Lecture W18

Methods and Importance of Desensitizing Ammonium Nitrate

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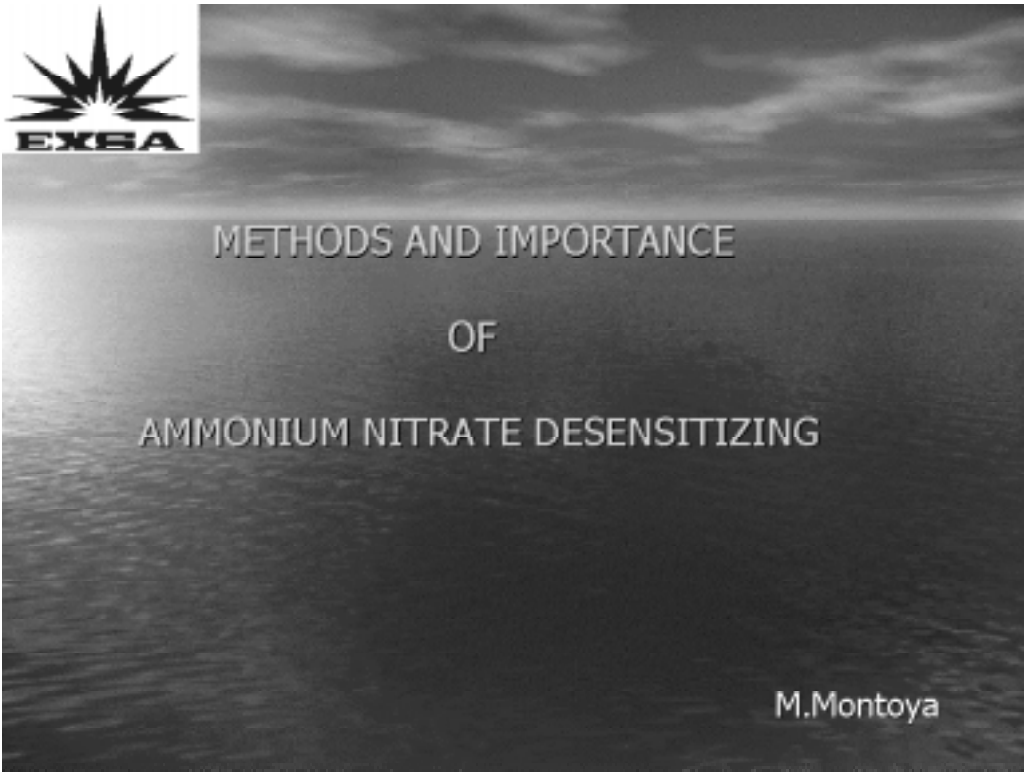


BACKGROUND

Porous and technical ammonium nitrate are the most important raw materials in the explosives and mining industry.

Waste, rejected or missquality porous and dense grade ammonium nitrate generated during, transport, handling and storage, must be correctly dispose.

Company policies, technical norms, legal regulations, and also political and social conditions, etc. are factors that defines the specific qualification, handling, storage and disposal of ammonium nitrate in different regions of the world.

SPECIFIC REGIONAL CHARACTERISTICS:

Due to political (goverments) and social (terrorismus) conditions in the region during the last decades :

Specially in Peru , explosives laws and regulations for civil explosives and relatives were not correctly reviewed and therefore storage, handling and disposal of the raw material ammonium nitrate is unclear.

- Unsafety policies of certain explosives manufacturers, covered by unclear regulations, derives ANFO grade ammonium nitrate to the fertilizer market based on quality complaints like high humidity or contamination.

- Any accident involving detonation/deflagration of tenths of tons of ammonium nitrate will provoque a crisis and affect directly the explosives industry in Peru and for sure in the region.

- Terrorismus attemps in the region were going more feasible and worser due to ammonium nitrate availability used mainly as a reinforcer of bombs.

- The Oklahoma attempt and the Toulousse accident reveals the hazard of fertilizer grade ammonium nitrate and ensure the higher risk of miss-quality porous grade for ilegal purposes.

REGULATION FOR UNSUABLE AMMONIUM NITRATE DISPOSAL

PERU:	Not regulated
CHILE:	Not regulated
ARGENTINIEN:	Law Nr. 20.429, year1982, paragraphs 557 & 558 of. Burn or disolution in water
BOLIVIEN:	Not regulated
ECUADOR:	Not regulated

REGULATION TO DEFINE DETONATION CAPABILITY OF AMMONIUM NITRATE

PERU:	Not regulated
CHILE:	Not regulated
ARGENTINIEN:	Not regulated
BOLIVIEN:	Law Nr. 00665, year 2000, paragraph 134 L
ECUADOR:	Not regulated

DETONATION TEST FOR HIGH DENSE AND FERTILIZER GRADE AMMONIUM NITRATE PRODUCTS:

The bolivien detonation test is similar to the european method (5 times cycling of the product and initiated with a booster in a 4" steel pipe fixed over lead blocks to measure the depress).

