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(HAD002/02)

Emergency Preparedness of Local Government for Nuclear Power Plant

(Approved and published by the National Nuclear Safety Administration, the Ministry of Environmental Protection and the Ministry of Health on May 24, 1990)

This Guideline comes into effect as of the publication day.

The Guideline shall be responsibly interpreted by the National Nuclear Safety Administration, the Ministry of Environmental Protection, and the Ministry of Health.

1 Introduction

1.1 Purpose

The site-selection, design, construction, commissioning, operation and decommissioning of nuclear power plant shall be in accordance with strict nuclear safety regulation. After adopting a variety of preventive measures, although it is extremely unlikely that fault or accident will result in nuclear emergency of the nuclear power plant, however, it can not be ruled out completely. The difference between nuclear emergency and other emergencies lies in that it may cause unacceptable release or radiation of radioactive substance. To enhance the emergency capacity so as to be able to quickly and effectively control the accident and mitigate the consequences in case of accident, each nuclear power plant and the provincial local government at its location must have careful overall contingency plan and full preparation for emergency.

The contingency plan of the nuclear power plant and the provincial local government at its location must be made according to the specific conditions of the nuclear power plant. The plan formulation must follow the principles of seeking truth from facts, practical and thrift. These plans must be reported to relevant national supervision agencies as prescribed.

The contingency plan of the local government is a plan stipulating all actions implemented or taken responsibility by nuclear accident emergency organization of local government (hereinafter referred to as local emergency organization) in an emergency situation. The local emergency organization is mainly responsible for off-site emergency actions and will support the on-site emergency actions when necessary.

The contingency plan of the local government is an important part of the overall contingency plan. This Guideline provides guidance for local government to compile contingency plan; schemes different from this Guideline may be adopted in actual work,

however, the fact that the adopted scheme possesses a safety level equivalent with that of this Guideline must be proved to the national nuclear accident emergency organization.

1.2 Scope

This Guideline summarizes the main points in formulation and implementation of contingency plan of local government, which mainly include:

(1) Formulating contingency plan of local government;

(2) Establishing emergency organization;

(3) Maintaining ready condition of emergency organization;

(4) Implementing emergency actions.

2 Contingency Plan

The provincial local government of the place where the nuclear power plant locates must make off-site contingency plan and make preparation for emergency. The off-site contingency plan of the local government and the on-site contingency plan of the operating unit must be coordinated.

2.1 Accidents Requiring Consideration

The local emergency organization shall make contingency plan according to the analysis of possible accidents of the nuclear power plant and their influence on the public and the environment of the site. These accidents must include the serious accidents which have low probability but whose environment influence is larger than that of the design-basis accidents.

2.2 Division of Emergency Planning Zone

The local emergency organization shall establish Plume Emergency Planning Zone and Ingestion Emergency Planning Zone according to the analysis of severe accidents larger than the design-basis accidents as well as the natural and social environment around the plant, jointly with the operating unit of the nuclear power plant. The size and division principle of the emergency planning zone shall be included in the contingency plan.

2.3 Requirements for Contingency Plan

The contingency plan of the local government must satisfy the following requirements:

(1) Determining the staff composition and responsibility of the emergency organization;

(2) Making a detailed plan of accidental emergency preparedness and response;

examined to maintain them in standby state. Some instances of specification requirements of the emergency equipment required are listed in Appendix I. The configuration of facilities and equipment shall implement the principle of active compatibility.

2.5.1 Emergency coordination

One room or one set of rooms shall be pre-selected in safe place which is expected to be free from the emergency situation of nuclear power plant as the emergency coordination site. This site is the place where the responsible person of local emergency organization coordinates, supervises and decides emergency actions of relevant emergency organizations and directs exercises. An emergency communication office shall be set up in the emergency coordination site and can effectively send and receive information according to the stipulated line.

2.5.2 Emergency radiation monitoring

A mobile or fixed lab shall be set up to determine the activity of environmental sample.

2.5.3 Evacuation reception

One or several evacuation reception sites shall be selected in a safe place according to the principle of active compatibility to provide food and accommodations for the public when evacuation is a must. The local school, public auditorium, cinema, etc. can be considered to act as evacuation reception site.

