

IFA Technical Conference

**Beijing, China
20-23 April 2004**

PRODUCT STEWARDSHIP

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ABSTRACT

Concerns are raised on the safety of fertilizers, both "accident related" and "security related".

For accidents, the problems relate to:

- **Manufacturers and distributors - poor management practices in setting standards and follow-up of operational implementation,**
- **Regulators – failure to enforce legislation,**
- **Communities – willingness to allow build-up of housing and public services close to major hazards industries.**

For security, the potential misuse of fertilizers in illegal activities calls for strict control of products during storage and distribution, and manufacturing of products with safe properties.

The fertilizer industry in Europe has collaborated in developing a Product Stewardship program, prescribing the role of the industry in dealing with the issues above, as well as other aspects concerning health, environment and safety. This was launched in September 2003. This paper describes the program and how Yara is addressing this in its global operations.

INTRODUCTION: WHAT IS PRODUCT STEWARDSHIP?

Product Stewardship is about manufacturing, distributing and using a product in accordance with the principles of Responsible Care. Our target in Yara is Safe production, Safe products and Safe food. More specifically, our objectives are:

Fertilizers and their raw materials, additives and intermediate products are processed and manufactured, handled, stored, distributed and used in a safe way,

We work according to the highest standards and respect applicable legislation with regard to health, occupational and public safety, environment and security,

Our plant nutrients shall satisfy society's requirements to safe food production and animal feed,

We co-operate with the whole supply chain to achieve these targets.

Received 9 February 2004 for presentation at the 2004 IFA Technical Conference, 20-23 April, Beijing, China

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* Yara is the new name of Hydro Agri

It goes beyond the traditional interpretation of Product Stewardship of being limited to the product properties. For Yara, Product Stewardship is a natural enlargement of the work on health, safety and environmental management, taking account of the whole value chain from purchasing of raw materials to the use of fertilizers at the farm, see figure 1. This implies that we will collaborate more actively with our service providers and customers in setting and achieving higher standards.

Typically, Product Stewardship addresses such issues as:

Product development:

- What are the requirements to health, environment and product quality
- What regulations shall have to be complied with
- What are the processing limitations for manufacturing of the product
- What should a product dossier contain,

Sourcing of materials:

- What criteria should be used for selection of suppliers
- Will quality criteria should be set of the raw materials or additives to satisfy the quality requirements of the final product
- Are there any health, safety or environmental risks associated with the materials,

Manufacturing:

- How should contractors and service providers be selected
- Process risks, health hazards and environmental management
- How to deal with waste material and offspecs,

Packaging:

- Which packaging material should be used
- What to print on the bag
- Advice on waste handling and recirculation of packaging materials,

Transportation:

- What criteria should be used for selection of service providers
- How to ensure traceability to the end user
- Emergency plans and product safety information,

Storage:

- What requirements should be set to warehouse standards
- Best practice storage operations
- How to deal with reclaimed and offspec materials
- How to deal fires,

Marketing and sales:

- Product safety information to customers
- How to respond to inquiries and complaints,

Product application and farmer services:

- Advice on product use and application rates
- Information on safe use and handling of fertilizers.

RECENT EVENTS WHICH EMPHASIZE THE NEED FOR PRODUCT STEWARDSHIP IN THE FERTILIZER INDUSTRY

21 September 2001 was a terrible day for the people of Toulouse and for the European fertilizer industry, when a warehouse with waste material, offspec ammonium nitrate suddenly exploded. This has led to a number of regulatory initiatives ranging from the demand for stricter control of location of major hazards industry in vicinity of residential areas, to detailed regulations for warehouse standards and handling of offspec and reject fertilizer materials.

Unfortunately, this has not been the only event of concern. Since then, there have been other incidents with fertilizers in Europe, of concern for the industry and for the regulators, such as:

- Decomposition of NPK fertilizer in a warehouse in Spain,
- Decomposition of NPK fertilizer onboard ships, in ports in Belgium, France and Italy,
- Fire in several farmers' barns in UK and France where fertilizer have been stored, in which one involved an explosion,
- Transport accidents involving fertilizers and ammonia and nitric acid chemicals.

Also, the political unrest in many parts of the world has increased the attention on the potential misuse of fertilizer material and other products for terrorist purposes. This is the reason behind UN's new transport security regulations.

