

EPR-NPP PUBLIC
PROTECTIVE
ACTIONS
2013

EMERGENCY PREPAREDNESS
AND RESPONSE

Actions to Protect the Public in an Emergency due to Severe Conditions at a Light Water Reactor

DATE EFFECTIVE: MAY 2013



IAEA

International Atomic Energy Agency

2. OVERALL CONCEPTS

2.1. EXAMPLE CONCEPT OF OPERATIONS

The concept of operations is a brief description of the response to an emergency used when planning your response. It needs to be developed at the beginning of the preparedness process to ensure that all those involved in the development of a response capability share a common vision.

This concept of operations presents an example of a response taken in the event of a severe emergency involving actual or projected severe damage to the fuel in a reactor core or spent fuel pool¹⁵ that will meet the objectives given in Section 1.1. This concept of operations is a starting point and needs to be adapted to local conditions in order to be effective. It describes the response that is detailed in this publication. The steps in the example concept of operations are summarized in Section 2.2.

The emergency begins with the occurrence of an event (e.g. loss of a safety system) in the nuclear power plant or facility storing the spent fuel pool that will result in conditions (e.g. severe fuel damage) warranting taking urgent protective actions off-site before or shortly after a release in order to be effective in protecting the public.

Within about 15 minutes of detection of the event (or its symptoms), the nuclear power plant shift supervisor declares a General Emergency on the basis of predetermined conditions and instrument readings in the nuclear power plant. These instrument readings are called emergency action levels (EALs) and the declaration of a General Emergency triggers a coordinated response by all response organizations since each organization has predetermined the actions it is to take upon declaration of the emergency. The nuclear power plant staff also immediately take all possible on-site actions to prevent or mitigate any release and take immediate actions to protect the people on-site.

Within 30 minutes of detection of the event (or its symptoms), the shift supervisor notifies the off-site decision maker(s) responsible for the jurisdictions where urgent protective actions need to be taken promptly to reduce the risk to the public within the predetermined emergency zones and distances around the nuclear power plant, (i.e. precautionary action zone (PAZ), urgent protective action planning zone (UPZ), extended planning distance (EPD) and ingestion and commodities planning distance (ICPD)¹⁶). The shift supervisor recommends to the off-site decision maker(s) that they immediately start to take the predetermined urgent protective actions (e.g. evacuation, relocation, iodine thyroid blocking (ITB), food restrictions) needed to protect the public within these areas.

Within 45 minutes of detection of the event (or its symptoms), the off-site decision maker(s) starts implementation of the predetermined urgent protective actions by warning those near the nuclear power plant in the PAZ and the UPZ (e.g. with sirens and a loudspeaker to explain the siren) and informing them via media (i.e. means of public communication, including radio, television, internet web sites, newspapers and magazines and social media) of the actions to take. This is possible because provisions for prompt decision making and use of pre-recorded messages have been put in place. Within the PAZ the public needs to be instructed to immediately take ITB agent¹⁷ and evacuate as soon as it is possible to do so safely¹⁸. Prior to evacuation the public needs to be instructed to shelter. Within the UPZ the public needs to be instructed to immediately take ITB agent and to shelter until instructed to evacuate. When there is a potential for a severe airborne release the population within the UPZ needs to be instructed to evacuate, as soon as it can be done so safely¹⁸ without

¹⁵ See Section 2.5 for more information).

¹⁶ See Section 4 for more information on the emergency zones and distances.

¹⁷ ITB agent can be immediately taken only if it has been pre-distributed in homes, schools, workplaces, hospitals and other special facilities.

¹⁸ Safely evacuating means not endangering the lives of those being evacuated. For example, patients in hospitals or care homes do not need to be immediately evacuated if this will put them at immediate risk. Evacuation needs to be delayed until these patients can be moved safely.

within the UPZ needs to be instructed to evacuate, as soon as it can be done so safely¹⁸ without delaying the evacuation of the PAZ. The evacuation of the UPZ may be phased in such a way that those areas at immediate risk are evacuated first (e.g. considering the projected wind direction), or in such a way that it can be implemented most effectively (e.g. optimization of the existing road network). However, ultimately the UPZ may need to be evacuated in all directions due to the wind shifts that could take place during a release or throughout the time period of a potential¹⁹ severe release. The off-site decision maker(s) also instructs those in areas where contamination of food, water, milk or commodities could represent a risk (i.e. within the ICPD) to: (a) place grazing animals on stored (covered) feed, (b) protect drinking water supplies that directly use rainwater, (c) restrict consumption and distribution of non-essential local produce, wild-grown products (e.g. mushrooms and game), milk from grazing animals, rainwater, animal feed, and (d) restrict distribution of commodities until further assessments are performed.

Within 1 hour of detection of the event (or its symptoms), having been instructed in advance as part of the preparedness programme, the public start to promptly take the protective actions recommended.

Following a radioactive release, the areas not evacuated are promptly monitored. Based on predetermined operational criteria, called operational intervention levels (OILs²⁰), areas are identified where additional protective actions and other response actions are warranted. The goal is to determine areas where the predetermined OILs are exceeded that require further:

- evacuation within a day;
- relocation within a week to a month; and
- restrictions on consumption of local produce, milk from grazing animals, rainwater and animal feed within days for those areas where ingestion will result in doses in excess of international criteria²¹.

The operating organization of the nuclear power plant ensures that the people on the site, or those responding from off the site, are protected from all possible hazards. Any people who have been severely contaminated or exposed or those who have been evacuated needing medical attention (e.g. patients from nursing homes and hospitals) are taken to hospitals located outside the EPD which have been prepared to screen and treat contaminated and exposed individuals in accordance with predetermined procedures. Those transporting and treating contaminated individuals do so without hesitation because they know that they can do it safely if they use universal precautions (used to protect from infectious agents – surgical mask and gloves). Physicians treating exposed individuals consult national experts with experience in dealing with overexposures. Assistance in treating contaminated and exposed individuals can also be obtained through the IAEA or World Health Organization following Ref. [5]. Centres are established within hours outside of the UPZ to register, process, monitor and screen evacuees and to determine whether they need to receive immediate medical treatment or be registered for a later medical follow-up based on predetermined criteria. People who show symptoms of severe deterministic effects are examined and treated at predetermined and prepared hospitals located outside the EPD.

Soon after the public have been warned, the media are briefed by a single official spokesperson. Joint press briefings are held periodically with the participation of the operating organization of the nuclear power plant and local and national officials to provide a single and understandable message to the

¹⁹ General Emergency conditions (see Section 3).

²⁰ See Section 6 for more information on OILs.

²¹ Monitoring is used to identify where local produce, milk from grazing animals and rainwater needs to be immediately restricted. This is done to put restrictions in place for the areas where ingestion will result in doses in excess of international criteria and before results from time-consuming environmental sampling and analysis become available. However, actions to protect the ingestion pathway are not limited to where monitoring criteria are exceeded but also include a programme of food, milk and water sampling and analysis in the entire affected area, as soon as it can be established, to: (a) confirm adequacy of controls, (b) provide for additional restrictions, (c) provide for food replacements, and (d) to remove restrictions.

