

MEASURES TO DEAL WITH DISASTERS CAUSED BY NUCLEAR (MATERIAL) TERROR

Section 1 : Outline of Accidents at Nuclear Power Facilities, etc.

1 - 1 Accidents which have occurred at nuclear power facilities, etc.

(1) Of all the accidents that have occurred in Japan, many were small accidents that did not involve the release of radioactive substances or radioactive rays. However, there has been one accident (Fire and Explosion Accident at an Asphalt Solidification Facility in 1997) classified as Level 3 (an off-site release of a very small amount of radioactive substance) on the International Nuclear Event Scale (INES), and another accident (Uranium Processing Plant Criticality Accident at Tokai-mura in 1999) classified as INES Level 4 (an off-site release of a small amount of radioactive substance).

Overseas accidents include the Three Mile Island Nuclear Power Plant Accident (in 1979) which was INES Level 5 (an off-site release of a limited amount of radioactive substance) and the Chernobyl Nuclear Power Plant Accident (in 1986) which was INES Level 7 (an off-site release of a critical amount of radioactive substance).

In light of such accidents, the “Measures for Dealing with Disasters at Nuclear Power Facilities etc.” (published by the Nuclear Safety Commission and hereinafter referred to as the “Disaster Prevention Guidelines”), which were revised in May 2000 in consideration of the lessons learned from dealing with the Uranium Processing Plant Criticality Accident at Tokai-mura and in order to maintain consistency with the Nuclear Disaster Special Measures Law (hereinafter referred to as the “Nuclear Disaster Law”), set forth, as shown in Table 1, the Standards for the Reporting of Abnormal Cases and the Standards for the Assessment of Nuclear Power Emergency Cases.

In view of the above situations, the relevant fire fighting and rescue authorities must maintain a flexible activity system so that they may perform effective fire fighting and rescue activities to deal with both small scale accidents and those which may happen on the levels described in the Disaster Prevention Guidelines (Standards for the Assessment of Nuclear Power Emergency Cases).

(2) More than 50% of the fires that occurred at nuclear power plants broke out in controlled areas. Even if there are some differences between the respective types of facilities, it seems true that at all nuclear power facilities fires more often break out in

controlled areas than in other areas.

When the Uranium Processing Plant Criticality Accident at Tokai-mura occurred, some of the rescue workers were exposed to radiation as they were not well informed of the situation when they engaged in rescue work in an environment subject to released radiation (neutron rays). In addition, it has also been reported that an accident happened in a controlled area of Tomari Power Plant (Hokkaido Electric Power Co., Inc.) that required rescue work to be performed.

Due to the aforementioned reasons, the relevant fire fighting and rescue authorities should give full consideration to the fact that in the event of accidents at nuclear power facilities, etc, a critical situation may arise and their forces may be required to perform fire fighting, emergency and rescue work in an environment subject to the leakage of radioactive substances or released radiation. Therefore, the authorities must create a detailed activity plan in advance so that they may deal with accidents quickly and appropriately while taking measures to securely control the rescue workers' exposure to radiation and to protect against the spread of secondary contamination.

1 - 2 Disaster Prevention System in the event of Accidents at Nuclear Power Facilities, etc.

1 - 2 - 1 Nuclear Power Facilities

(1) Disaster Prevention System based on the Nuclear Reactor Regulation Law

Based on the "Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors" (hereinafter referred to as the "Nuclear Reactor Regulation Law"), safety regulations are enforced for nuclear power facilities, such as nuclear power stations, in the respective stages of their design, construction and operation; in order to take into account measures to prevent the occurrence/expansion of accidents and disasters.

In particular, with regard to measures that should be taken in the event of dangerous cases such as accidents, the regulations on nuclear power facilities, such as the "Regulations on the Installation and Operation of Commercial Power Reactors", set forth that nuclear power corporations shall take the following measures. (The following points of concern apply to commercial power reactors, however; similar points have been stipulated as requirements for other types of nuclear power facilities as well.)

- If a fire occurs in a nuclear power reactor facility or if a fire may spread to such a facility, immediately report it to the fire department, while making efforts to fight the fire or prevent it from spreading.

