

Specific Aspects of the Emergency Arrangements when Establishing ERO

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Abstract. Considering the requirement for the adequate emergency arrangements and accident management, some areas in this field are still blank or not well addressed. Among all the factors which play role during accident management and emergency activities, there is one which is a kind of underestimated in most of the emergency arrangements. That is the operators' stress.

This article is not about the requirements on the emergency response centre or the facility itself but to place the basis for two other aspects - the arrangements and the philosophy behind the emergency response organization together with the role of the Technical Support Centre, and the impact on the persons involve in the emergency activities and Emergency Response Organization.

Keywords: accident management, emergency response, ERO.

Abbreviation	Description
DiD	Defence-in-Depth
ECC	Emergency Control Centre
ECR	Emergency Control Room
ERC	Emergency Response Centre
ERO	Emergency Response Organization
IAEA	International Atomic Energy Agency
MCR	Main Control Room
NPP	Nuclear Power Plant
TSC	Technical Support Centre

1 Introduction

Within the light of the latest reports of Fukushima and the improvement of the level of safety focusing on the 4th and the 5th level of Defence-in-Depth (DiD), a lot of regulations, requirements and guidance are applicable and provide a good basis for an adequate accident management and emergency arrangement. A basic definition of the terms which are subject to this article are well presented in [1], a document issued by the IAEA. In this document the term "Emergency" is defined in the context of the extreme situations which requires actions to mitigate hazards and accident consequences. This includes nuclear and radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. The performance of the required actions to mitigate the consequences of an emergency is understood as an Emergency response. Another important aspect also is the ability and the capability of the emergency arrangements to ensure the adequate implementation of the emergency response, which is to a greater extent, an emergency preparedness. And while the regulations and guidance available are focused on the emergency planning

and preparedness, there are not so many guides on how to implement and make it work the accident management together with the emergency arrangements considering the human factor.

2 Emergency Response Aspects

The practical goals of emergency response in a nuclear or radiological emergency are well summarized in [2]. Some of these goals include:

- Regaining control;
- Preventing and/or mitigating consequences at the site;
- Preventing the occurrence of deterministic health impacts and prevent the stochastic effects;
- Protecting, to the extent practicable, the environment and property;

It is well known the context of the emergency planning and preparedness [3]. But as long as the accident management approaches and emergency arrangements differ from country to country; considering differences in the nuclear technologies, there is not a single template kind of arrangement that could fit everywhere. The activities which are necessary to ensure that, in the event of an accident, all actions necessary for the protection of the public and the plant staff could be carried out, should be defined and respective organization be established [3].

By definition, a Response Organization is an organization designated or recognized as being responsible for managing or implementing any aspect of an emergency response. This also includes those organizations or services

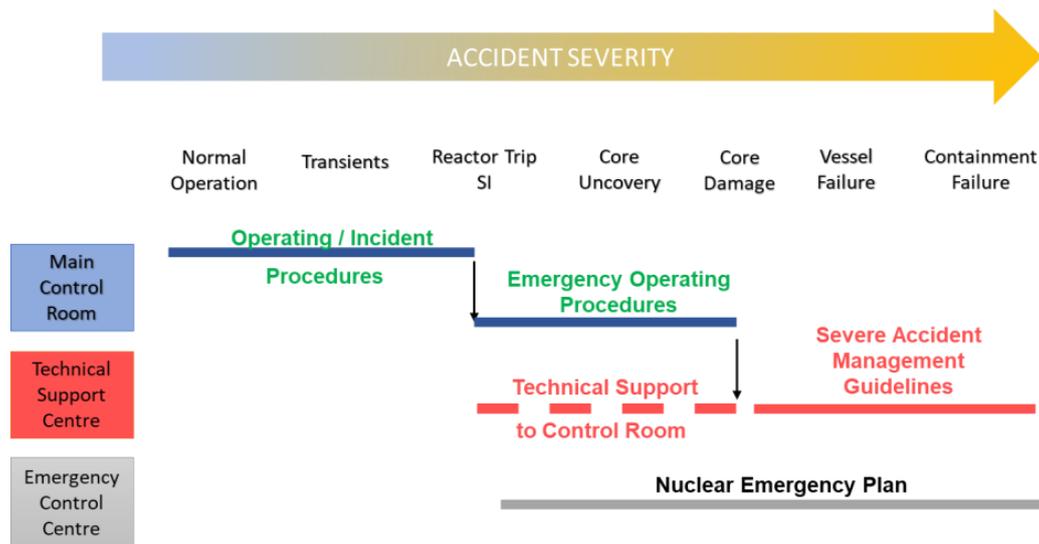


Figure 1. Accident management.