Test results for :

-high dense ammonium nitrate:

without additives
with up to 2 % Ca/Mg
with organic coating (0,2 % C content)

-fertilizer grade:

with 3 % P_2O_5

All the 4 evaluatedd products were NEGATIV to the test.

- The detonation capability test for dense and fertilizer pure ammonium nitrate are negativ, but the same products cycled (5 times) with the proper ammount of fuel oil (6 %) shown deflagraton/detonation rates, according to the following reports:

High dense technical/fertilizer grade A.N. with 2,5 % of Ca/Mg additives (1,06 g/cm^3).

Detonation positive: 2 600 m/s

Fertilizer grade A.N. with 3 % P_2O_5 additive (1,03 g/cm^3).

Detonation positive: 2 400 m/s

- **On the other side desensitation of high porous grade ammonium nitrate is not possible to assure due to mechanical mixtures with solid inerts, or water additions as shown:**

Porous grade with 15 % chalk (6 % fuel oil):

Detonation positive: 2 500 m/s

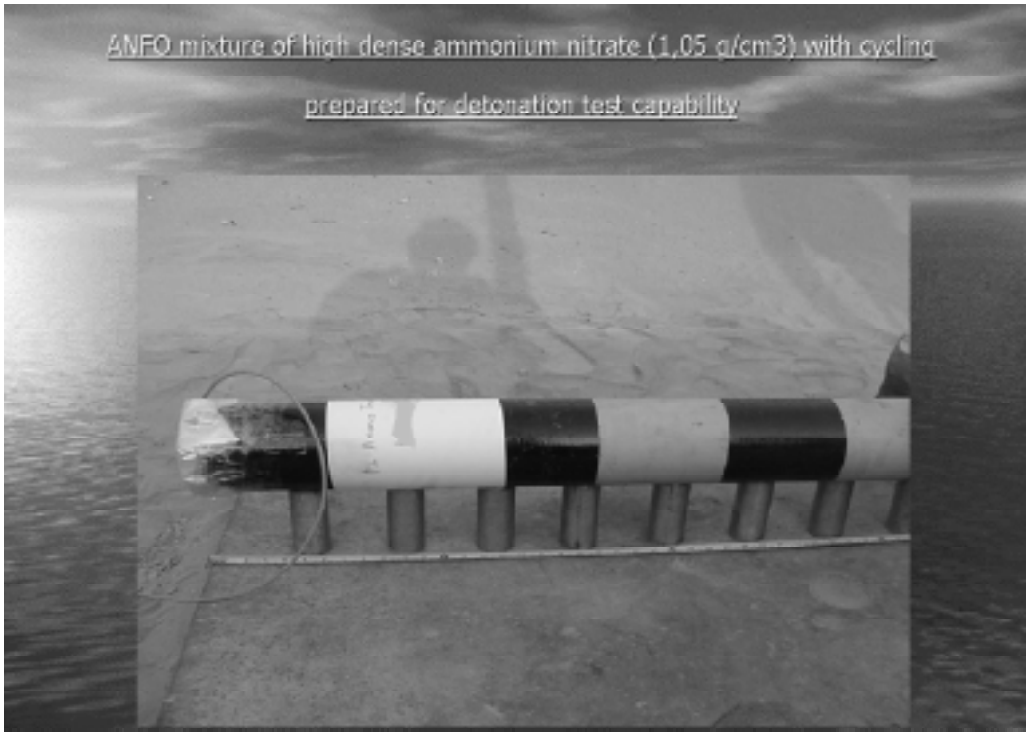
Porous grade with 10 % water (6 % fuel oil):

Detonation positive: 2400 m/s

RECCOMENDATIONS

- Desensitation of discarded porous ammonium nitrate to eliminate its detonation capability requires mixtures with contents of more than 15 % of chalk or diatomaceous earth and 20 % of water. The so-obtained products are not attractive for the fertilizer market.
- Dense or fertilizer grade ammonium nitrate are feasible to be converted into a blasting agent precursor as ANFO.
- Disposal of discarded ammonium nitrate must be done by disolution with water to derive it as raw material for emulsion production or at the end as fertilizer liquor.


ANFO mixture of high dense ammonium nitrate
(1,05 g/cm3) with cycling


ANFO mixture of high dense ammonium nitrate (1,05 g/cm3) with cycling
prepared for detonation test capability


Steel plate base condition after blast


Steel plate base condition after blast


Lead block condition after blast


Steel pipe fragment after blast