- If there is sufficient time and room to remove the nuclear fuel material to another place, move it to a safe place, as necessary, secure the area with a rope and signs, and post a guard to prevent people from entering the area.
- In order to avoid generating radiation hazards, evacuate people in the nuclear reactor facility and surrounding areas, as necessary.
- In the event of contamination from nuclear fuel material, take immediate actions to prevent the spread of contamination and remove the pollutants.
- If anyone has suffered or may have suffered radiation exposure, rescue them immediately and take measures to evacuate them from the area, etc.
- Take other measures necessary to prevent radiation hazards.

(2) Disaster Prevention System based on the Nuclear Disaster Law

① Enactment of the Nuclear Disaster Law & Fundamental Reinforcement of Nuclear Power Disaster Prevention Measures

In preparation for a worst-case scenario, such as the release of a large amount of radioactive substance, the national government and local public authorities have taken measures, such as establishing disaster prevention plans, etc. based on the Disaster Measures Basic Law. However, in dealing with the Uranium Processing Plant Criticality Accident in September, 1999, it became obvious that many challenges still exist, including the reinforcement of collaboration between the national government and local public authorities in the initial reaction phase, the reinforcement of the national government system for dealing with emergency cases according to the special characteristics of nuclear power disasters, the clarification of the responsibilities of nuclear power corporations in taking measures to prevent disasters, etc. Consequently, the Nuclear Disaster Law was enacted in December of the same year in order to promote the fundamental reinforcement of anti-disaster measures in respect to nuclear power facilities and the transportation of radioactive substances.

Among the anti-disaster measures that were reinforced, the following are the main points of concern:

(a) Securing a prompt initial reaction

Nuclear power corporations are obliged to “report emergency cases” (See ② below) (Article 10 of the Nuclear Disaster Law), and the competent minister receiving the report and confirming the occurrence of a nuclear power emergency case (See Note) must immediately report it to the Prime Minister.

The Prime Minister must issue a “declaration of a nuclear power emergency case” (See

③ below) (Article 15 of the Nuclear Disaster Law), and set up a “headquarters to deal with the nuclear power disaster” in order to promptly conduct the required initial activities.

[Note] Nuclear power emergency case: refers to cases where radioactive substances or radioactive rays are released in an abnormal quantity from a nuclear power facility of a nuclear power corporation as a result of the operation of the nuclear power reactor, etc. of the corporation (or are released from a container used for the transportation of radioactive substances when transporting such substances outside the nuclear power facility) (No. 2 of Article 2 of the Nuclear Disaster Law).

(b) Securing organizational collaboration between the national government and local public authorities

In order to reinforce collaboration between the national government and local public authorities, the national government officials in charge of the prevention of nuclear power disasters must be stationed locally, in the areas where nuclear power facilities are located. In addition to emergency cases, officials should regularly conduct activities such as providing instruction for nuclear power corporations, and collaboration with the local public authorities. Furthermore, in the event of nuclear power emergency cases, national government officials, prefectural government officials and local municipal government officials shall gather in a pre-designated center for the provision of initial measures against the emergency case (Off-site Center). They must organize a joint committee to deal with the nuclear power disaster and set up a harmonious system for collaboration.

(c) Reinforcing the national government system to deal with emergency cases

To make it possible for the national government to deal with emergency cases appropriately, the national government’s chief of the headquarters for dealing with nuclear power disasters (the Prime Minister) is empowered to direct, as necessary, the relevant administrative authorities, local public authorities and nuclear power corporations, and is authorized to request the dispatch of the Self-Defense Forces to conduct initial measures against emergency cases. Such actions serve to reinforce the national government’s system for dealing with emergency cases.

(d) Clarifying the responsibilities of nuclear power corporations

The responsibilities and roles of nuclear power corporations are clarified by making it compulsory for those corporations to install radioactive ray measurement systems and other required equipment and materials, prepare a disaster prevention plan, establish an organization for nuclear power disaster prevention, and appoint a responsible manager in charge of nuclear power disaster prevention (whose job it is to manage the

organization for nuclear power disaster prevention in the nuclear power facility).

② Reporting of abnormal emergency cases (reporting of specified events)

In the first paragraph of Clause 1 of Article 10 of the Nuclear Disaster Law, it is stipulated that nuclear power corporations (or the responsible personnel in charge of nuclear power disaster prevention) must report the “occurrence of any event where a certain amount of radiation was detected in or near the nuclear power facility which exceeds the standard set forth by the law, or the occurrence of any other events referred to in any other relevant law” (Note). The outline of the format and required items is shown in Table 1.

