NEW FERTILISER REGULATIONS

In June 2004, the Council of Australian Governments (COAG) agreed to a national licensing system to limit access to ammonium nitrate because of its history of terrorist use and concern about its ready availability. However, for many hydroponic growers, the introduction of a licensing system could present major problems. Here, the AHGA outlines the criteria for obtaining a licence, and alternatives to ammonium nitrate where a licence isn't required.

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BACKGROUND

Under sweeping new legislation being introduced by each Australian State and Territory, hydroponic growers will soon be required to obtain a 'Farmers' Licence' to use Ammonium Nitrate and possibly other fertilisers used in crop production. To obtain a licence, growers will need to demonstrate a legitimate need, provide safe and secure storage and handling, and undergo background checks by Police and the Australian Security & Intelligence Organisation (ASIO), among other requirements.
In Australia's Federal System, the sale of fertilisers comes under State and Territory control, with each jurisdiction planning to introduce regulations to give effect to the COAG (Council of Australian Governments) agreement for a national licensing system to limit access to ammonium nitrate. During the process to draft national guidelines, the Australian Hydroponic & Greenhouse Association (AHGA) has been working closely with peak State and National grower organizations to highlight the impacts of the new licensing system on hydroponic growers. The AHGA approach has been that it recognises the need to restrict access to ammonium nitrate and the need to have at least some form of grower registration to have access to security sensitive ammonium nitrate (SSAN). However, the AHGA is working hard to minimise the impacts on growers, including the financial burden for increased security.

Under the proposed licensing system, growers who use ammonium nitrate and fertiliser blends containing more than 45% ammonium nitrate will require a licence or permit to purchase, transport, store and use SSANs. This will include many hydroponic growers who use close enough to 100% ammonium nitrate for pH control. The licensing system will also impact on fertiliser suppliers and manufacturers of nutrient mixes.

SSAN means ammonium nitrate, ammonium nitrate emulsions, and ammonium nitrate mixtures containing greater than 45% ammonium nitrate, excluding solutions and dangerous goods described under the *Australian Dangerous Goods Code*. This includes dangerous goods with UN numbers 1942, 2067, 2068, 2069, 2070, 2071, 2072, 3375 and 3139, where applicable. The UN number should be on the packaging of bagged fertiliser products that are classified as dangerous goods, and fertiliser suppliers should be able to provide UN numbers where applicable. Some SSAN products, such as Calcium Ammonium Nitrate, will not have a UN number.

COAG agreed that the States and Territories would use their best endeavours to ensure the legislative arrangements for the licensing regime would be in place by 1 November 2004, with administrative arrangements to be finalised as soon as possible thereafter. However, only Victoria and Queensland have met these guidelines. NSW is expected to introduce legislation in March 2005 with timelines for other States and Territories are still uncertain.

To obtain a licence or permit, applicants will be required to:

- Demonstrate a legitimate need for access to SSAN.
- Provide safe and secure storage and handling procedures.
- Report any loss, theft, attempted theft or unexplained discrepancy to the regulatory authority and police in each jurisdiction.
- Undergo ASIO and police background checks.
- Be a minimum of 18 years of age.
- Provide verifiable proof of identity, and if a company, details of the company.

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SECURITY PLAN AND RECORD KEEPING

There are also additional requirements specifically targeting importation, manufacture, storage, transport, supply, export, use/dispose, reporting loss/theft and tightening of general explosives regulations. The licensing system will require the applicant to submit a “Security Plan” that will be implemented, understood and complied with by all people on the farm. The compulsory security plan must include a site map and a sketch showing public roads and access points to the property.

The new licence regime will allow growers to use SSANs on their own property, but it will not authorise the supply or on-selling of SSANs to others. SSANs must be stored in a locked facility/container or be under constant surveillance.

Growers will also be required to keep records with procedures to reconcile incoming and outgoing quantities, and procedures for reporting any loss, theft, attempted theft or any other security incident involving SSANs.

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VOLUNTARY SECURITY MEASURES

The SSAN guidelines also include voluntary security measures, in addition to the minimum requirements outlined above. Additional security measures may deter, detect or delay a potential adverse experience. These additional measures include:

Signage such as “No trespassing” signs posted at farm gates and/or perimeter fencing, and “Authorised Access Only” warning signs posted on or near storage facilities containing SSAN and other chemicals.