necessary to support the management and/or conduct of an emergency response, such as meteorological services. Bearing in mind the complexity of a potential nuclear accident, the organization aspects and the level of involvement of different institutions is probably at the maximum.

A well-known schematic view of the Accident Management is given on Figure 1. It is not an ultimate representation of the understanding about accident management but rather provides a good sketch of the fields which take part in the management of accidents and achieving the goals of the emergency response discussed above. Going top-down on the left-hand side of the diagram the blocks show the increase of responsibilities and number of activities with the increase of severity of the accident. The synchronization of actions and sequence of activities lies on the organization and the clear structure of the responsible teams. Teams focused on the site are dedicated to bringing the plant under control and protecting the staff. The teams involved off the site, on the other hand, are much broader engaged with the state and public.

Whatever arrangement is in place, an off-site emergency centre is considered as a must nowadays. There is a principle [3] that a permanently equipped emergency centre should be established and available off the site for emergency response. A similar centre on the site is provided for directing emergency activities within the plant and communicating with the off-site emergency organization. The off-site emergency centre should have a reliable capability to communicate with the similar centre at the plant, with all important units of the emergency response organization (police and fire services, and governmental and public information sources). In fact, the accident management and emergency arrangement should be understood from the point of view of both – nuclear technology and operation. It should be recognized that design issues are specific to a reactor type. However, operational issues tend to be more of a function of the culture of a specific country, utility or NPP.

A good example of the said is the Main Control Room arrangement/design on Fukushima NPP where a single team was responsible for two cores and the fact about the diesel generators location installation.

One of the critical aspects of the emergency arrangement is the role of the individuals. The persons involved in the accident management and those making decisions. Among all the factors which play role during accident management and emergency activities, there is one which is a kind of underestimated in most of the emergency arrangements. That is the operators' stress. In most of the cases where a severe accident is under management there are not so many automatic equipment or systems which can be put in operation. On the other hand, all the actions and decisions are directed from the operators/accident management team. This is another aspect which one could consider as a function of the emergency management culture but should be taken into account when establishing emergency arrangement organizations and respective facilities together with the philosophy of being able to manage multi-unit emergency. Going back to the Fukushima accident, one of the drawbacks in emergency arrangement was the simultaneous need for emergency measures and actions at more than one unit. No one could be able to measure the level of operators' stress in such kind of situation. For that reason, some solution might be to ensure a complete set of operators be in charge replacing and supporting on-the-shift team.

Some major aspects of the elements presented in Figure 2 need to be discussed but under condition that the presented is not the structure of the emergency response organization and accident management but rather basis for such a structure.

The initial stage of the accident which require urgent actions and of the competence of the operators is marked with the responsibility to bring the unit under control and to avoid further escalation. In that stage the plant supervisor or equivalent role is responsible for decision making