[Note] Any event means an “abnormal emergency case” as referred to in (a) of ①. For your reference, in the Disaster Prevention Basic Plan, such events are referred to as “specified events (events which should be reported according to the provision in the first paragraph of Clause 1 of Article 10 of the Nuclear Disaster Law)”.

According to the Manual for preparing regional disaster prevention plans (the edition that deals with nuclear power disasters) (revised in June, 2000 by the Science and Technology Agency/Resources and Energy Agency/Fire and Disaster Management Agency), the report must be submitted to the Prime Minister’s Office (Cabinet Secretariat), the competent ministries and agencies in charge of safety control, the competent prefectural government, the local municipal offices, the relevant neighboring prefectural governments, the police headquarters in the prefecture, the local fire department, the local maritime safety department, the competent government officials in charge of nuclear power disaster prevention, etc.

③ Making a declaration of a nuclear power emergency case

In Article 15 of the Nuclear Disaster Law, it is stipulated that the competent minister receiving a report of a specified event and confirming the occurrence of a nuclear power emergency case (See Table 1 for an outline of the standards for the assessment of nuclear power emergency cases) must immediately report it to the Prime Minister. The Prime Minister, upon receiving the information, must immediately make an official announcement on the occurrence of a nuclear power emergency case and on the following items (hereinafter referred to as a “declaration of a nuclear power emergency case”):

- a. Area where the initial measures for dealing with the emergency case should be performed
- b. Outline of the nuclear power emergency case
- c. Points of concern that should be made known to residents, visitors, and public/private bodies in the Area.

In the event of a nuclear power emergency case (if a declaration of a nuclear power emergency case is made), the national government, local public authorities, nuclear power corporations, etc. should perform the initial measures for dealing with the emergency case in organizational collaboration with each other. Figure 1 shows the

outline of the disaster prevention system to deal with such situations.

1 - 2 - 2 Facilities that handle radioactive isotopes, etc.

Facilities that handle radioactive isotopes (hereinafter referred to as “RI”) are provided with a variety of safety measures based on the “law concerning the prevention of radiation hazards caused by radioactive isotopes, etc.” (hereinafter referred to as the “Radiation Hazard Prevention Law”).

In particular, with regard to the measures to be taken for dealing with dangerous situations such as accidents, it is stipulated in the “law enforcement regulations concerning the prevention of radiation hazards caused by radioactive isotopes, etc.” that business entities handling RI, etc. must take the following measures:

- In the event of a fire at a radioactive facility or a fire involving radioactive material during transportation, or if a fire may spread to such a facility or material, immediately report the fire to the fire department or other point of contact designated by the head of the municipality, according to the provision of Article 24 of the Fire Defense Law, while making efforts to fight the fire or prevent the spread of the fire.
- If there is sufficient time and room to remove RI, etc. to another place, move them to a safe place, as necessary, secure the area with a rope and signs, and post a guard to prevent people from entering the area.
- In order to avoid generating radiation hazards, evacuate people in the radioactive facility, the surrounding areas and those engaged in the transportation of the material, as necessary.
- In the event of contamination from RI, take immediate actions to prevent the spread of contamination and remove pollutants.
- If anyone has suffered or may have suffered radiation exposure, rescue them immediately and take measures to evacuate them from the area, etc.
- Take other measures necessary to prevent radiation hazards.

1 - 2 - 3 Transportation of radioactive materials

With regard to the measures to be taken in case of dangerous situations related to nuclear fuel materials and RI, etc., the relevant regulations are specified in: “Regulations concerning the measures to be taken in case of dangerous situations related to the transportation of nuclear fuel materials outside the facility” and the “Regulations concerning the measures to be taken in case of dangerous situations related to the transportation of radioactive isotopes, etc. outside the facility”.

The main points of concern in those regulations are as follows: (The following descriptions apply to the transportation of nuclear fuel materials outside the facility, however; similar requirements are also made for the transportation of radioactive isotopes, etc. outside the facility.)

- If a fire occurs in a railway car, a tracked car, a trackless car, a cable car, a motor vehicle, a light vehicle, a ship or an aircraft which is used for the transportation of nuclear fuel materials, etc., or a fire may spread to such vehicles, immediately report the fire to the fire department or maritime safety officials while making efforts to fight the fire or prevent the spread of the fire.
- If there is sufficient time and room to remove the nuclear fuel materials, etc. to another place, move them to a safe place, as necessary, secure the area with a rope and signs, and post a guard to prevent people from entering the area.
- In order to avoid generating radiation hazards, evacuate people in the surrounding areas, as necessary.
- In the event of contamination from nuclear fuel materials, etc., take immediate actions to prevent the spread of contamination and remove pollutants.
- If anyone has suffered or may have suffered radiation exposure, rescue them immediately and take measures to evacuate them from the area, etc.
- Take other measures necessary to prevent disasters which might be caused by the nuclear fuel materials.

