contaminated AN into a store of uncontaminated AN.
 |  |  |
| 5.2 CAKING OF AN | 16 | * Protect AN from rain and direct sun.
* Appropriate measures should be in place to ensure AN is not stored for longer than necessary.
 |  |  |
| 5.3 DISPOSAL OF CAKED AND CONTAMINATED AN | 17 | Caked and contaminated AN should be segregated from usable product and disposed of as soon as practicable. |  |  |
| * 1. REQUIREMENTS IN A STORAGE BUILDING
 | 17 | 1. Maintain 1.2m free air space between AN in packages/IBCs and the outer walls of the building and lowest support beam of the roof.
 |  |  |
| 1. Do not permit smoking and naked lights inside AN stores, and display notices to this effect.
 |  |  |
| 1. Hot work inside the storage building should be avoided if possible.
 |  |  |
| 1. Hot work inside or outside the storage building should be controlled by a “Hot Work Permit System”.
 |  |  |
| 1. Floors, walls and equipment should be kept clean and any rubbish, foreign matter and spillages. Organic materials should not be used to clean floors.
 |  |  |
| 1. Pallets should not be used when storing more than 10 t of AN in IBCs in a building. Plastic pallets are acceptable for dome structures in remote locations to keep AN off the ground.
 |  |  |
| 5.4.1 Storing more than 10t of AN | 17 | A dedicated store is required when storing more than 10 t of AN. For a building, this means a stand-alone structure that contains no other substances or equipment. |  |  |
| 5.4.2 Storing 10t or less of AN | 17 | * For a store containing 10 t or less of AN, any building in which the AN store is located should not be used for any other purpose.
* If this is not practicable then all other substances and equipment should be located at least 5 m from the AN store.
* Where the other substances are liquid and incompatible with AN, provide fire-resistant spillage containment capable of holding at least 100% of the liquid volume stored, and designed so that liquid cannot encroach within 5 m of any stored AN.
 |  |  |
| 5.5 LOOSE PRILL | 18 | For loose prill stores of more than 500 t max. stack size in AN manufacturing plants, where no impact to residential buildings can occur, additional control measures beyond those required by this code must be applied in accordance with the safety report for the major hazard facility. |  |  |
| 5.5.1 Separation of piles of loose prill | 18 | * The “toes” of bulk piles of loose prill should not overlap.
* Where piles of loose AN prill are separated by only a single concrete wall, use the aggregated quantity of AN for calculating separation distances.
 |  |  |
| 5.6 COMPATIBLE AND INCOMPATIBLE SUBSTANCES | 18 | Substances listed at section 5.6.2 as "Incompatible substances” should never be stored in the same building as AN nor within a building attached to an AN store. |  |  |
| 5.6.1 Compatible substances | 18 | The fertilisers listed in 5.6.1 should be separated from AN by at least 5 m. |  |  |
| 5.6.2 Incompatible substances | 18 | Do not store the substances listed in 5.6.2 in any building used to store AN nor within any building attached to an AN store.  |  |  |

| **SECTION 6 EMERGENCY RESPONSE AND FIRE PROTECTION** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| --- | --- | --- | --- | --- |
| 6.1 EMERGENCY RESPONSE | 20 |  |  |  |
| 6.1.1 Emergency plan | 20 | A site-specific emergency plan in line with r75 should:* establish an efficient process for assigning specific roles and alerting key managers
* be practised to ensure it works efficiently
* alert fire fighters to protect against the release of NOx
* determine at what point emergency personnel and non-emergency persons need to evacuate to a safe distance.