Considering health related issues, the "mad cow disease" that hit Europe some years ago, has given rise to demands for safer food, which in turn puts focus on the input materials used for animal feed and agricultural food production. Although mineral fertilizers are rated as safe by tests carried out under a combined TFI/EFMA program, see Appendix 1, we must expect additional attention from consumers and authorities. Therefore, as fertilizer manufacturers we must check the acceptance of the raw materials we are using, and of the additives and coatings, and we must ensure that contaminants cannot enter the products during the processing and distribution operations.

For environmental care, fertilizers and agricultural practices are under heavy pressure in many parts of the world. Naturally, the fertilizer industry must provide advice on the type of fertilizer to use and application rates – "not too much, not too little", in order to support a sustainable agriculture.

We consider the issues above as being part of Product Stewardship. For creating further trust in our industry as responsible towards safety, health and environment, the European fertilizer industry has created a Product Stewardship program – a kind of "brand name" for our emphasis on health, safety and environment in the total value chain.

THE EUROPEAN FERTILIZER INDUSTRY'S PRODUCT STEWARDSHIP PROGRAM

The European fertilizer industry is strengthening efforts to ensure safe production and handling of its products. Last September, the European Fertilizer Manufacturers Association (EFMA) officially launched the improvement programme Product Stewardship. This is the industry's response to the increased focus on the fertilizer industry from the authorities. It meets the need for further improvement of routines throughout the value chain. The program reflects the responsibility the industry takes and its desire to work closely with transporters, customers and distributors. It covers the elements shown in figure 1.

The industry has worked out practical guidelines explaining what Product Stewardship means for a fertilizer company, with an overview of the European and international regulations that must be complied with. Several best practice standards are being exchanged and worked out by the EFMA members, covering:

- Safe production of fertilizers,
- Safe storage of fertilizers,
- Safe handling of offspec and reject fertilizer material,
- Safe loading and transport of fertilizers by sea,
- Safe transport of nitric acid,
- Safe transport of ammonia,
- Safe and reliable inspection of ammonia storage tanks,
- Best available techniques for pollution prevention and control in fertilizer production,
- Code of best agricultural practices.

Let me specifically draw your attention to the guidance given on handling of reject ammonium nitrate material:

- Clean up frequently – dust and contaminated spills can be unsafe,
- Do NOT use saw dust for cleaning up – use instead sand, limestone, phosphate rock, or other inert material,
- Store in small volumes before diluting with inert material (half and half),
- Do NOT use MAP, DAP, SSP, TSP for dilution,
- Commercialise, or dispose as waste material.

You will find the EFMA documents and a brochure on the EFMA Product Stewardship program, on their web page www.efma.org.

An important part of EFMA activities is to verify the members' implementation of the Product Stewardship program and compliance with the industry standards. For this purpose a Questionnaire with some 140 questions has been worked out in collaboration with Det Norske Veritas, a world leader in independent certification services. Annex 2 contains an extract of some of the questions. The answers are scored to enable further improvements to be decided by company management – in the belief that "what is measured, is done". This was completed by the EFMA members for the first time last autumn and will be repeated later this year.

PRODUCT STEWARDSHIP IN YARA

Product Stewardship has a firm foundation in Yara. It is anchored in our core values: We must create trust with customers, regulators and the public that the industry and our products are safe. We are accountable for operating to the agreed standards. And Product Stewardship involves many disciplines and organisational units, so teamwork, competence and networking are essential for success.

Yara has, as the other EFMA members, completed the EFMA Questionnaire for the first time last autumn. We did not restrict ourselves to our European operations, but addressed this to all our business units worldwide. An example rating for a business unit is shown in figure 2. Generally, we do well in areas where we have direct responsibility. The low scores on leadership/ administration/monitoring/review are not surprising since the EFMA program has only very recently been introduced. This will be readily improved. We are more concerned about the low scores in transportation and external storage, which normally are outside our direct responsibility. We shall have to improve our follow-up of product handling beyond the factory gate. Our actions will therefore be to work closer with our service providers and customers.

It is important for us to get the principles of Product Stewardship turned into practical actions. One priority action is to safeguard the product quality right up to the end user. The product quality is important to ensure that (1) that the farmer gets exactly what he has ordered in terms of nutrient composition, (2) that the product can be easily spread on the field, to the distance required, and (3) that the product can be handled safely and dust free. Our surveyors and logistics operators provide simple and sound advice and training for transporters, warehouse operators and customers on how to store and handle fertilizers. We have noticed a significant decrease in complaints after such training sessions, which highlights that competence is the backbone of Product Stewardship.

