

Lecture PT8

Survey on Explosives Waste Disposal at Safex Member Companies

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1. INTRODUCTION

The methods used to carry out the destruction operations of explosives are widely known and have been developed for a long time, however, and despite the experience acquired throughout the years, accidents and incidents derived from this activity are still commonplace.

We only need to look at SAFEX database to see how in the decade of the nineties there are more than ten accidents related with the activity of explosive waste destruction. We would have to add to this datum tens of minor incidents that happen every year and are not registered in this organisation.

SAFEX members have increasingly become concerned with this matter. This concern is due to the above mentioned, and also to the fact that the legislation regarding environmental matters are progressively becoming stricter and the requirements developed by the authorities which must be followed when dealing with explosive disposal and limitations on the amounts to be destroyed.

That is why UEE considered at a given point that this could be a subject of interest that should be dealt with at a maximum level in SAFEX and put it forward as a theme for this Congress.

2. OBJECTIVES

The way in which UEE undertook this subject was by setting objectives under three main points:

1. The first point was to establish a situation map that analyses the present reality of the companies that belong to the sector, members of this forum. Thus the points that were determined, which needed to be taken into account were:
 - Waste management systems
 - Existing disposal methods
 - Common disposal methods used
 - Legislative points
 - Environmental treatment applied to wastes
2. Deal with and organise the information so that useful results can be provided.
3. Draw up a document that gathered this information and at the same time could be used as a guide for companies that are uneasy about the subject and are considering making changes. With this, the aim is to reduce the number of incidents and accidents, diminish environmental impact, and adapt the legislation and possible trends...

3. THE METHOD

These objectives were materialised when the questionnaire was made up. It was sent to the members by post and in some cases by e-mail. This questionnaire also included some additional questions. The idea behind them was to look for the main concerns that affect the members.

The survey was sent to 80 SAFEX members, that is all of those whose addresses we were able to get. After waiting for a couple of months, we received 29 replies from all over the globe and all types of products. The number of replies received has a percentage of participation of 36.25%. Do not underestimate the figure as it gives us an ample vision of the real situation.

We are aware that by not having received a total response, it conditions the results obtained, however, we are grateful for the collaboration and think that it is enough to be able to reach conclusions despite the evident limitations.

4. MAIN PROBLEMS RELATED TO EXPLOSIVE DISPOSAL

After making a first analysis of the problems or main concerns the activity of explosive waste disposal come across, the following 4 points can be taken into consideration:

- Risk during disposal
- Risk during transportation, storage, and handling...
- Environmental problems during disposal
- Environmental problems after disposal

The residues and remains from explosive material have a serious risk to the extent that its nature can be more or less unpredictable, because it is not a finished product and its characteristics are perfectly controlled. This implies an added risk to operations such as transportation, storage and the very handling of an explosive.

To the previously mentioned operations, we must add the danger that waste disposals imply. In order to carry out disposal it is necessary to have different type of energetic contribution: calorific in the combustion and incineration, mechanic feeding in these operations, energetic contribution from the chemical decomposition ... which increases the risk even more, making disposal an especially sensitive operation.

Other parallel drawbacks that also affect labour safety and health are environmental problems caused by emissions, noises, leachates caused by the remains after disposal...

5. REGULATIONS AND RECOMMENDATIONS

If indeed it is true that in practically all of the countries, where we can find SAFEX members, the legislation provides specific regulations for incineration and/or for explosive waste detonation; however, it is not less true that in the majority of the cases this legislation is very ambiguous. Some of the members have sent us extracts of the legislation from their respective countries. After an analysis, we reached the conclusion that far from being a regulation it is more like a series of recommendations or generic type indications.

None of the analysed cases imposes maximum quantities to be destroyed, minimum distances, ways of operation... However, it is common that competent authorities approve the disposal installations as well as carry out a control on the amounts destroyed throughout the year, as we will see further on. This proves that there is growing responsibility on behalf of the authorities when it comes to this matter.

It seems logical that the internal disposal procedures, which practically every company

has, can not be based on the prevailing legislation. This is why there is a tendency to use other recognised sources in the field of explosives. As an example, 34% of the surveyed companies have their procedures based at least on the FEEM (Federation of European Explosives Manufacturers) recommendations, the majority of which are European companies. 14% follow other organisation recommendations and 52% admit that they do not follow recommendations from any outside organisations. This percentage is quite high, but one may wonder that a part of this would base their procedures on the prevailing legislation from their respective countries, while the rest would base their procedures on their own experience.