In addition, in the event of nuclear power emergency cases related to the transportation of materials outside the facility, the chief of the headquarters for dealing with nuclear power disasters should designate the facility to be used to provide initial measures against the emergency case, giving due consideration to the location of the emergency.

1 - 3 Duties of the fire department in the event of accidents at nuclear power facilities, etc.

(1) Range of fire fighting activities stipulated in the Fire Defense Law, etc.

With regard to the range of fire fighting activities at nuclear power facilities, etc., it is

provided in Article 1 of the Fire Defense Law that “The duties of the fire department are to protect human life, wellbeing and assets against fire, as well as to prevent disasters such as fire caused by floods, earthquakes, etc. and to mitigate the damages resulting from such disasters, using the equipment and personnel of the fire department”. The concept of such “disasters” is defined in No. 1. Article 2 of the Disaster Measures Basic Law (Law No. 223: 1961) as “Disasters caused by windstorms, heavy rain, heavy snow, floods, high tides, earthquakes, tsunamis, other abnormal natural phenomena, large-scale fires or explosions, or any other similar causes as stipulated in the government ordinance (such as a release of a large amount of radioactive substance, the sinking of a ship with a large number of casualties, or other types of large-scale accidents)”. In addition to natural disasters, disasters caused by human error are included in this definition. Furthermore, the fire department has long dealt with such disasters as the only front-line actual operating team. Meanwhile, citizens’ expectations for the role of the fire department have been changing as the social economy advances. In consideration of such facts, the concept should be interpreted flexibly and the fire department must perform activities in response to disasters, ranging from minor accidents to wide-scale disasters.

In general, the fire department performs activities mainly in the areas of fire fighting, rescue work and emergency services. However, in addition to such activities, the fire department performs a variety of duties depending on the situation, including the setting up of a disaster warning area after fire fighting and rescue activities, the setting up of a fire warning area to protect residents against disasters, and evacuation guidance following disasters, etc.

(2) Fire fighting and rescue activities during nuclear power disasters

With regard to disaster prevention measures to be performed by the fire department in the event of nuclear power disasters (damage to human life, wellbeing and assets caused by nuclear power emergency cases, as stipulated in the Nuclear Disaster Law), the relevant regulations are, in general, set forth in the national government’s Disaster Prevention Basic Plan, which shall form the basis for the local public authorities’ Regional Disaster Prevention Plan, as follows:

- ① The fire department shall promptly perform fire fighting activities by backing up or cooperating with the nuclear power corporation (while securing the safety of fire fighters who make decisions on and conduct fire fighting activities), based on information from administrators for the prevention of nuclear power disasters, or from nuclear power reactor engineering specialists or radiation protection specialists.
- ② Based on the mutual assistance agreement, the fire department must make efforts to promptly and smoothly perform assistance.

- ③ In addition to rescue and emergency services, the local public authorities must make efforts to understand the damage situation as soon as possible; and as necessary, the authorities must request assistance from the local headquarters for dealing with disasters, other local public authorities, or other nuclear power corporations, etc.
- ④ According to instructions from the Prime Minister or their own judgment, the local public authorities must check the conditions for the evacuation of residents, and perform initial measures against emergency cases, including recommendations or instructions for the evacuation of residents to other safe areas or buildings.

(3) Fire fighting activities by voluntary firefighters

In respect to the fire fighting activities to be performed by voluntary firefighters, voluntary firefighters have the same duties as professional firefighters, as set forth in Article 6 of the Law of the Fire Service Organization. However, as the form of their fire fighting activities usually involves their general daily business, and “call up” for activities only in emergency cases, voluntary firefighters do not have as much equipment or materials as professional firefighters. Furthermore, it is unusual for them to perform activities in such special cases as nuclear disasters. For the above reasons, if voluntary firefighters join the activities at a nuclear power facility, etc., they should mainly be involved in support activities, and as a rule they shouldn’t be involved in any activities in a radiation hazard area. (Note)

In addition, in the event of nuclear power disasters, voluntary firefighters should be engaged in activities based on the Regional Disaster Prevention Plan. In this case, as they are familiar with the local situation, they should be in charge of activities related to local residents, such as evacuation, guidance, public relations, etc. In this way it is expected that their activities will be beneficial to local residents, making people feel safe, and confident to rely on the fire department. Thus, it is desirable that voluntary firefighters be deployed positively.