Competence is also the important issue when it comes to providing advice on the correct use and application of fertilizers. This does not only depend on the competence of the salespeople and agronomists, but also on the practical tools that the grower can apply himself. We are proud to have developed fertilizing planning tools for maximising yield and crop quality and at the same time minimizing the environmental impacts. Our hand-held N-Tester and the tractor mounted N-Sensor have gained wide recognition amongst regulatory authorities.

However, the recognition of the fertilizer industry can be rapidly destroyed if we are not consistent in our efforts towards Responsible Care. We can easily agree that the industry's reputation is at stake when it comes to accidents. It is also valid for product quality. Let me draw your attention to a survey recently carried out on the quality of fertilizer blends from our competitors in the UK market:

- 47% of the samples tested were found to be underweight,
- 92% had poor storeability (poor liner material in bags),
- 63% had poor spreadability (lumps),
- 58% failed to meet the legal declaration,

Some bags contained extra's such as rat droppings, maize kernels, iron flakes.

This is the opposite of Product Stewardship. You might claim that this does not concern your company since you always deliver quality products. You are wrong: Poor results - whether they concern product quality or accidents – impact on the image of the total industry. We should not accept negligent “cowboys”, neither amongst our company colleagues nor in other companies.

Turning back to Yara, allow me to briefly mention some other activities that we have initiated in connection with Product Stewardship:

- A central unit, called the Product Technology Centre, will now establish and distribute safety data sheets for all Yara products, for use globally, and tailored to suit local regulations,
- A project group has proposed and are now implementing improvements relating to the safety of road and rail transport of chemicals and fertilizers. This covers:
 - Standard contracts for purchasing of logistics services
 - Specification of technical equipment to be used
 - Checklist for loading at supplier’s site and unloading at customer’s site
 - Routines for emergency preparedness
 - Competence requirements for the personnel involved,
- We are tightening our routines in order to comply with the European Union’s new food directive, by having implemented the HACCP control program (Hazard Analysis and Critical Control Points) for all products and chemicals that can be used or come in contact with food and animal feed.

In addition, we are rigorously checking compliance with our internal standards for production and materials handling.

You will find more about Yara and our Product Stewardship activities on our web page: www.yara.com.

GLOBAL PRIORITIES

Based on our experiences in Yara and the lessons we learn from participating in the EFMA Product Stewardship program, I would recommend the following issues to be have high attention in every fertilizer company:

- Adherence to best practice production standards for ammonium nitrate,
- Handling of offspec and reject materials containing ammonium nitrate, in production plants and in storages,
- Working with the distributors on correct handling of fertilizers and for safe storage,
- Security at warehouses, terminals and production sites,
- Competence building of employees and service providers, for correct handling of fertilizers and reject materials, and for providing professional advice to the end user.

THE POSITION OF AMMONIUM NITRATE

The attention from authorities is primarily on ammonium nitrate when it comes to safety and security issues. However, as long as ammonium nitrate is produced and handled correctly, we consider ammonium nitrate as a safe product.

Let us look at some facts about our ammonium nitrate fertilizer produced in Europe:

- Stabilizers (magnesiumnitrate, aluminiumsulphate) are added to protect the product quality during transport and storage,
- They are produced to satisfy strict quality standards, i.e.
 - High density/ low porosity in order to limit the possibility for oil absorption
 - Very low level of combustible ingredients
 - A minimum level of pH
 - Limitation on the extent of small particles
 - Very low level of chlorine and copper content,
- Products with more than 80% ammonium nitrate must satisfy a resistance-to-detonation tests,
- NPK fertilizers are being tested for decomposition properties (cigar burning) in order to avoid the production and sale of products with dangerous properties.

Besides safety, there are other important aspects to consider, such as the agronomic efficiency of a fertilizer and its environmental impact. In Europe, extensive field trials have shown that ammonium nitrate is superior with respect to efficiency – the higher the nitrate share in N-fertilizer the higher the yield. The average of 15 trials with winter wheat at Levington Research station in UK during the period 1994-98, with an average application rate of 160 N/ ha, the ammonium nitrate gave a yield of 8,7 tonnes/ha. This was some 3% higher than for urea.

