Ammonium Nitrate Challenges:

Safety & Security

Kish Shah, MBE
Consultant
Shah4*SHE*

Scope

- Historical Perspective
- Potential Hazards
- Incidents: accidents & deliberate acts
- Legislative Controls in EU & UK
- Industry Initiatives
- Concluding Remarks

Historical Perspective

- Interest in AN as a source of fertilizer nitrogen from around 1900.
- Significant production of fertilizers from AN started around 1915, with the advent of new technologies for NH3 and HNO3.
- Three important land-marks in AN history: 1915-1925, 1945-1950, 2000-2006.

Historical Perspective

- After the second world war significant AN capacities diverted to fertilizer markets in the US.

- To prevent caking AN coated with 0.8 –1% wax
  - Product was called ***FGAN***
  - Involved in major accidents e.g. Texas City, Brest, several fires.

Historical Perspective

- Following much research, new process technologies and safe practices introduced in 1950’s
  - Prilling/granulation process
  - Effective anti-caking
  - Thermal stabilisation treatment
  - Safe product specification (<0.2% C)
  - Unsafe practices recognized & discontinued

Potential Hazards

Three Main Hazards of interest:

- Fire due to oxidizing nature
- Decomposition due to thermal & catalytic effects
- Explosion due to shock or involvement in fire

NOTE: AN itself does not burn.

Incidents

- Pre-1955 accidents not relevant, waxed coated products now cannot be marketed as fertilisers
- 1955-1990: long healthy period with very few major accidents
- However
  - Port Neal (1994): explosion in neutraliser
  - Toulouse (2001): bulk heap of AN rejects of different types (fertiliser and explosive grades) detonated.
  - Three major explosion accidents with loads on trucks, multiple fatalities (Brazil, Spain, Romania)

Port Neal, USA

Toulouse 21st Sept 2001

AN Truck, Romania

Crater

Incidents

- Oklahoma (1995)
- Several incidents of explosions due to criminal acts

Challenges

- **Safety**: Maintain high level of performance throughout industry
- **Security**: Safeguard plants and products throughout distribution chain in effective and convincing manner
- Stay **competitive** against other N-sources

Control Measures

- By regulatory authorities
  - International e.g. UN transport
  - European Union (EU)
  - National e.g. UK
- Fertiliser industry
  - Improve understanding of AN behaviour
  - Guidance and codes of practice
  - Product stewardship initiatives

Regulations

In relation to:

- Product
- Production & storage
- Packaging & transport
- Security

Will focus on European scene.

Product Related

- **EU Regulation EC No. 2003/2003**
  - Applies to EC fertilisers and covers various aspects e.g. declaration of nutrients, tolerances, safety.
  - Special criteria specified for AN fertilisers with >28% N (80% AN)
    - e.g. combustible matter, Cl^-, pH, porosity (4%max), resistance to detonation test after 5 thermal cycles; size grading.

Product Related

- **EU: Classification, Packaging & Labelling Directive (67/548/EEC)**
  - Provision of safety and environment information: Safety data sheets
  - AN not listed as a hazardous substance, based on results of oxidising capacity tests

Product Related

- ICCA Global voluntary programme: 1000 HPV (high production volume) chemicals
- Joint TFI/EFMA testing programme for 23 fertilizer materials in progress
- REACH: Registration, Evaluation and Authorization of Chemicals

Production & Storage Related

- SEVESO II (COMAH)
- Integrated Pollution Prevention and Control (IPPC) and various environment related regulations

Production & Storage Related

EU ‘SEVESO’ II Directive (EC/2003/105)

Two tiers of controls based on quantities present, requiring

- -Major Accident Prevention Policy
- -Safety Management Systems
- -Safety Report
- -Emergency Plans
- -Safety Audits
- -Accident Reporting
- -Information to public
- -Land-use Planning etc.

Production & Storage Related

EU ‘SEVESO’ II Directive (Cont.)

	tes	tes
AN (UN 2071, SSD)	5,000	10,000
AN (UN 2067, Fert. Grade)	1,250	5,000
AN (UN 1942, Tech. grade)	350	2,500
AN (Reject materials)	10	50

Security Related

- UK has been the front-runner
  - new regulations in 2003
  - voluntary industry scheme, called FIAS
- EU watching the developments and studying the situation
- Canada & USA drafting legislation
- UN: recent regulations to address security in transport

UK Regulations : Security

AN Materials (High Nitrogen Content) Safety Regulations 2003: since May 2003

- Detonation to Resistance Test (DRT) mandatory for AN based fertilisers with >28%N derived from AN (i.e.80%AN)
- Applies to production, storage, import & supply when AN> 500 kg
- EU: DRT for every batch of 90 days production
- Non-EU: DRT prior to import

UK Regulations: Security

AN Materials Safety Regulations (Cont.):

- ISO standards for sampling and test laboratory
- Producers/exporters to supply copies of DRT certificates & keep records
- All in distribution chain covered up to farms
- Non-fertiliser products: apply for exemption

Transport Regulations: Security

A new chapter concerning security in the UN Regulations (Orange Book)

- Applies to all modes.
- Two-tier approach
- Requirements include:
  - General provisions
  - Security plans for High Consequence Dangerous Goods

Transport Regulations: Security

- The list of High Consequence Dangerous Goods includes

  – Ammonium Nitrate and AN-based fertilizers of UN No. 2067, when transported in **bulk**.

Industry Organisations

Main organisations in EU & USA

- International Fertilizer Industry Association: IFA
- European Fertilizer Manufacturers Association: EFMA
- The Fertilizer Institute: TFI
- National associations e.g. AIC (formerly FMA in UK), UNIFA in France, etc..

Industry Initiatives

- Codes of practice and guidance documents
- Research projects to improve understanding: EFMA large scale testing programme
- EFMA’s Product stewardship programme
  - Ensure and promote safety, security and environment-care from ‘factory to farm’

Industry Initiatives

- UK FIAS
  - Voluntary scheme of annual assessment by an independent body, recently launched
  - Producers, importers, merchants, hauliers and store-keepers covered
- Security guidance for farmers

Concluding Remarks

- All activities concerning AN-based fertilizers are highly regulated in EU to ensure safety and security.
- Safety record excellent since 1950’s considering large volumes (several hundred millions tonnes) supplied.
- Industry is co-operating with the regulatory bodies to enhance security.

Concluding Remarks

- Ammonium Nitrate is a very efficient nitrogen fertilizer, its importance as regards minimum losses to the environment is recognised by all concerned.
- All concerned are working hard to meet the challenges to secure its future.

Thank you for your attention!

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