[Note] A radiation hazard area means any area where there is a possibility of contamination arising from radiation exposure or radioactive substances. Such an area shall be designated in order to avoid the unnecessary radiation exposure of rescue workers. Furthermore, unqualified rescue workers shall be separated from other workers who specialize in emergency rescue work, in order to avoid the unnecessary spread of radioactive contaminants.

Table 1 Outline of the Standards for Reporting and the Standards for the Assessment of Nuclear Power Emergency Cases, as set forth in the Nuclear Disaster Law

<p>Standards for reporting</p>	<ul style="list-style-type: none"> • In the area near the perimeter of the nuclear power facility, check if the spatial radiation dose rate is $5 \mu\text{Sv/h}$ or over in one location for 10 minutes or longer, or the rate is $5 \mu\text{Sv/h}$ or over in two or more locations at the same time. (If the gamma ray level is $1 \mu\text{Sv/h}$ or over, also measure the neutron rays, and check if the total dosage is $5 \mu\text{Sv/h}$ or over. However, any dosages due to lightning should be excluded.) • Check if there are any releases of radioactive substances, etc. which are equivalent to a radioactive concentration level of $5 \mu\text{Sv/h}$ or over in the area near the perimeter of the nuclear power facility, after diffusion from a normal releasing point such as an exhaust stack. (If the level is managed based on the cumulative release amount, check if there are any releases equivalent to $50 \mu\text{Sv/h}$ or over per event.) • In the event of fires, explosions, etc., check if there are any releases of radioactive substances, etc. which are equivalent to a spatial radiation dose rate of $50 \mu\text{Sv/h}$ or over, or equivalent to a radioactive concentration level of $5 \mu\text{Sv/h}$ or over in any area outside the controlled area. • In the event of accidents during the transportation of radioactive substances outside a nuclear power facility, check if there is a spatial radiation dose rate of $100 \mu\text{Sv/h}$ or any leak of radioactive substances at a location 1 m away from the transportation container. • In the event of criticality accidents or the fear of such accidents • In the event that a nuclear reactor can not be shut down by means of inserting the control rods in a light-water reactor, or the individual event based on the characteristics of the nuclear power facilities.
<p>Standards for the Assessment of Nuclear Power Emergency Cases</p>	<ul style="list-style-type: none"> • In the area near the perimeter of a nuclear power facility, check if the spatial radiation dose rate is $500 \mu\text{Sv/h}$ or over in one location for 10 minutes or longer, or a rate is $500 \mu\text{Sv/h}$ or over in two or more locations at the same time. (If the gamma ray level is $5 \mu\text{Sv/h}$ or over, also measure the neutron rays, and check if the total dosage is $500 \mu\text{Sv/h}$ or over. However, any dosages due to lightning should be excluded.) • Check if there are any releases of radioactive substances, etc. which are equivalent to a radioactive concentration level of $500 \mu\text{Sv/h}$ or over in the area near the perimeter of the nuclear power facility, after diffusion from a normal releasing point such as an exhaust stack. (If the level is managed based on the cumulative release amount, check if there are any releases equivalent to $5 \mu\text{Sv/h}$ or over per event.) • In the event of fires, explosions, etc., check if there are any releases of radioactive substances, etc. which are equivalent to a spatial radiation dose rate of $5 \mu\text{Sv/h}$ or over, or equivalent to a radioactive concentration level of $500 \mu\text{Sv/h}$ or over in the area outside the controlled area. • In the event of accidents during the transportation of radioactive substances outside a nuclear power facility, check if there is a spatial radiation dose rate of $10 \mu\text{Sv/h}$ or any leak of radioactive substances at a location 1 m away from the transportation container. • In the event of criticality accidents • In the event that a nuclear reactor can not be shut down by means of injecting a boric acid solution, etc. in a light-water reactor, or the individual event based on the characteristics of the nuclear power facilities

Figure 1 Outline of the Disaster Prevention System to deal with Nuclear Power Emergency Cases

Conceptual Diagram of the Initial Measures against Emergency Cases under the Nuclear Disaster Special Measures Law