Physical security such as: lockable gates; good quality chains and padlocks; windows fitted with quality locks; locating the SSAN storage facility within sight of the farm residence; storing chemicals in separate locked storage areas; locking spreaders and other equipment when not in use; and securing trucks left standing in paddocks overnight.

Sensor lights installed in particular locations, and light timers installed in isolated locations.

Alarm systems where SSAN and other dangerous goods are stored.

Farm dogs or guard dog(s) to alert growers to the presence of strangers around the farm.

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WHO WILL ADMINISTER THE REGULATIONS?

In Victoria, the licensing scheme will be administered by Workcover, who will take care of the Police and ASIO checks required before growers can purchase, transport, store and use SSAN products that fall under the licensing regime. There will be a phase-in period starting in January 2005, but by June 2005 all Victorian growers will be required to meet the regulatory requirements. Workcover inspectors will visit growers to help them meet their obligations. The licence will have a life-span of five years and the Police and ASIO checks are likely to cost under $100.

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COST TO GROWERS

To determine the actual costs growers will face in complying with the new SSAN regulations, the National Farmers Federation conducted an industry survey in late 2004 to assess likely costs to growers of meeting the new regulatory requirements. The survey is intended to help agricultural lobby groups seek a compensation package for growers. The survey identifies several major costs to growers, but at the time of going to press the NFF has yet to put numbers alongside these financial impacts.

The cost of obtaining a Farmers' Licence, which may vary from State to State.
The costs of upgrading facilities on the farm to ensure the secure storage of SSAN products.

The costs of developing a Security Plan to submit to the regulatory authority.
Any changes in the retail cost of those fertilisers deemed SSAN products.

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AMMONIUM NITRATE ALTERNATIVES

Earlier this year, the major Australian supplier pre-empted the reviews of "measures to regulate the sale of ammonium nitrate" and unilaterally removed ammonium nitrate from sale without prior warning. This has caused problems for hydroponic growers who can no longer buy this fertiliser and are therefore looking for alternatives.

If and when ammonium nitrate again becomes more readily available, hydroponic growers will still face the choice that they need to obtain a "farmer's license" in order to be able to buy it. Because they normally require only a relatively small quantity of ammonium nitrate, it will be attractive to use an alternative fertiliser. This will enable them to avoid the hassle and expense of having to obtain a license and implement the security plan involved.

How is ammonium ion used in hydroponics?
Hydroponic growers use ammonium ion to control pH drift within their system. That is, if the pH is rising within the system extra ammonium is added to keep the pH steady.

For example, say the pH of the feed solution is 6.0 but the run-off from the system has risen to 7.0. In this case, ammonium ion content of the feed solution can be increased until the pH of the run-off solution returns to a more reasonable figure, say about 6.2. If the run-off solution pH falls to lower levels, the ammonium ion content of the feed solution can be reduced until the required run-off pH is obtained.

Most growers would review ammonium ion content of the feed solution weekly, and only occasionally find a change to be needed. Normally there would only be a small number of changes made to the ammonium ion content throughout a cropping season.

Until now there have been two sources of ammonium typically used by hydroponic growers. Some ammonium ion comes automatically as part of greenhouse grade calcium nitrate. Of its nitrogen (N) content, it typically contains about 1.1% N as ammonium ion (NH_4^+), and about 14.4% N as nitrate ion (NO_3^-).

Previously, if extra ammonium was needed, it was added by using greenhouse grade ammonium nitrate, such as Incitec Pivot's Pinaccle. Ammonium nitrate contains equal percentages of N in each of the nitrate and ammonium forms - 17.5 % N each. That is, to add an extra 1 part per million (ppm) of ammonium N brings with it 1 ppm nitrate N. It was a convenient fertiliser to use because it added proportionally little to the high level of nitrate ion already present in the nutrient solution. Also, the time of most need for extra ammonium is during periods of the plants having high nitrate demand.

The quantity of ammonium nitrate needed to be added is quite small. As a proportion it typically only makes up between 0% and about 4% maximum of the total weight of the fertilisers in the feed solution. Over the life of the crop it would usually be no more than 2% of the total weight of fertilisers used.

Substitutes for ammonium nitrate
In simple terms, the requirements for a solid substitute are that it must be a greenhouse grade or hydroponic fertiliser, that is:

It must contain no insoluble matter, which could block dripper lines;
It must contain no urea.