6. INSTALLATIONS

After, the questionnaire sent highlighted on the installations that the members dispose of as well as they use made of them. The reason behind this was to evaluate the technical advance that these installations went about throughout the years and see at what point we are at now.

The facts we came across were the ones expected. Despite that more advanced installations and varied solutions progressively come up, the situation can be defined as somewhat precarious. The most widely used installations are the burning ground and that of detonation, which lack leachate collection and other environmental or safety measures. They simply consist of a wide land surface to deposit waste and are burnt or detonated depending on the case. This method has been almost exclusively used in the past and even today, we can see how it still is the main one.

On the other extreme, we have a number of companies, more technically developed in this subject, that have other installations like the semi-closed chambers and incinerators. The truth is this variety of equipment is generally in the same companies, which have various complementary solutions to the burning ground. Thus, it is not evenly distributed.

A significant datum that confirms what has been explained, is that 13 of the 29 surveyed companies do not have any other means of disposal than that of open air burning and detonation. This represents almost 45% of the total companies. On the other hand, only 17% have the more technically developed options such as the incinerator with fume treatment. The remaining 38% have intermediate solutions, apart from the simple field of disposal. These intermediate solutions can be varied, and refer to incinerators with a furnace to allow waste collection, with or without a roof, with or without leachate collection, semi-closed detonation chambers...

7. PRODUCT WASTE DISPOSAL

Once the availability of the installations for explosive waste disposal were analysed, the next step of the survey would go on to studying each type and in which installation or through which method destruction was carried out.

We can see, in this way, how powders are frequently recovered in the very productive process and general wastes such as packaging, plastic bags, saw-dust and also inert elements that could have been contaminated through contact with the explosive at some point are incinerated over the ground in practically all of the cases.

However, groups of explosives like compounds by nitro-glycerine, monometilamine and above all initiators and systems of initiation have somewhat more variety when it comes to the methods used in their disposal process.

As an example, the explosives based on nitro-glycerine and/or nitro-glycol have little

variety in the methods used in its destruction. In 70% to 80% of the cases, incineration over ground without catch tank is used.

If we notice the case of initiator explosives and initiation systems, the variety of solutions considerably increases. This seems logical when taking into consideration the relatively small amounts that are destroyed, more acute sensitivity, the inert remains that are produced in detonators, relays, detonating cords... These particularities facilitate and recommend the use of different incineration methods in open field that are not used in detonators and relays and lose importance in pistons and primary explosives. However, when talking about boosters or initiating pastes, this method is used in 60-70% of the cases due to its nature, substantially different from the rest of the initiators.

In the case of detonators and relays disposal, detonation is the most commonly used method, only resorting to incineration in 15-20% of cases and never on the ground. Detonation can be done open-air, this method is used approximately in 25% of the cases. Another solution consists of using semi-closed chambers that make it easy to collect inert residues. It is used 30-35%, somewhat higher than in the other cases. Lastly, another frequently used method is taking advantage of blasting holes. This is carried out 10-15% of the cases. It is comfortable and safe. It has the inconvenience that it is only feasible in very concrete cases: when the factory is placed near a mine site or an agreement is reached for this activity and there is the corresponding approval from the authorities (as the legislation frequently prohibits that wastes leave the factory).

8. AUTHORITIES, WHAT CAN WE EXPECT?

As we have mentioned before, the legislation relative to explosive disposal is scarce but it has progressively been developed, giving more responsibilities to the competent authorities through official regulations.

In more and more countries, authorities intervene in waste disposal operations in points such as:

- The authorization of installations that will be used for disposal, as well as the methods as such that will also need to be approved by the competent authorities. According to the questionnaires received, in 90% of the cases, explosive waste disposal has to be approved by authorities, and in 95% of the cases, the installations must have the ok from the authorities.
- In some countries, there is a limitation on the maximum amounts of explosive waste destroyed per operation. At a given point, there could be serious problems coming from the accumulation of stocked wastes that will eventually be destroyed, not to mention the consequential harm that it could cause.
- If we now centre on the follow-up the authorities carry out on the quantities destroyed and the generated wastes, in the majority of the cases there is an annual follow-up on the amounts destroyed. This follow-up is normally compulsory, moreover when as explosive waste is included in the "Toxic and Dangerous Waste Law", then the quantities and destination of the final wastes must be declared.

We foresee that these measures will become stricter and will spread to other countries.

