

Chapter 7

The Link Between Nuclear Disaster Countermeasures and General Disaster Countermeasures

Field of expertise: Disaster Radiology

Yoshio Hosoi

Translated by Catherine Sachi Kkuchi

Summary

In Japan, laws and regulations concerning nuclear disaster prevention were enacted in response to the 1979 Three Mile Island nuclear power plant accident and the 1999 Tokaimura, Ibaraki Prefecture, JCO (formerly Japan Nuclear Fuel Conversion Co.) criticality accident. However, these regulations were designed for accidents of the same scale as the Tokaimura JCO criticality accident. The Fukushima nuclear power plant accident in 2011 required the evacuation of a large number of residents, indoor evacuation, and support for the livelihoods of the victims.

Keywords: nuclear disaster

1: Opportunity for Nuclear Disaster Countermeasures in Japan

On September 1, 1974, the nuclear-powered ship, Mutsu, observed a radiation (fast neutron) leak during a test cruise in the North Pacific Ocean due to a design error in the shielding ring (Westinghouse Electric Company LLC). Nuclear emergency preparedness in Japan began with the establishment of the Nuclear Safety Commission in 1978, triggered by this radiation leak (Figure 7-1). The Nuclear Safety Commission was abolished on September 18, 2012 after the accident at the Fukushima Daiichi Nuclear Power Plant, and the Nuclear Regulation Authority was established on September 19 of the same year (Figure 7-1).

On March 28, 1979, the Three Mile Island nuclear power plant accident occurred in the U.S., resulting in a partial meltdown of the reactor core and the release of radioactive materials into the surrounding area. Two days after the accident, the governor of the state recommended the evacuation of pregnant women and pre-school infants within five miles (about 8 kilometers) of the plant, and at the same time ordered the closure of all schools in the area. Upon hearing this, the residents voluntarily evacuated, and it is estimated that about 10% of the 630,000 people living within 20 miles were evacuated. This accident prompted the Nuclear Safety Commission to compile the Disaster Prevention Measures around Nuclear Power Plants in June 1980.

At 1:24 a.m. on April 26, 1986, an accident occurred at the Chernobyl Nuclear Power Plant's reactor No. 4 in the former Soviet Union's Ukraine, releasing a large amount of radioactive material into the environment. By May 6 of the same year, the government of the Soviet Union conducted a mandatory evacuation of residents within a 30 kilometer radius of the plant,

evacuating approximately 135,000 people, and the evacuation was later expanded. In Japan, no major changes were made to the nuclear disaster prevention system after this accident. (Figure 7-1).

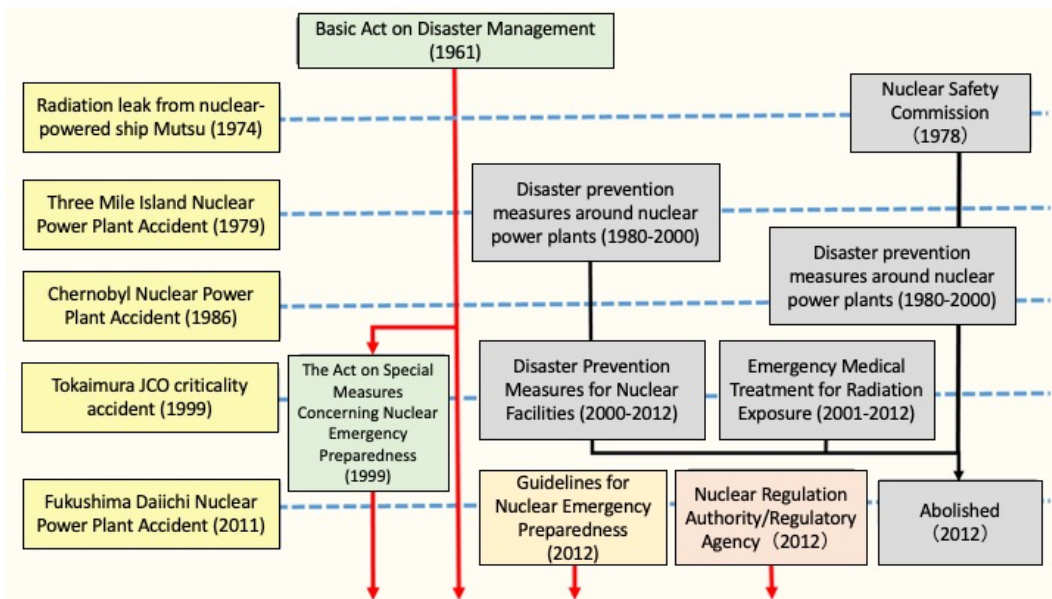


Figure 7-1. Major nuclear disasters and changes in the laws and regulations related to nuclear disaster countermeasures in Japan

2: The Tokaimura JCO Criticality Accident and Subsequent Nuclear Disaster Countermeasures

The Tokaimura JCO criticality accident that occurred at around 10:35 a.m. on September 30, 1999, released radioactive materials into the surrounding area, and at 3:00 p.m. on September 30, the mayor of Tokaimura issued an evacuation order for residents within a 350 meter radius of the JCO, forcing 150 people to evacuate. The accident led to the enactment of the Act on Special Measures Concerning Nuclear Emergency Preparedness in December 1999, and the Disaster Prevention Measures for the Surrounding Areas of Nuclear Power Plants was revised in 2000 to be based on the Nuclear Emergency Preparedness Act, and its name was changed to Disaster Prevention Measures for Nuclear Facilities (Figure 7-1). In June 2001, the Nuclear Safety Commission compiled a report, The State of Emergency Exposure Medical Care.