2.5.4 Information publishing

To make the public and the press fully obtain the information on emergency situation, a public liaison information publishing organization may be set up in a safe place in the emergency coordination site. It can be considered to use existing public buildings as the office of this organization.

2.5.5 Facilities to receive and cure the personnel suffering from pollution and radiation

To receive and cure the injured personnel and the personnel possible to suffer from high-dose radiation or pollution, one or several hospitals nearby may provide facilities. Plan arrangement and preparation shall be made for the rescue and treatment of the suffering personnel. For personnel suffering from high-dose radiation, special equipment is required and they shall be timely sent to specialist-hospital where conditions permit for treatment. For this treatment arrangement, which hospitals (including the name and place of the hospitals and transfer method) shall these personnel be transferred to under what conditions shall be indicated in the contingency plan. The medical care personnel shall also accept the training on treatment of personnel who suffer from pollution.

2.6 Communication System

2.12 First aid and Decontamination

It must be considered to provide first aid measures for personnel suffering from overdose radiation and pollution of radioactive substance as well as personnel with injury or illness caused by implementation of protective measures (for example, evacuation) after accidents occur.

Local and (or) national government shall be responsible for providing personnel and equipment for first aid and decontamination, which must be included in the contingency plan of local government.

2.13 Alarm and Notice Issuance Procedure

The contingency plan shall strictly stipulate the alarm and notice issuance procedure. The notice of alarm shall be issued through direct telecommunication and the recipient shall notify that he/she has received the information. The communication shall use carefully-worded standard communication words to avoid ambiguity. The contingency plan must include a list of all personnel who ought to be notified in case of emergency, accompanied by the address and telephone number, which shall be always revised and supplemented.

The means to give alarm to and notify the public must be explicit, reliable and effective. The possible methods include alarm, wired broadcasting amplifying system, public radio, television, and other electronic means (for example, radio audio alarm). An instance of notice plan is given in Appendix I.

2.14 Traffic Control

The traffic control measures in the contingency plan must be able to isolate all personnel except for those personnel who need to implement special tasks outside the emergency coordination site and influenced area. Special passes must be issued to all personnel who are required to enter the influenced area or come in and go out the emergency coordination site due to undertaking tasks to make the emergency personnel smoothly arrive at the site or their operating posts. The contingency plan shall make access arrangement for necessary vehicles.

2.15 Security Defense

The contingency plan must take the security defense in overall emergency state into account.

3 Emergency Organization

3.1 Responsibilities of Local Emergency Organization

The people's government of province, autonomous region and municipality of the place where the nuclear power plant locates shall set up local nuclear accident emergency organization according to the national nuclear accident emergency management regulations, and uniformly direct the emergency response in off-site emergency state and coordinate the emergency action of relevant organizations according to the contingency plan. The main responsibilities of local nuclear accident emergency organization are as follows:

(1) Implement the national guidelines, policies and regulations on emergency operation of nuclear accidents;

(2) Formulate and implement off-site plan;

(3) Determine the off-site emergency state; report to the national nuclear accident emergency organization for approval; issue the orders and notices on off-site emergency state; uniformly direct the emergency action; in case of extreme emergency, implementing emergency measures first and reporting later is allowed;

(4) Timely notify nuclear accident to adjacent provinces, cities and regions.

When drawing up the contingency plan and implementing emergency preparedness, the local nuclear accident emergency organization shall pay attention to the publicity and education of the public as well as the training and maneuvering of emergency personnel. After releasing the emergency state, the local nuclear emergency organization shall have the right to:

(1) Request or order the public to enter or stay indoor;

(2) Provide prophylactic agents (such as potassium iodate or iodide) to the public;

(3) Request or order the public to hide;

(4) Request or order the public to evacuate from the region;

(5) Prevent the polluted agricultural products and other food from being eaten;

(6) Make a requisition of public facilities;

(7) Shut down the public and private facilities (for example, means of transport and factories) in influenced or possibly influenced area.

The local nuclear accident emergency organization shall set up corresponding administrative body according to the principle of active compatibility to be responsible for daily work.

3.2 Constituted Personnel

Local nuclear accident emergency organization shall be composed according to the stipulations of national nuclear accident emergency management regulations to be fully

4 Emergency Evaluation and Protective Measures

The contingency plan shall clarify the protective measures to be taken and the implementation methods; these measures shall take the analytic events and the actual characteristics of the plant area and its surrounding area, and must balance the achieved effect of reducing radiation dose AND the inherent risks and dangers of these protective measures into account.