If inter-stack distances are inadequate to prevent sympathetic detonation, the total storage quantity determines the evacuation distance. |  |  |
| 6.1.2 Evacuation distances | 21 | Table 6.1 provides recommended evacuation distances for persons not involved in the emergency operation and for emergency personnel. |  |  |
| 6.2 FIRE PROTECTION | 21 | The fire control equipment must be designed and constructed to extinguish any fire that is reasonably foreseeable at the site. |  |  |
| 6.2.1 Fire protection strategy | 21 | The fire protection strategy should:* be based on eliminating or rigorously minimising, the presence of combustibles around AN
* recognise the chemical properties of AN

Do not fight fires involving AN. |  |  |
| 6.2.2 The application of water | 22 | Guidance regarding the application of water is available in AS 4326. |  |  |
| 6.2.3 Firefighting requirements | 22 | Fire protection should meet the following requirements:1. water from hoses and fixed monitors should be able to reach all parts of the store
2. foam and dry chemical extinguishers should be available to deal with vehicle and electrical fires before the fire gets out of control and involves the AN
3. firefighting systems should be automated or capable of single person operation where AN stores are operated by a small number of people
4. for stores located within cities, towns and major hazard facilities consideration should be given to installing automatic fire water sprinkler systems and VESDA fire detection systems.
 |  |  |

| **SECTION 7 POWER TRANSFER EQUIPMENT** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| --- | --- | --- | --- | --- |
| 7.1 GENERAL | 23 | The use of suitably designed, constructed and maintained powered transfer equipment is essential. |  |  |
| 7.2 EQUIPMENT REQUIREMENTS | 23 |  |  |  |
| 7.2.1 Permitted powered transfer equipment | 23 | Powered transfer equipment should only be used to move AN if:1. it is powered by electricity, diesel fuel or LP gas
2. its power source is located outside, and at least 5 m from, the AN store
3. it is electrically or hydraulically driven.
 |  |  |
| 7.2.2 Prohibited powered transfer equipment | 23 | Petrol powered vehicles must not be used to move AN into, within or from an AN store. |  |  |
| 7.2.3 Powered transfer equipment requirements | 23 | All powered AN transfer equipment should:1. be free of any leaks of fuel, lubricating oils or hydraulic fluid
 |  |  |
| 1. not include in its construction any copper, zinc (including galvanised iron), cadmium or their alloys that can come into contact with AN
 |  |  |
| 1. be constructed from materials that, if in contact with AN, will not corrode
 |  |  |
| 1. have all non-essential electrical equipment removed, and all remaining equipment sealed against dust ingress in accordance with IP65 of the IP Code — equipment should be designed and constructed to resist dust ingress as far as is reasonably practicable, and inspected and cleaned regularly
 |  |  |
| 1. where mobile, be kept outside of the AN store when not in use and parked at least 10 m from the AN store — control measures should be in place to prevent contaminants being brought into the AN store on vehicles
 |  |  |
| 1. be refuelled or recharged at a distance of at least 10 m from the AN store
 |  |  |
| 1. be fitted with a spark arrester or equivalent and started outside of the AN store if they use diesel fuel or LP gas
 |  |  |
| 1. be provided with a dry-powder fire-extinguisher having a rating of not less than 40(B) and consider the need for an additional foam fire extinguisher to deal with fires that respond poorly to dry powder
 |  |  |
| 1. if it incorporates a battery, be provided with a clearly marked battery isolation switch and insulated cover for the battery terminals
 |  |  |
| 1. all transfer equipment should be attended when in operation
 |  |  |
| 1. vehicles should be attended at all times when they are inside the AN store and have unhindered egress from the store
 |  |  |
| 1. vehicles that deliver AN into or out of the store should have direct egress that does not involve the vehicle having to manoeuvre or reverse
 |  |  |
| 1. be designed and constructed, including consideration of failure modes, to avoid situations where AN may become trapped, heated or brought into contact with incompatible substances — items to consider include:
	* suitability of seals, gaskets, bearings and clearance distances;
	* use of solid rather than hollow equipment components;
	* provision of alarms and shut-down systems for over-speed, under-speed, no-flow and over-heat situations
 |  |  |
| 1. if it is a conveyer belt, have fire-resistant belt and rollers
 |  |  |
| 1. be regularly maintained
 |  |  |
| 1. unless it is a vehicle, be provided with a clearly labelled and readily accessible emergency stop
 |  |  |
| 1. be cleared of as much AN as is reasonably practical after each use.
 |  |  |