It must contain no significant quantities of soluble impurities with any potential to impact on plant or human health. These could be heavy metals, such as cadmium, lead, mercury, etc, or other compounds that could be phytotoxic to plants in soilless systems. However, helping with this is the dilution effect of adding such a relatively small amount of fertiliser to the overall feed solution.

The major possible solid alternatives are mono ammonium phosphate (MAP) and ammonium sulphate. If it is available, by far the best alternative is liquid ammonium nitrate.

Mono ammonium phosphate (MAP)
If MAP is used to control pH drift, the phosphorus (P) content of the feed solution is being changed.

Typical analysis of greenhouse grade MAP is 26.4 % P as phosphate and 11.8 % N as ammonium. That is, an increase of 1 ppm in ammonium N will give a 2.2 ppm rise in P. Phosphorus as phosphate is a macronutrient added in relatively low concentrations. Because of its high P content, any addition of MAP will give a significant increase in the P content of the feed.

Nutrition experts generally recommend that P levels in the feed not be changed, especially not increased, unless indicated by tissue analysis. This is because P is taken up so very easily by plants. That is, excessive addition of P will not show up in the root zone or run-off solution analysis, because the excess will be readily taken up by the plant.

The fertiliser usually added to supply P to the feed solution is mono potassium phosphate (MKP). To maintain the input of P steady would require that every time the MAP in the feed was, say, increased, then the amount of MKP in the feed should be reduced. For typical growers holding large quantities of fertiliser concentrates, this is impossible until the concentrate tank is renewed.

The difficulty in keeping P addition steady is a good reason not to use MAP for control of pH drift.

Ammonium sulphate
If ammonium sulphate is used to control pH drift, the sulphur (S) content of the mix is being changed.

Typical analysis of greenhouse grade MAP is 24 % S as sulphate and 21 % N as ammonium. That is, an increase of 1 ppm in ammonium N will give a 1.2 ppm rise in S.

Sulphur (S) as sulphate ion is taken up slowly by plants. Therefore, in standard root zone solution guidelines it is kept at a relatively higher level than the plant needs in order to help its uptake.

Sulphur is the nutrient ion that is probably the least critical as to its strength in nutrient solutions. That is, provided the minimum is present, it seems relatively unimportant how high its concentration goes. For this reason it is often used as the balancing ion when compromise is needed in making up fertiliser mixes from calculated analyses.

The relative proportion of S in the fertiliser is only 1.2 ppm S for 1 ppm N added. Combining this with the non-critical nature of S indicates that any change in ammonium

sulphate addition is unlikely to cause problems with the S content of the root zone/run-off solution.

If root zone solution analysis does indicate that S is getting too high, the S input can be reduced by substituting magnesium nitrate for some of the magnesium sulphate in the feed. This method can keep the magnesium level steady while reducing the sulphate level.

Liquid ammonium nitrate

In the long term, the best option is liquid ammonium nitrate. Ammonium nitrate is very soluble in water and so can be made into a strong solution. In the liquid form it is not a security risk and so its sale does not require the purchaser to have a farmer's license.

The greenhouse hydroponic industry in Australia is geographically widespread through the country. This means that the use of fertilisers in liquid form becomes very expensive because of the added cost of transporting large quantities of water. There is also the higher cost of the containers required.

However, in these circumstances and because of the small quantities involved, the use of liquid ammonium nitrate becomes feasible. The liquid form is also easier for the grower to use.

Hence there is an opportunity for one or more manufacturers to supply this need.

Other fertilisers

There are reported to be moves to review other nitrate based fertilisers. Those of most concern to the hydroponic industry are calcium nitrate and potassium nitrate.

Being unable to access solid ammonium nitrate is much more of a problem for hydroponic growers than for soil growers. However, it is mainly of nuisance value in that alternative strategies and fertilisers can be used.

But when it comes to calcium nitrate and potassium nitrate, the difficulties become critical. Together, these are the biggest and most vital components of a hydroponic fertiliser mix, making up about three-quarters of the total mix. Therefore, if these were legislated as security sensitive products, growers would only have the choice of getting a farmers license or getting out of commercial hydroponics. There is also a risk that supplies would dry up which would put the entire hydroponic industry in a precarious position. Changing to a liquid form of these fertilisers may be possible but would substantially increase costs.

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