Concerning environmental impacts, the ammonia loss from mineral fertilizers in European agriculture is some 2% of the N-rate applied for ammonium nitrate compared to 15% for urea (ECETOC 1994). Taking the total life cycle of a product into consideration, and weighting all environmental impacts of concern, it is found that ammonium nitrate is the best – for European agriculture. Figure 3 and 4 illustrate the environmental life cycle of fertilizers. It should be recognized, however, that different conclusions can be found for agriculture in other regions with other climates and crops.

For European agriculture there is no substitute for ammonium nitrate fertilizers. They are superior with respect to efficiency as plant nutrients. They are the most environment friendly. And their safety is ensured by strict quality requirements and testing.

My request to you

As a conclusion, in whatever company you are working, I urge you to

- Implement Product Stewardship. All products require special attention in the manufacturing, when blending, and during distribution and storage, in order to safeguard the product quality and safety requirements.
- Operate according to Best Industry Practice, and react towards low standard operators and incompetent service providers – they are a threat to our industry.

Finally, let us agree to “unite” in addressing regulatory issues, for the promotion of fair trade based on just and scientifically correct requirements.

**EURO/AMERICAN FERTILIZER MANUFACTURERS COMPLETE
JOINT PRODUCT TESTING PROGRAMME**

**Conclusive evidence that fertilizer products pose no threat to man or
environment**

Brussels, 7 February 2003

The European Fertilizer Manufacturers Association (EFMA, Brussels) and The Fertilizer Institute (TFI, Washington, D.C.) today announced the completion of their joint four-year toxicity testing research programme on high production volume fertilizer products. The results of this voluntary programme have generated scientific data on these products and have demonstrated that intrinsically they pose no harm to industry workers, communities or the environment.

“This is another practical step on the road to gaining complete public confidence in our products”, said EFMA’s Director General, Helmuth Aldinger, “Fertilizers guarantee food security, and we can feel good about the fact that they do so without compromising public health and safety, or affecting our environment. The efforts taken, and resources used to bring this programme to completion, demonstrate the lengths to which we are willing to go to ensure the highest levels of understanding at all levels of the fertilizer chain. It clearly underlines our commitment to sustainability.”

The comprehensive tests conducted under the EFMA/TFI initiative applied human health and ecological criteria to investigate 23 fertilizer materials in five categories (ammonia compounds, nitrate compounds, phosphate compounds, salts and acids). Products were evaluated on the basis of their environmental fate and their potential toxicity to mammals and ecological systems. The study found conclusive evidence that when handled and used as intended, fertilizers are safe and that they exhibit no carcinogenic properties.

A health and environmental safety data summary dossier has been prepared for each of the 23 fertilizers studied. This dossier summarizes the available scientific literature on the product as well as the new testing data, using both to reach a conclusion regarding the inherent hazards of the material.

The content and format of the summary documents produced in the fertilizer testing program are intended to meet the objectives of the Environmental Protection Agency’s High Production Volume (HPV) Challenge programme and the OECD’s Screening Information Data Set (SIDS) programme. “This is a great achievement for our industry”, stressed Mr Aldinger “and a major step towards fulfilling all the requirements of the voluntary ICCA/HPV programme as well as EU chemicals policy.”



TRANSPORTATION

6.1 Transport Safety Adviser (5 Points)

6.1.1 Has the Company nominated transport safety adviser(s) in accordance with legal requirements?

6.2 Assessment (10 Points)

6.2.1 Do assessments of transportation (by what means, route, quantity, customers, transporter) take account of:

1. HSE aspects?
2. Security aspects?

6.3 Transport operator (20 Points)

6.3.1 Does the selection of external transport operators include an assessment of the operators' HSE performance?

6.3.2 Do the instructions to the transport operator specify requirements for:

1. Transport equipment?
2. Procedures and protective equipment during loading and discharging?
3. Labelling?
4. Competence?
5. Emergency preparedness and response?
6. Security?

6.4 Loading and discharge (25 Points)

6.4.1 Are procedures in place for safe loading/discharge of fertilizer products and chemicals:

1. On lorries and roadtankers?
2. On railwagons and railtanks?
3. On ships and barges?

6.4.2 Do the procedures specify correct product quality handling during loading/discharging?

6.4.3 Are drivers of road vehicles required to identify themselves before access to Company sites is permitted?

6.5 Transport documents (10 Points)

6.5.1 Is product related HSE information communicated and given to the truck driver, railway operator and/or vessel captain before departure?