| **SECTION 8 PARKING OF VEHICLES LOADED WITH AN ON PRIVATE PROPERTY WITH RESTRICTED ACCESS** | **Page** | **COP Specification** | **Describe what is proposed/actual to demonstrate compliance** | **Complies****(Y/N/NA)** |
| --- | --- | --- | --- | --- |
| 8.1 OVERVIEW | 25 |  |  |  |
| 8.2 PARKING REQUIREMENTS ON PRIVATE PROPERTY WITH RESTRICTED ACCESS | 26 |  |  |  |
| 8.2.1 Introduction | 26 | The transiting of AN on private property with restricted access may require a Dangerous Goods Site Licence under the Storage Regulations. |  |  |
| 8.2.2 Inter-vehicle distances for parked dangerous goods vehicle | 26 | All parked dangerous goods vehicles, including those carrying AN should be separated in parallel from each other by at least 3 m. |  |  |
| 8.2.3 Parked vehicles carrying flammable of combustible liquids or gases | 26 | Vehicles carrying flammable or combustible liquids and/or flammable gases should be parked in a separate area, at least 10 m from vehicles carrying AN or other oxidising agents. |  |  |
| 8.2.4 General parking requirements for all dangerous goods vehicles | 26 | Applicable to parking of all dangerous goods vehicles including those carrying AN:1. the parking areas and vehicle bays should be clearly marked
 |  |  |
| 1. all vehicles with AN should be separated from any dangerous goods storages, combustible materials, on-site office buildings and open flames by at least 10 m
 |  |  |
| 1. access and escape routes should be clearly defined and kept clear at all times
 |  |  |
| 1. parked vehicles should be able to drive away without reversing and with minimal manoeuvring
 |  |  |
| 1. spill kits should be available to clean up and recover any dangerous goods spill and fuel and oil spills. Separate spill kits should be available for AN and fuel/oil spills
 |  |  |
| 1. before leaving the parked vehicle, the driver should ensure that wheel and bearing temperatures of the parked vehicles are within safe operational limits to prevent vehicle fires
 |  |  |
| 1. disconnected lead trailers should be supported by braced landing legs, or equivalent external support, to prevent a potential trailer collapse.
 |  |  |
| 8.2.5 Separation distances to off-site occupancies for AN vehicles | 27 | If AN transport yards have manifest quantities of AN in transit on a 24-hour, daily basis for most of the year, the operation will need to establish sufficient separation to the following off-site occupancies, as per Table 4.1:* + vulnerable facilities
	+ residential and accommodation occupancies
	+ commercial buildings
 |  |  |
| 8.2.6 Emergency response | 27 | For AN vehicles in transit, the emergency response requirements and fire protection requirements of sections 6.1 and 6.2 of this code apply. |  |  |
| 8.2.7 Fire suppression | 27 | Water-based extinguishers should be placed so that they are readily accessible to each AN vehicle in the yard.The following is required:1. at least one 90 L mobile foam (AFFF) extinguisher, or
2. at least one fire hose reel that complies with AS 1221 Fire hose reels.
 |  |  |
| 8.2.8 Temperature checking stations | 27 | Water-based fire extinguishers should be located near any temperature checking stations, area unless AN vehicles are already fitted out with foam extinguishers. |  |  |

**Areas of Non-conformance and Action Plan**

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| --- | --- | --- | --- | --- | --- | --- |
| **Non Conformance Number** | **Section****Number** | **Action Plan** | **Actionby** | **Due****Date** | **Completion****Date** | **Comments** |
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**Compliance check summary**

This **proposed** / **existing** - storage of solid ammonium nitrate **complies / does not comply** with the DMIRS Code of Practice – Safe Storage of Solid Ammonium Nitrate (4th Edition).

**Name of assessor/s** …………………………………………………………. …………………………………………………………. ………………………………………………………….

**Signature/s** …………………………………………………………. …………………………………………………………. ………………………………………………………….

**Date**  …………………… **Date of next review** …………………………………………………………………