The contingency plan shall determine the basic principle for protective measures decision-making, several guidance suggestions on adoption of various protective measures in different stages after accident are given in Appendix II.

4.1 Preliminary Evaluation

Chief commander of operating unit shall make an initial assessment on whether the off-site emergency has existed or is coming, and be responsible for contacting with local emergency organization on off-site emergency (refer to Safety Guideline HAD002/01).

The preliminary evaluation of off-site radiation mainly depends on the following obtained information:

(1) On-site situation includes readings of gaseous effluents monitor;

(2) Meteorological data available in control room;

(3) The fixed on-site and off-site radiation monitoring equipment can be read in the control room, or their settings make it possible to obtain data almost immediately in the control room.

The chief commander of emergency organization of operating unit shall provide suggestions to local emergency organization, on whether emergency action is required for off-site emergency according to the comparison of estimated value of release amount of radioactive substance and pre-computed derived intervention level, and report the accident development and relevant data.

The emergency radiation monitoring group shall carry out quick survey on the surrounding area of the plant, especially densely populated area.

Quick survey must include measurement of external radiation dose, dose rate and β and γ radioactivity of aerosol. The survey result shall be immediately transmitted to the emergency coordination site. For this kind of initial survey, simple and quick technologies shall be adopted, however, these surveys shall provide sufficient information to facilitate the emergency organization to take effective early protective measures (for example, giving out prophylactic agents, hiding, evacuation, etc.). The air sample shall be sent to the emergency radiation monitoring room for more comprehensive evaluation (for example, γ spectrometry).

Continuous air sampler and thermoluminescent dosemeter shall be set up around the plant. The filter of continuous air sampler can provide useful information for evaluation of preliminary harm. The sampler and thermoluminescent dosemeter can immediately start measurement after the accident takes place and can continuously and automatically operate for a long term.

4.2 Initial Protective Measures

Initial protective measures must be decided according to the initial evaluation result, the effectiveness of initial protective measures is closely related to its quick implementation. These measures include:

(1) Entering or staying indoor;

(2) Giving out prophylactic agents;

(3) Controlling the access to the polluted area;

(4) Hiding;

(5) Evacuation.

Deciding whether the public shall evacuate shall consider not only the predicted dose suffered by the personnel in this area, but also factors like age, health condition and responsibilities of personnel to evacuate, main meteorological condition, preparation and transportation capability of evacuation reception site, etc.

4.3 Comprehensive Evaluation

After having carried out the preliminary evaluation and formulated the protective measures against emergency, it is required to conduct a comprehensive evaluation of emergent circumstances with a view of determining which kind of auxiliary measures will be taken. The evaluation shall be carried out in accordance with the following procedures:

(1) If the conditions inside the plant area become stabilized, it is likely to obtain the more accurate estimated value of the radioactive substances emitted and its quantity from the emergency chief commander of operating entity.

(2) The well-equipped and well-trained tour-gauging group must carry out a tour-gauging of dose rate of β-γ on the ground of different areas surrounding the plant area (especially, the downstream wind direction areas). These tour-gauging groups can be provided by the operating entity, local environmental protection authority, radiological protection authority and other relevant authorities. To predict the dose, the tour-gauging group must ascertain the key radionuclide.

(3) It is required to estimate the dose that is already absorbed by the general public and correct it according to the radiometric data that is constantly acquired. Besides, it is also required to estimate the predicted dose, so as to determine whether to take

record it on the work log and study it, so as to observe the trend of its transient change. All measuring groups must use the identical radioactivity unit and secondary unit, so as to avoid confusion.

4.3.2.2 Sampling Data

It is required to prepare the computer program in advance, so as to identify the sample type, sampling time and place, and the units adopted in the experiment result. Besides, the program for sorting, storing and tracking the variation trend of the sampling data shall also be available. To ensure that the health physicist can calculate out the dose-burden caused by consumption of contaminated food and water in a supposed period, the formula shall also be derived out in the emergency plan in advance.