There will also be a requirement for new measures, which in some cases are already being applied. However, there is no record of them being applied in general or preponderantly:

- More segregation of wastes (before disposal and also after along with the

obtained inert remains)

- Another measure that could come through is the use of determined installations for particular types of explosives.
- Fume scrubbing in some of the equipment.
- Control over final inert waste management. This measure would be related to the demand for more segregation.

It is true that these measures have a general environmental point of view; however, these measures also, to a certain extent, have a weight on safety, because there is a demand for documented management and the need for authorisation pertaining installations and methods on behalf of the authorities.

9. REMAINS AFTER EXPLOSIVE WASTE DISPOSAL

It is clear that when the disposal is carried out in determined installations and not on ground, the wastes are collected to give room for the following operations. However, when disposal was carried out through incineration or detonation on open ground on land, what happened with those generated wastes?

If we centre on burning operations, which cause a major environmental impact we make the distinction between:

- civil explosives
- initiators
- contaminated wrappings

We can see that burning is most widely used in industrial explosives, when the amounts destroyed are bigger than in the case of initiators. The packaging, including plastic, commonly have the same end.

With this data in mind, lets now centre on what happens with these wastes:

- there is no collection in 7% of the cases
- even if they are collected, 60% are not sent to authorised waste management.

This information corresponds to the fact that in 35% of the cases the competent authorities demand an annual follow-up document pertaining to the remains that have been generated after disposal. We can then reach the conclusion that this practice is carried out only in the cases where the authority actually asks for it. Only 5% do it out of their own initiative.

10. CONCLUSIONS

According to the different aspects shown there are some conclusions that must be taken into account as recommendation:

- Each Company should develop a waste management system based on procedures according to Good Practice Codes and National Regulations
- It is necessary to minimize the amount of wastes generated by means of: segregation, selection, recovery...
- When possible introduce the explosives waste in blast holes
- To set up burning and blasting installations so they could minimize the environmental impact
- To collect and treat properly the remains of explosive waste disposal according to Company and also National Environmental Policy.



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THEME III: EXPLOSIVES WASTE MANAGEMENT

SURVEY ON EXPLOSIVES WASTE DISPOSAL AT SAFEX MEMBER COMPANIES

30/05/02

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OBJETIVES

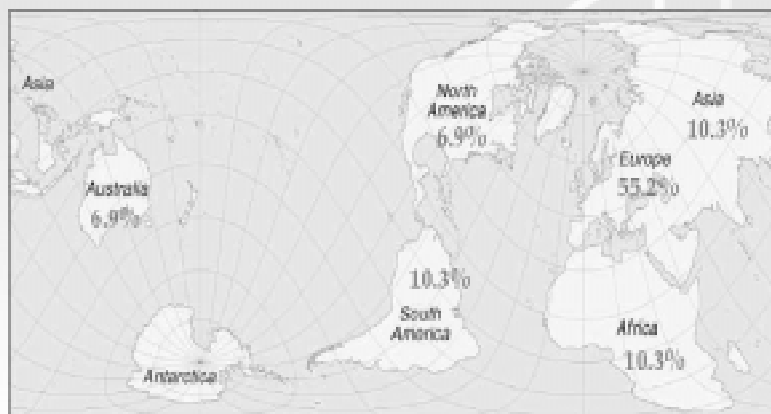
- 1 **SITUATION OF MANAGEMENT AND DISPOSAL OF EXPLOSIVES WASTE NOWADAYS**
*THE WAY:
A QUESTIONNAIRE*
- 2 **ANALIZING THE INFORMATION**
- 3 **CONCLUSIONS AND STATUS DOCUMENT**

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NUMBER OF QUESTIONNAIRES SENT	80
NUMBER OF QUESTIONNAIRES RECEIVED	29
PERCENTAGE OF PARTICIPATION	36.25%



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INHERENT RISKS AND PROBLEMS

- RISK DURING DISPOSAL
- RISK DURING TRANSPORTATION, STORAGE, HANDLING...
- ENVIRONMENTAL PROBLEMS DURING DISPOSAL
- ENVIROMENTAL PROBLEMS AFTER DISPOSAL

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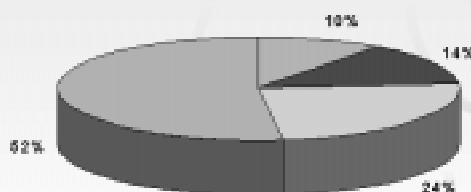
REGULATIONS

OFFICIAL REGULATIONS RELATED TO EXPLOSIVES
DISPOSAL ARE NOT SPECIFIC

MOST COMPANIES FOLLOW THEIR OWN PROCEDURES BASED ON:

- CODES OF GOOD PRACTICE (FEEM)
- OTHER RECOMMENDATIONS (VSSF, BAM, NSIEF, EPA, IME...)