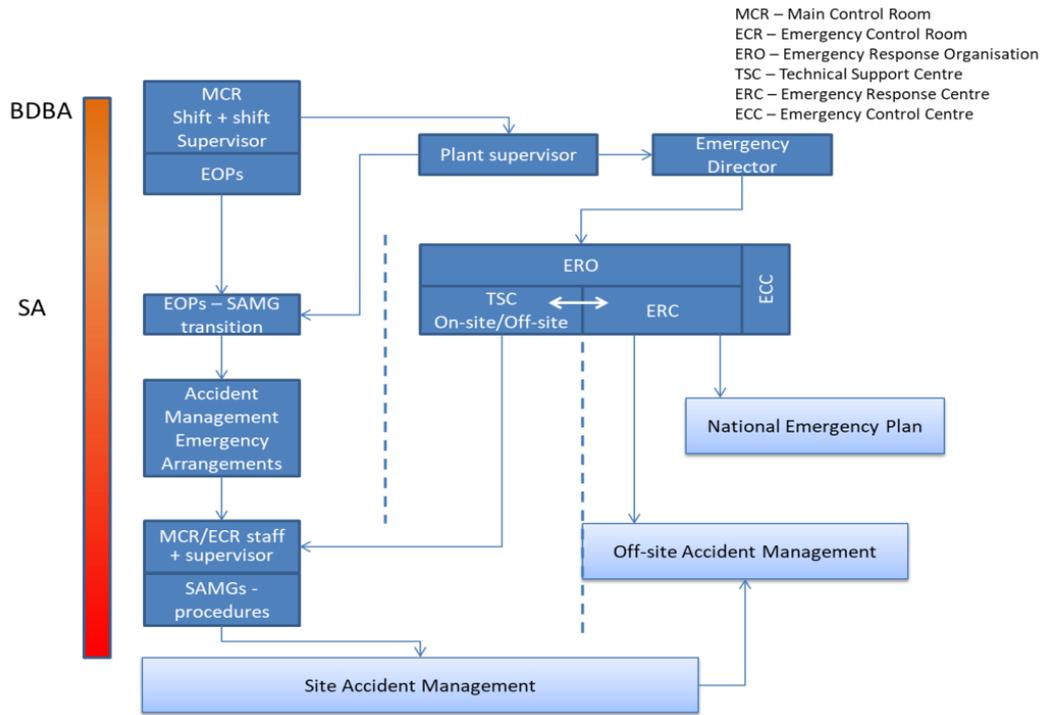


Figure 2. Accident management functional structure.

in terms of informing Emergency Director and keeping a constant connection with the shift and shift supervisor. As long as the Plant Supervisor is informed about the severity of an accident the Emergency Director should be informed and considering the information from the plant, the Emergency Response Organization (ERO) to be activated. In order to minimize the confusion and assist in the control of the emergency response, the ERO should be designed so that only dedicated person, or his alternative, is responsible for the implementation of specific emergency actions. In addition, the functional areas of responsibility remain flexible enough to accommodate the needs of the emergency and the availability of personnel and resources.

A vision for Emergency Response Organization a placed in Technical Support Centre (TSC) and Emergency Response Centre respectively but often this separation is informal. In the ideal way these two units are together – Emergency Control Centre (ECC), internationally recognized also as Emergency Control Facility. Considering the definition in Ref. [1] this is a facility or location necessary for supporting an emergency response, for which specific functions are to be assigned at the emergency preparedness stage, and which need to be usable under emergency conditions. In any case, advance preparations are necessary to ensure the operability of the centre under emergency conditions. For a nuclear power plant, emergency response facilities (which are separate from the control room and the supplementary control room) include the technical support centre, the operational support centre and the emergency centre.

The scheme presented in Figure 2 makes it possible separation of the TSC and its role from the ERC and to establish a clear communication channel for information exchange. In this way the ERC could be focused on the Emergency

plan and activities both on and off-side. The coordination of actions and resources is up to the organization established to manage and be in charge. Some countries dedicate the emergency activities to military units. Relying on such a structure where a single institution is responsible and involved in all emergency situations is a bit tricky if we face a nuclear accident combined with a natural disaster (Fukushima example). Often priorities are difficult to define and to ensure successful achievement of emergency measures.

3 Conclusion

This article is not about the requirements on the emergency response centre or the facility itself. Two other aspects are in the focus though. The first one is the arrangements and the philosophy behind the emergency response organization (ERO) together with the role of the Technical Support Centre (TSC), and the other is the human resources.

Mentioning the case which considers nuclear accident induced or accompanied by a natural disaster, a responsibility of the ERO should be to ensure low level of stress and psychological factors for the people involved in the accident/emergency arrangements. This includes families' status as well.

To summarize, this article is not about depicting and establishing rules or requirements but rather highlighting some aspects of the emergency arrangements, which should be considered when establishing EROs. Each country adopts the most suitable and applicable set of arrangements. This is acceptable providing countermeasures are foreseen to cover accident management challenges.

References

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