Comments on the NSW Discussion Paper to introduce Separation Distances for Solid Ammonium Nitrate (AN) storages October 2022

WorkSafe Victoria supports the introduction of a Code of Practice for solid ammonium nitrate that complements the requirements in AS 4326-The handling of oxidising agents

AS 4326 includes general requirements for oxidizers and specific, requirements for ammonium nitrate, which is an oxidizer but can, have explosive properties under certain conditions. Whist the standard covers, security, , emergency response pans, minor storages, transit shortages and to a degree neighbouring separation distances, it does not specify separation distances of ammonium nitrate storages to vulnerable facilities, residential commercial and industrial facilities.

Jurisdiction and Industry Code of Practices

The Western Australian Department of Mines, Industry Regulation, Safety, have in place a Code of Practice-Safe storage of solid ammonium nitrate (fourth edition 2021). This code cover solid ammonium nitrate (AN) oxidising agents UN 1942 and UN 2067.

Explosive Inspectorate Resources Safety & Health Queensland have in place Bulletin 53 (2020)-Storage of requirements for security sensitive ammonium nitrate (SSAN). It's recognised that SSAN are administered as an explosives not a class 1, and SSAN retains its dangerous goods classification as an explosive of class 5.1, class 9 or a non-dangerous goods in case of calcium ammonium nitrate.

In 2022, the Australian Explosives Industry Safety Group (AEISG) put into place their Code of Practice- Storage and Handling of Solid Ammonium Nitrate. The ASESIG code incorporates the IMSEFAR software tool for estimating the blast consequences, like hood of accidental explosion, and the likelihood that such an explosion may cause injuries or death. The Code is essentially Risk based consequences.

The WA and QLD codes like AS 2187 recommend separations distances based on (consequences based). They use a base AN converted to an equivalent quantity of TNT, as this provides a well-defined reference point.

Although, all three codes have a number of subtle differences, application, and basis they nevertheless share the core principle of the specification of Separation Distances of Ammonium Nitrate storages to Vulnerable, Industrial, Residential and Commercial facilities.

Prescriptive Separation Distances

Whilst, no information, is provided, it is assumed that the distances in table 3 are based on the historic frequency of explosion- taken from Good Practice Guide Storage of solid Technical Grade Ammonium Nitrate (SAFEX) International 2014, and harmonised with the risk criteria from the Hazardous Industry Planning Advisory Paper no 4 Risk Criteria for land use safety planning (HIPAP 4) NSW Department of Planning 2011

Use of TNT equivalence of 32%

"TNT Equivalence" is used throughout the explosives and related industries to compare the effects of the output of a given explosive to that of TNT.

The TNT equivalence is just an estimation and is different for every explosion and depends on how much ammonium nitrate (AN) has actually reacted and how much AN is unreacted and fertilised the environment around the explosion site.

Although, consistent with QLD, this figure is on the high side leading to rather large separation distances. Since the vast majority of explosion causation is from a fire, it is advisable to use 25% (equivalence, which is still very conservative and overestimation of the usual explosion with fires, which is often around 10% equivalence.

Separation Distances

The use of a high TNT Equivalence such as proposed in the discussion paper of 32% leads to very much higher separation distances. In general, to twice the distances in the WA code. Using unrealistically large distances makes the storage of AN near populated area and towns too difficult could have adverse effects on the Fertilizer Industry.

Separation distances, are based on ensuring that in the event of a store of ammonium nitrate catching fires and exploding the effects will not result in significant casualties or property damage. This is, applied for vulnerable, residential commercial and industrial facilities.

To illustrate the different approaches used in the various codes, the storage of 10,000kg of AN to Vulnerable Facilities.

10,000 kg AN	**Vulnerable facility (m)**
NSW(proposed)	654
WA	300
QLD	654
AEISG	430

Protected Works

The various codes use slightly different approaches when it comes to what constitutes protected works or facilities that require protection.
The discussion paper proposes to use three categories of protected works, Protected Works A, B, and Vulnerable facility as defined in AS2187 and referenced in explosive regulations. Whilst this approach aligns with QLD, it does not align with the WA or AEISG approach, which provides a greater level of sensitivity and adjustment in that it cater differently and more leniently with commercial buildings and industrial plant and factories. In addition, it makes no sense to use traditional protected works A and B when the risk criteria come from the NSW Planning Advisory Paper.

Relaxation of Rules based on Risk Assessment

For New Facilities all separations distances should be consequence based rather than risk based (as proposed in the draft).

It is noted that some of the existing codes makes allowances for a reduction of separation distances by taking into account a number of factors including results. This approach is not favoured as there are too many variables beyond the control of the facility and does not provide the required level of certainty that quantity separation distances provide.