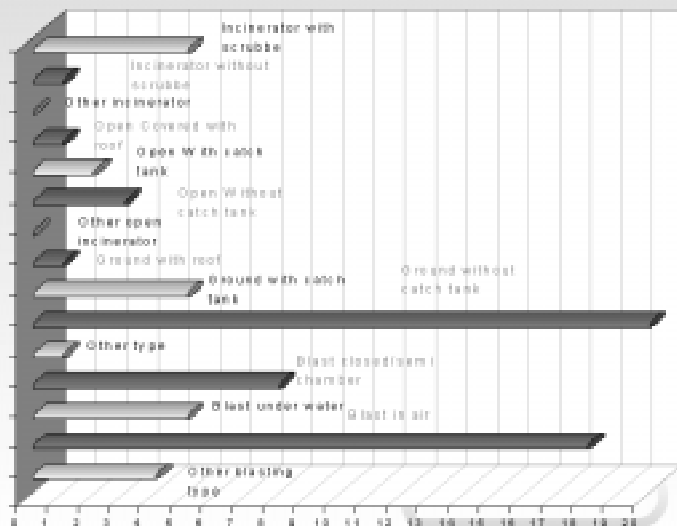
- ☐ 52% Do not follow any recommendations
- ☐ 24% Follow FEEM recommendations
- ☒ 14% Follow other recommendations
- ☐ 10% Follow FEEM & also other recommendations



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INSTALLATIONS



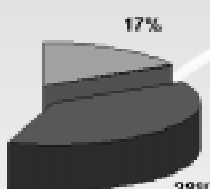
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INSTALLATIONS OR FACILITIES



45%

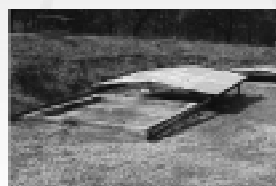


17%

38%



Incineration/blast on the ground



Incinerator with fume scrubbing

Other solutions

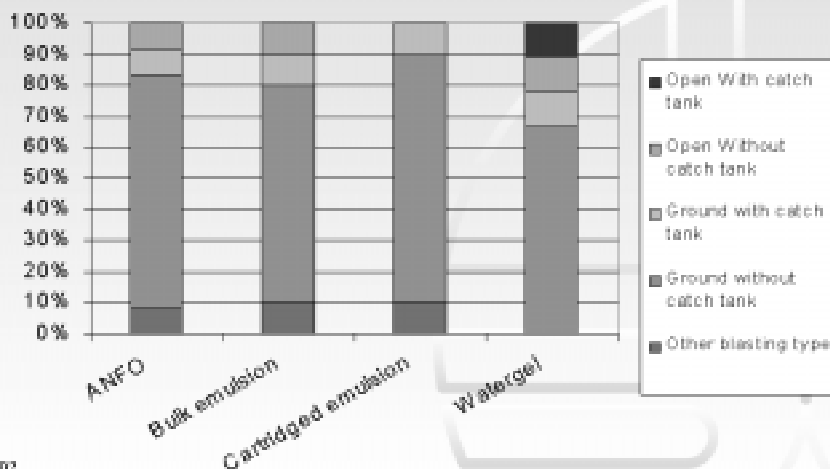
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PRODUCT WASTE DISPOSAL