6.6 Emergency preparedness (30 Points)

6.6.1 Does the Company ensure all transport operators establish an emergency plan?

6.6.2 Have transport operators established emergency plans?

6.6.3 Is there a procedure for reporting and investigating incidents during loading, transport and discharge

1. At the Company?
2. At the transport operator?

6.6.4 Have responsibilities in the Company been assigned for providing guidance on emergency handling related to incidents during product loading, transport and discharge?

6.6.5 Are transporters provided with an emergency number for reaching the Company in case of an emergency?

6.6.6 Is there a procedure on how the Company should respond to emergency calls from transporters?

Figure 1: Product Stewardship deals with the whole product life cycle, from product development to application



Figure 2: Score sheet on Product Stewardship for a business unit

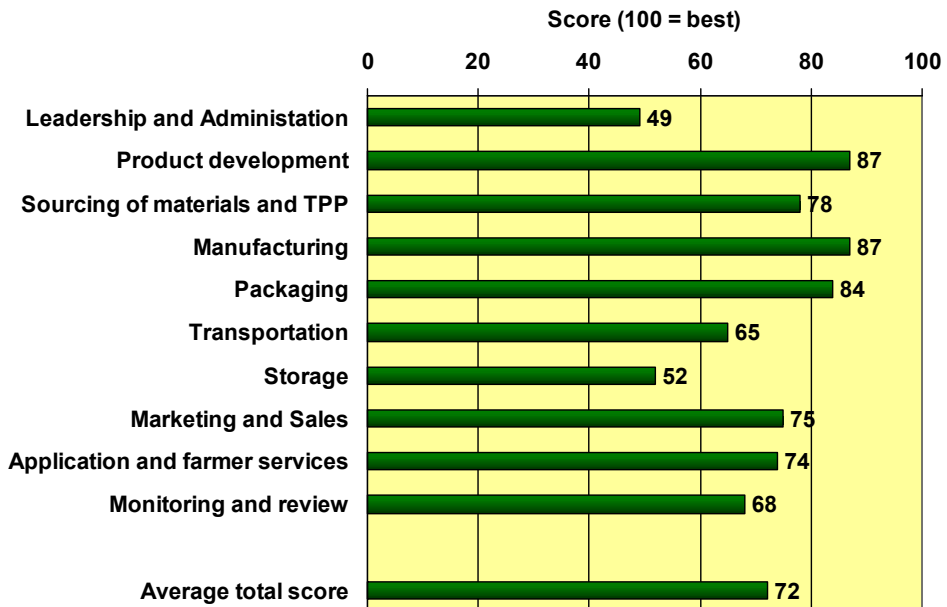


Figure 3: Environmental impacts during a product's life cycle

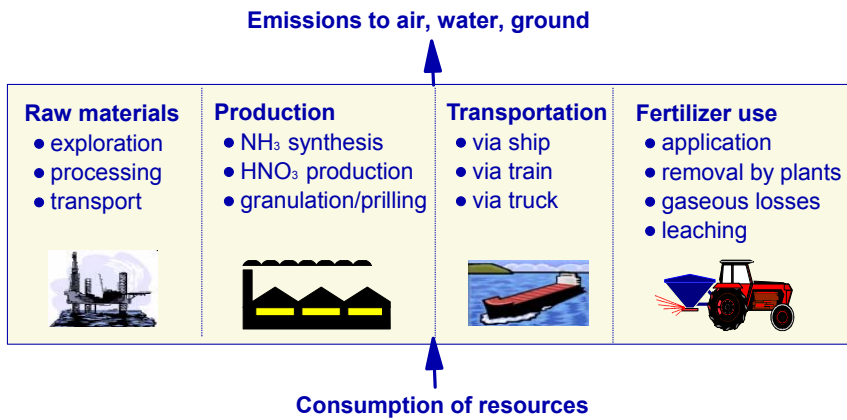


Figure 4: Environmental impact of wheat production in Europe, comparing different N-fertilizers at optimum N-rate of 160 kg N/ha (based on field trials in UK and emissions data from European production)

