LESSONS FROM GOIÂNIA

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Abstract

LESSONS FROM GOIÂNIA.
The lessons learned from the radiological accident of Goiânia in 1987 derived from the observations from the Regulatory Agency which was in charge of the decontamination tasks may be consolidated into four classes: Preventive Actions, characterised as those that aim to minimise the probability of occurrence of a radiological accident; Minimisation of time between the moment of the accident occurrence and the beginning of intervention, in case a radiological accident does occur, despite all preventive measures; Intervention, which is correlated to the type of installation, its geographical location, the social classes involved and their contamination vectors; and Follow up, for which well established rules to allow continuing monitoring of the victims and rebuilding of homes are necessary.

The greatest lesson of all was the need for integration of the professionals involved, from all organizations.

1. INTRODUCTION

The lessons learned from any event in which a person has participated depends on his position during its occurrence. In the specific case of the radiological accident of Goiânia, in 1987, the lessons shown here are derived from the observations from the Regulatory Agency responsible for the production and commerce of nuclear materials and radioactive sources which was also in charge of the decontamination tasks. Seven years after the accident four classes of learning have been consolidated: prevention; minimising time between the moment of the accident and the beginning of action; intervention and follow-up.

2. PREVENTIVE ACTIONS

Preventive actions have been characterised as those that aim to minimise the probability of occurrence of a radiological accident. This minimisation is influenced by the control and responsibilities pyramid, the frequency and types of control, the audit of these controls and the difficulties found in this procedure. The control and responsibilities pyramid include the participation of the operator, the NATIONAL NUCLEAR ENERGY COMMISSION, MILITARY INSTITUTE OF ENGINEERING, governmental organizations from the City, State and Country. Since the operator is the only one with permanent control on the installation he should bear the main responsibility. As a consequence, he should have technical abilities that allow him to understand all the aspects involved in this responsibility. By analogy, it is supposed sharing of responsibility between a vehicle driver and the government agency that verifies the ability of the driver and the mechanical and safety conditions of the vehicle. It is also supposed that at some time this subject will either suffer or cause an accident. In case the accident was caused by a negligent driver, lack of proper maintenance of the brakes for instance, only this driver could have avoided the accident, never any other organization involved in issuing a drivers license or vehicle registration documents. This fact, however, does not omit the action of governmental organizations to establish rules, frequency and types of controls, to minimise the possible accident consequences. In the specific case of radioactive sources operation, the frequency of control of existing sources should be daily, by the operator. The integrity verification should be periodical. It should be
emphasised that this operator routine check becomes boring reducing its reliability. A weekly report to the regulatory agency could improve credibility of the quantitative information. To this government control it could be added quality controls, both of integrity and of optimisation of operational procedures, with results in visual qualification of the installation to the general public. What happens is that these preventive actions, specially in Developing Countries, are difficult to implement by conflicts between legal aspects and necessary technical actions. Also a lack of qualified professionals, geographical dimensions and the growing use of radioactive sources, contribute to make preventive actions a difficult task. It should be remembered that social problems in Developing Countries, some very urgent, conflict with the necessary safety actions. These difficulties are even greater since one verifies that the technical skills of operators are mainly located in the Hospital Network, in the Nuclear Medicine and Radiotherapy sectors. On the other hand a large number of government agencies, particularly in small cities lack technically qualified personnel to implement the legal controls. It should be emphasised that in many countries as well as in Brazil the medical use of radioactive sources started more than a decade before a system to control their use and to assess the risks involved. Even today the use of radioactive sources in smoke detectors places a new risk to non qualified maintenance personnel, although these risks are small and localised. At the same time the law is slower to change to keep up with the fast evolution of radioactive source applications.

3. MINIMIZATION OF TIME BETWEEN THE MOMENT OF THE ACCIDENT OCCURRENCE AND THE BEGINNING OF INTERVENTION

If, despite all preventing measures, a radiological accident occurs, the affected area, the number of victims and the psycho-social effects will be influenced by the time between accident initiation and the identification and intervention. It is natural that factors that influence in these times reduction are correlated with those of the preventive actions. Thus, the type and frequency of control constitute the first accident indicators. It is required that the established control system be preserved reliably and ready to actuate.

However, as in the case of ophthalmologic sources, not always this conscientization of the risks involved exist among operators becoming necessary the employment of other local indicators of popular use. It is considered that these indicators can be utilised from a chain in which, for instance, radioprotection supervisors, medical doctors, pharmaceuticals and firemen participate.

