

INDUSTRIAL ACCIDENTS IN RADIOLOGICAL CONTROLLED AREAS: THE IMPORTANCE OF RADIATION PROTECTION IN THE ORGANISATION OF THE EMERGENCY AID

Jean-Louis FENOLLAND, M.D., EDF Golfech NPP, France

Eric LAPORTE, M.D., EDF Saint Alban – Saint Maurice NPP, France

I – Introduction

After some disappointments when the first French nuclear units were started, it became clear that all the aspects linked to radio-protection needed to be taken into account in the context of emergency aid in the case of an industrial accident in radiological controlled area.

II – Context

In the case of an accident involving people, on-site first aid is provided by permanent services of the power plant. These teams are trained in first aid and fire-fighting. They are well trained in radio-protection.

The specificity of an industrial event in controlled zone is that the victims' conventional injuries, whether it be a wound, a burn or a fracture, can be complicated by radioactive contamination.

If it is justified, the exterior emergency services (firemen and medical teams) are immediately called in. These teams are not necessarily trained in radio-protection.

III – Stakes

The main aim is to have no delay in the medical care of the victims. It is therefore very important that the exterior emergency services are not perturbed by the radiological conditions of the operation. Anxious state of mind in an unknown situation can generate unsuitable behaviour.

In parallel, radio-protection must be provided for the victims and the teams who are assisting them.

IV – Organisation

In case of accident in radiological controlled area, a specific kind of organisation needs to be set up which depends on the number of casualties and the seriousness of their injuries.

When the usual means of first-aid are insufficient and there is a lack of balance between the available resources and the needs, an Emergency Plan with a Sanitary approach needs to be implemented, which places the same means at our disposal, by adapting them to the situation, as those which are provided in the case of events which affect the safety of installations.

The events successively take place on the scene of the accident, then in an intermediate structure which is for grading the casualties and for serious medical intervention, called Medical Outpost Station and finally in the services of the different hospitals.

The aim of this organisation is to make a list of all the casualties, to take care of the most seriously injured as soon as possible and to optimise the evacuation of the victims.

The role of the medical teams and the radio-protection team on site is to ensure and to deal with the radio-protection of the victims and the first-aid workers throughout their intervention, from the NPP to the evacuation hospital.

Concerning the radio-protection and whatever the organisation used, the main principles to set up are always the same :

- the evaluation of the radiological risk
- the marking of the sites which have a high radiation area, and the contaminated areas
- the optimisation of the radiological exposure suffered by the casualties and the first-aid workers
- the availability of individual protections (overalls, breathing protection, etc...) and collective protections
- the control of the measures taken and their efficiency
- the recording of the radiological conditions that have been sustained, in terms of both external and internal exposure, whether by inhalation, ingestion or contaminated wound.

The casualties are transported from the site of the accident to the Medical Outpost Station, which is put into place if the situation justifies it. It is ideally a large, open and sheltered area, situated away from the contaminated areas. The medical and radiological grading is carried out here. It is essential to remember that, in every case, standard medical emergency takes precedence over the radiological risks.

In the Medical Outpost Station, two distinct zones are defined : the conventional zone and the contaminated zone.

When the condition of the victim permits, the following gestures are carried out concerning radiological risks

- undressing, which contributes decreasing the contamination of a factor 10
- external decontamination by washing
- total body counter measuring the internal contamination.

In the Medical Outpost Station, the radio-protection team's mission is to manage the contaminated zones, to inform the participants at the entrance of the zones with a contamination risk, to control everybody and everything at the exit, and finally to deal with the waste.

The casualties are then sent to hospital. The radio-protection must be ensured during the transport, and the personnel and equipment must be controlled at the end of the mission.

From the point of view of radio-protection, the reception of a contaminated casualty must respect the same principles as classical French theatre :

- the principle of unity of place ; the concern of reducing the spreading of the contamination inside the hospital
- the principle of unity of time, which means decontaminating the casualties as soon as possible
- the principle of unity of action, which consists to work in close collaboration both the hospital staff, who are dealing with the casualties, and the radiological teams, who are dealing with the radiological risks.

If these few rules are followed, they ensure the same quality of treatment for the casualties who are contaminated as for the conventional casualties.

V – Conclusion

Even if a serious accident with a large number of casualties is highly unlikely, an industrial event with one contaminated victim can happen at any moment and these situations need to be well prepared to be dealt efficiently.

The keys to success are :

- the training of the fire-fighting and medical staff who intervene on the site
- radio-protection support from the power plant teams throughout the rescue operation
- regular drills with role-plays which will test the different interfaces, including the reception in the hospital services.

Finally, a relationship of trust absolutely needs to be worked on and maintained with the different partners who take part in those kind of accident situations.