AMMONIUM NITRATE GUIDANCE NOTE No. 4

SITING OF NEW FACILITIES

1. PURPOSE

On 25 June 2004 the Council of Australian Governments (COAG) agreed to a national licensing system to limit access to security sensitive ammonium nitrate (SSAN). Each state and territory has introduced legislation and/or regulations to give effect to the COAG agreement.

This guidance note will provide guidance to regulatory authorities and persons proposing to store SSAN at new facilities in order to achieve adequate separation distances to off-site facilities in line with community expectations for public safety.

This guidance note was developed to take account of the new terrorist environment, and in particular the potential sabotage of SSAN facilities. While it gives an outline of national standards, precedence should be given to the specific requirements of each state or territory legislation.

2. DEFINITIONS

Security Sensitive Ammonium Nitrate (SSAN)
ammonium nitrate, ammonium nitrate emulsions and ammonium nitrate mixtures containing greater than 45% ammonium nitrate, excluding solutions and excluding Class 1 explosives.

(**Note**: This includes substances such as calcium ammonium nitrate that are not classified as dangerous goods and dangerous goods with UN numbers 1942, 2067, 2068, 2069, 2070, 2071, 2072, 3375 and 3139 where applicable. Explosives of Class 1 are excluded.)

Vulnerable facility
A category of facility that includes, but is not restricted to, the following:

a. Multistorey buildings of four storey or higher;
b. Large glass fronted buildings of high population;
c. Health care facilities, child care facilities and schools;
d. Public buildings or structures of major historical value;
e. Major traffic terminals, e.g. railway stations and airports;
f. Major public utilities, e.g. gas, water, electricity works;
g. Residential areas;
h. Sports stadium; and
i. Critical infrastructure.

Regulatory Authority *means* -
in each state or territory the regulatory authority is the authority that issues the licence or permit.

3. FACTORS AFFECTING THE SITING OF A FACILITY IN RELATION TO OFF-SITE DEVELOPMENTS

From a security point of view, it is helpful to locate the storage of SSAN as closely as possible to occupied buildings for greater surveillance. However, SSAN has the potential to

explode under certain fire circumstances or acts of sabotage and therefore optimum distances to occupied buildings need to be carefully considered.

In all cases where a new storage site is proposed, the Regulatory Authority should be consulted for guidelines to the required separation distances from potential terrorist targets such as centres of high population density, critical infrastructures such as power plants, residential areas or important historic buildings.

Where there are no such vulnerable facilities, the new storage building should be located in accordance with AS 4326 – 1995: *The Storage and Handling of Oxidising Agents*. Such close location to off-site facilities assumes that the storage complies fully with safety standards making the probability of an explosion a remote possibility.

Where new facilities, including Major Hazard Facilities, are proposed to be located close to vulnerable facilities, it is recommended that the consequence distances as detailed below are applied.

The issue of requiring consequence distances to vulnerable facilities for SSAN products is a new concept, but is now being advocated by regulators with the intention of protecting the public from sabotage events. There are problems with the usual alternative approach of using quantitative risk assessments, when applied to terrorism and sabotage events, since there is no reliable historic data that can adequately predict terrorist event probability. The lack of consensus on societal risk criteria in Australia is an added problem of the past approach.

In accordance with the *National Standard for the Control of Major Hazard Facilities* (NOHSC:1014(2002)) all storage/manufacturing facilities storing in excess of 2500 tonnes for UN 1942, and 5000 tonnes for ammonium nitrate fertilizers of UN 2067, 2068, 2069, 2070, 2071 or 2072 are classified as Major Hazard Facilities (MHFs) and it is common practice for the proponent to conduct a site specific quantitative risk assessment for the purpose of land use planning (i.e. to determine the minimum separation distances to various types of developments) and to minimise all risks to as low as is reasonably practicable. Regulatory authorities may also decide to classify new sites as MHFs at lower quantities than that mentioned above, where a facility poses a particularly high level of risk. Risk screening is usually conducted by the Regulatory Authority for proposals in excess of 10% of the Schedule 1 thresholds as listed in the National Standard.

It is likely that the above quantitative risk assessment for MHFs will indicate that greater separation distances are required than indicated by AS 4326.

4. CONSEQUENCE DISTANCES FOR NEW FACILITIES

Any new SSAN storage/manufacturing facilities should be located away from vulnerable facilities by a minimum distance to be determined by consulting AS 2187.1 – 1998: *Explosives – Storage, transport and use, Part 1: Storage* and in particular by reference to Table 3.2.3.2. This Quantity/Distance column for "Protected works Class B" applies.

This type of consequence distance is known as the "Inhabited Building Distance" and it protects people from injuries and fatalities from blast overpressure. However it does not protect them adequately from shrapnel or debris effects within 400 metres from the centre of an explosion. Buildings would undergo minor damage at the boundary.

Table 3.2.3.2 is based on TNT as the donor explosive and the net explosives quantity (NEQ) will require to be adjusted to allow for the particular SSAN to be stored.

In order to make use of the above-mentioned Quantity/Distance table, the equivalent weight of TNT of the particular type of SSAN needs to be calculated.

The equivalent weight of TNT of an explosives event is governed both by the explosives power of the material, or TNT equivalence, and the efficiency of the process.

For example, in the case of ammonium nitrate (AN), if the efficiency of an explosion were 100% then the TNT equivalence would be as high as 0.58. However, the efficiency is variable and depends on factors including the amount of confinement and the size of the initiating mode.

For loosely stacked AN, some people in the industry now accept that 0.32 is the factor that must be used to determine the quantity of TNT listed in Table 3.2.3.2 to gain the necessary separation distances. (The explosives industry is currently conducting studies to determine the equivalence factors for SSAN substances with greater certainty.)

As an example, assuming 100 tonnes of pure AN were being stored, the Equivalent weight of TNT would be 32 tons. Table 3.2.3.2 shows that 32,000 kg of TNT would require a protection distance from off-site occupied buildings of approx 705 metres. It may be that this distance can be substantially reduced by storing the AN in a manner that would not allow sympathetic explosion of the total storage.

While a minimum distance of 180 metres has been provided for in Table 3.2.3.2, a minimum distance of 400 metres should be considered to guard against shrapnel/debris damage that could prove lethal to potentially exposed people within 400 metres from the blast. Where shrapnel/debris is unlikely as a result from the explosion, or there are no exposed people, the minimum distance may be discounted.