In the case of material robbery, another agent is necessary, the receptor, lying in line between the legal and the illegal. These receptors are not reliable information sources and normally become national distribution vectors, since the stolen objects are not negotiated in the region where the robbery occurred.

4. INTERVENTIONS

Although it is possible to determine some accident scenarios, these will never include all aspects involved in intervention. The type of installation, its geographical location, the social classes involved and their contamination vectors are all correlated.

Thus, some basic principles of practical origin, extracted from the decontamination of Goiânia experience will be related.

— Intervention Levels:

The ICRP 26 and 60 predict that the radioprotection actions should be based in limits as low as reasonably achievable, considering economic and social aspects.
After the start of the intervention at some site the local public, by natural curiosity, becomes the main controlling agent, practically demanding that the exposure levels return to the original values. In this way record and intervention levels defined in the Radioprotection Basic Standards become only reference values.

In Goiânia the return of the exposure levels to their original values resulted in an excessive amount of waste compared to what should be removed to prevent radiological risks.

The lack of conceptual knowledge in which intervention levels are based, contributes to discrimination of sites, people and products. This discrimination can be reduced by the action of people involved in decontamination. The credibility in this action of the technical team has aspects pureed personal and its use in the wrong fashion can work in the opposite direction producing more discrimination. It is natural that the actions are taken considering the local characteristics. In Goiânia, the public living near the contaminated areas, offered water, juices, coffee and local fruits to CNEN technicians trying to identify rejections indicating possible contamination.

— Co-ordination and Unified Action:

Although government agencies planning for intervention should exist, some characteristics should be anticipated and legally consolidated to reduce and enable intervention.

The lack of previous knowledge of the area involved in the accident, the number of victims, the contaminating material, the site characteristics, makes impossible to a single agency to possess all necessary means to intervention. It is a must the participation of several organizations with well differentiated subordination demanding a co-ordination including federal, state and city agencies and an unified command.

This unified command should have legal authority to all necessary actions. Additionally, to existing global planning daily procedure should be proposed resulting from the work development. This unified command should remain in the area during all process of intervention.

— Legal Aspects:

Intervention characterises an emergency demanding urgent decision. These include exceptional procedures on material acquisition, importing, hiring of services and material disposal. Customs barriers should be removed to import medical products, equipments and consuming materials. On the other hand it should grant the authority to isolate areas, retrieval of contaminated goods, decontamination or demolishing of houses, selection of areas to store temporary waste and co-ordination to victim support.

The lack of these exceptional legal tools, can prevent or delay an effective action disabling the minimising of intervention time.

— Waste Area:

The beginning of decontamination of the affected area produces a large amount of waste that should be immediately removed. The choice of a region nearby for temporary storage is a must. This area should possess characteristics that allow it in the future to become a permanent waste site. This avoids transport accidents and unnecessary personnel exposure.

— Local Products Verification:

The social phenomena of discrimination occurs not only near the affected area but also in faraway regions.

During the Goiânia accident it was normal discrimination against vehicles with Goiânia license plates.
Additionally, non ethical financial interests led to discrimination of Goiânia region products, as well as from faraway points not affected. It is important the creation of groups to analyse the products, issuing certificates to avoid this discrimination reducing the psycho-social impact of the accident. The analysis results should have legal backup and should be final.

— Personal Damages:

The victims classification, the sites and rescue teams should be immediately defined. It was observed that in the preparation of medical teams to look after the Goiânia victims there were no nurse paramedicals and cleaning personnel with enough background in radiological protection.

Additional problems were lack of laboratory support to perform clinical analysis, laundry, collection and disposal of hospital and decontamination wastes and medical equipment.

FOLLOW-UP

The insufficiency of funds in developing countries makes necessary establishing priorities to future actions once the cause has stopped. It is adequate to existence of well established rules to allow continuing monitoring of the victims, rebuilding of homes, indentations. These needs should be based on proper laws.

CONCLUSIONS

Despite without all conditions previously established, the rapid decontamination of the affected area and the victim assistance, presented positive reports by specialists and international organizations. This is attributed to the solidarity of the different federal, state and city agencies supported by technical ability of the Comissão Nacional de Energia Nuclear staff.

A great lesson was the integration of all the professionals involved, from all organizations, becoming an example of efficiency in short time.