4.4 Subsequent Protective Measures

As the comprehensive evaluation plan is carried out, it is advised to make the decisions as of whether to take subsequent protective measures. These decisions include decisions over the following matters:

(1) Enlarge (i.e., expand) the application scope of early-period protective measures;

(2) Evacuate from the contaminated areas;

(3) Limit the consumption of drinking water, local agricultural products, dairy products (especially milk), other foods, and livestock products;

(4) Make preparation for temporarily preserved food;

(5) Decontaminate the personnel, equipment, buildings, and the roads;

(6) Give medical treatment to the personnel being severely exposed or contaminated.

4.5 Emergency Cancellation

Before announcing the emergency outside the plant area is over, the director of local emergency response organization must make sure that the accident of the plant is already under control and the safety state is almost restored. The emergency director shall especially be sure of:

(1) The release of radioactive substances in nuclear power plant has already decreased within the stipulated limit value for normal operation;

(2) Take and continue to take all necessary protective measures to prevent the general public from being contaminated, and reduce the exposure resulted from the long-term consequence of the accident to the minimum level.

The local emergency response organization shall guarantee that, it will execute the tour-gauging, sampling and evaluation plan if it is necessary, so as to make sure that Condition (2) is satisfied until natural process restores and purification or other remedial

measure are no longer needed any more.

4.6 Post-Emergency Action

After the emergency is over, it is suggested that the following actions should be taken:

(1) Evaluate all the emergency logs, records, written information, etc.;

(2) Review and evaluate the accidents that lead to the emergency state;

(3) Review and evaluate all the actions adopted (remedial or operational);

(4) Modify the existing plan and formulate new plan according to the actions mentioned in (1), (2) and (3) if it is necessary.

The local emergency response organization must establish the nuclear accident recording and reporting system.

5 Public Education

The local emergency response organization shall organize the popularization education of the basic knowledge of nuclear safety and radiation protection to the general public in the surrounding area of the nuclear power plant, and offer education and guidance to the general public on the knowledge about emergent protective measures such as alarm, concealment, evacuation and taking anti-radiation drugs under emergent situations. It is advised to make the general public informed of the information of the emergent circumstances through news and reportage or distributing counseling announcement to the general public in the affected areas.

6 Training and Drills

All the working personnel that execute tasks during the emergency period shall receive comprehensive initial training and regular re-training in later period. The personnel of certain working groups that participate in certain task (for example radiation tour-gauging group) shall receive the training together rather than receiving the training individually. The working groups that are required to work together during the emergency period shall also often receive trainings together. The specific tasks cover: radiation monitoring, driving vehicles, using communications equipment, filling out the data log and marking the map, health physics evaluation, and protective measures organization and implementation.

The local emergency response organization shall organize the drills regularly. The scope of the drills covers each exercisable aspect of the overall plan. In certain circumstances, all the relevant emergency organizations are required to participate in the training. The

radioactive substances occurs. During this stage, the direct danger generally comes from external exposure of radioactive smoke plume and the inhalation of radioactive substances.

(2) Middle stage, i.e., several days to several weeks after the early stage. The danger in this stage generally comes from the external exposure of radioactive sediment on the ground, the internal exposure of inhalation of re-suspending radioactive particles and the internal exposure of ingestion of contaminated foods.

(3) Late stage, i.e., several weeks to several months after the first two weeks. The danger in this stage might come from ingestion of contaminated foods and environmental pollution.

The various protective measures applicable to different stages are shown in Table 1. It shall be pointed out that, the applicability of these measures partially depends on some regional factors, for example: the population distribution and terrain of the region where the nuclear power plant is located.

Table 1 Applicability of Protective Measures

Protective measures	Stage		
	Early stage	Middle stage	Late stage
Concealment	XX	X	-
Preventive drugs	XX	X	-
Traffic control	XX	XX	X
Evacuation	XX	XX	-
Individual protection method	X	X	-
Personnel decontamination	X	X	X
Medical management	X	XX	X
Transfer of foods and water supply	X	XX	XX
Use preserved animal feed	XX	XX	XX
Regional decontamination	-	X	XX
XX represents “applicable and probably indispensable”; X represents “applicable”; - represents “inapplicable or of limited use”.			

Moving the livestock (as one link of the food chain) out of the pasture and providing protective measures for stored animal feed is, by no means, the direct helpful protective measures for human. However, if conditions permit, the earlier the stored animal-feed is used to feed the livestock, the more the dose will be reduced when the livestock product come into the food chain at later stage.

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