EMULSIONS, WATERGELS & ANFO



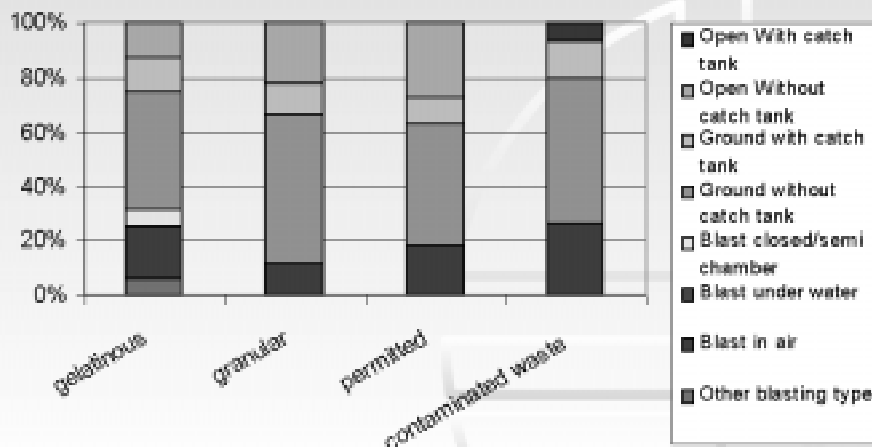
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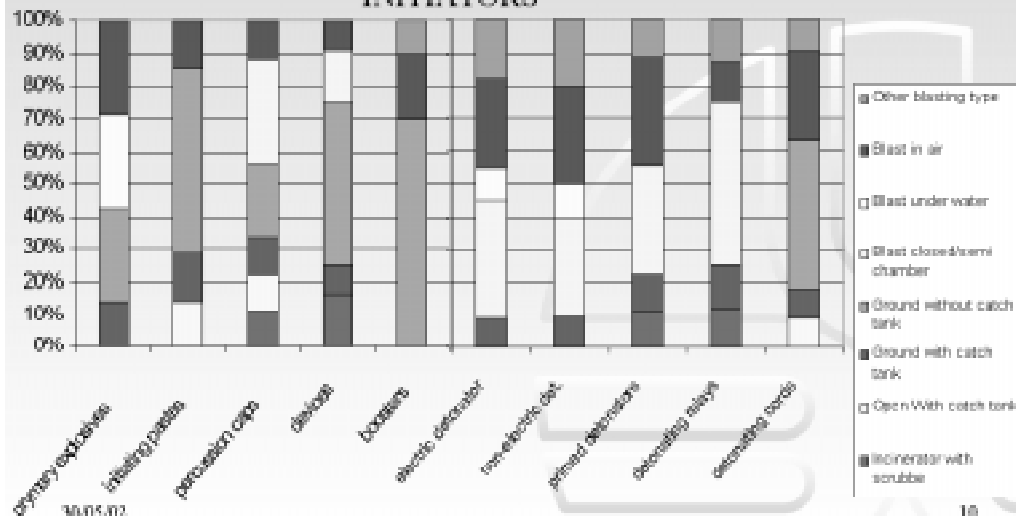
PRODUCT WASTE DISPOSAL

Explosives containing Nitroglycerine or Nitroglycol



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PRODUCT WASTE DISPOSAL INITIATORS



AUTHORIZATIONS

BASED ON THE NATIONAL LEGISLATION THE COMPETENT AUTHORITIES HAVE DEVELOPED SOME RESPONSABILITIES IN DIFFERENT COUNTRIES:

- GRANT PERMISSION FOR THE DESTRUCTION (90% of the companies)
- THE INSTALLATIONS HAVE TO BE AUTHORIZED (95% of the companies)
- THE PROCEDURES HAVE TO BE AUTHORIZED
- THE QUANTITIES OF EXPLOSIVE DESTROYED ARE SOMETIMES CHECKED AND LIMITED
- AN ANNUAL REPORT MUST BE SUBMITTED TO THE AUTHORITIES INCLUDING DESTROYED QUANTITIES AND FINAL DESTINATION OF THE REMAINS AFTER EXPLOSIVE WASTE DISPOSAL



AUTHORIZATIONS

WHAT IS EXPECTED IN THE FUTURE?:

- GENERALIZATION OF THE ASPECTS IN PREVIOUS SLIDE
- MORE SEGREGATION OF DIFFERENT MATERIALS
- SPECIFIC INSTALLATIONS FOR SPECIFIC PRODUCTS
- FUME SCRUBBING
- STRONG RESIDUES CONTROL AND MANAGEMENT

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REMAINS AFTER EXPLOSIVE WASTE DISPOSAL

60% OF THE CIVIL EXPLOSIVES WASTE ARE DESTROYED ON THE BURNING-GROUND

25% OF THE INITIATORS WASTE ARE DESTROYED ON THE BURNING-GROUND

85% OF EMPTY BAGS AND CONTAINERS ARE BURNT ON THE BURNING-GROUND

	YES	NO
•Are solid ashes and residues collected?	83%	7%
•Are they sent to a waste management authority?	40%	60%
•Is a report on this ashes and residue generated required?	35%	65%

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CONCLUSIONS

- Each Company should develop a waste management system based on procedures according to Good Practice Codes and National Regulations
- It is necessary to minimize the amount of wastes generated by means of: segregation, selection, recovery...
- Introduce the explosives waste in blast holes when possible.
- To set up burning and blasting installations so they could minimize the environmental impact
- To collect and treat properly the remains of explosive waste disposal according to Company and also National Environmental Policy.

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