In this way, the nuclear emergency preparedness system in Japan prior to the Fukushima Daiichi Nuclear Power Plant accident was designed to cope with an accident of the same level as the Tokaimura JCO criticality accident. Specifically, the Act on Special Measures Concerning Nuclear Emergency Preparedness enacted after the Tokaimura JCO criticality accident mandated the establishment of off-site centers. Most of these off-site centers that were actually established were located at a distance of 5-10 kilometers from nuclear facilities. Similarly, in the Emergency Medical Treatment for Radiation Exposure, which was enacted after the Tokaimura JCO criticality accident, hospitals within 20 kilometers of nuclear facilities were often designated as initial exposure medical institutions to provide initial medical treatment and emergency medical treatment regardless of contamination (Nuclear Safety Commission, 2008).

3: The Fukushima Daiichi Nuclear Power Plant Accident and Subsequent Nuclear Emergency Preparedness

After the Tohoku Pacific coast earthquake that occurred at 2:46 p.m. on March 11, 2011, Units 1, 2 and 3 of the Fukushima Daiichi Nuclear Power Station lost all AC power. At 3:42 p.m., TEPCO reported the occurrence of a specific event based on Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness, and at 4:42 p.m., they made another report based on Article 15 of the same act. At 7:03 p.m., the government issued a nuclear emergency declaration based on the Act on Special Measures Concerning Nuclear Emergency Preparedness. Evacuation orders were issued to residents within a 20 kilometer radius in stages by 6:25 p.m. on the following day, March 12. The number of evacuees was reported to be 164,865 at its peak in May, 2012.

After the accident at the Fukushima Daiichi Nuclear Power Plant, the former Nuclear Emergency Response Center (Off-site Center) established in Okuma Town, 5 kilometers away from the plant, had to move to Fukushima City, 60 kilometers away from the plant. They moved on the night of March 14, three days after the March 11 earthquake, due to high air dose rates in the surrounding area. Similarly, most of the initial exposure medical institutions designated at the time of the nuclear power plant accident were located within 20 kilometers of the Fukushima Daiichi Nuclear Power Plant, and due to power outages and water supply breaks caused by the earthquake and tsunami, they could not fulfill their role as initial exposure medical institutions.

After the accident at the Fukushima Daiichi Nuclear Power Plant, the Disaster Prevention Measures for Nuclear Facilities and Emergency Medical Treatment for Radiation Exposure were abolished, and the Guidelines for Nuclear Emergency Preparedness was established instead (Figure 7-1). These guidelines are based on the assumption of an accident of the same scale as the Fukushima Daiichi Nuclear Power Plant accident, not the Chernobyl Nuclear Power Plant accident (Nuclear Regulatory Commission, 2019).

4: The Link between Nuclear Emergency Preparedness and General Emergency Preparedness

After the accident at the Fukushima Daiichi Nuclear Power Station, one of the features of the Guidelines for Nuclear Emergency Preparedness was the emphasis on its link to general disaster countermeasures (Nuclear Regulatory Commission, 2019). Similarities with general disaster prevention measures included the number of evacuees and indoor evacuees after the Fukushima Daiichi Nuclear Power Plant accident being large, information needing to be disseminated, evacuation and sheltering of residents, and support for the lives of victims.

The Guidelines for Nuclear Emergency Preparedness stipulate nuclear emergency core hospitals instead of initial, secondary, and tertiary exposure medical institutions (Nuclear Regulatory Commission, 2019). In principle, nuclear emergency core hospitals are designated to be located at least 30 kilometers away from nuclear power plants (Figure 7-2).

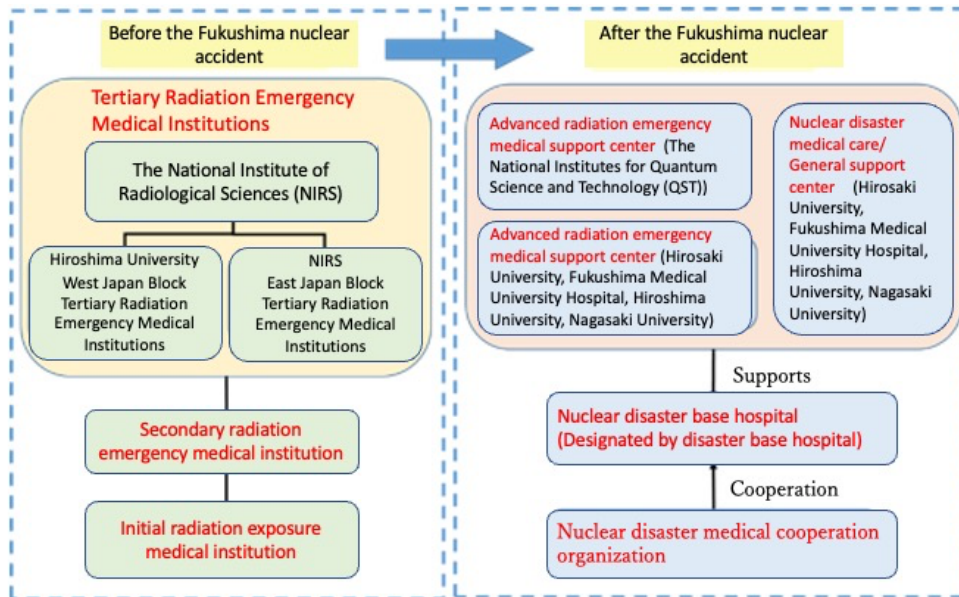


Figure 7-2. The emergency radiation medical system before and after the Fukushima nuclear power plant accident

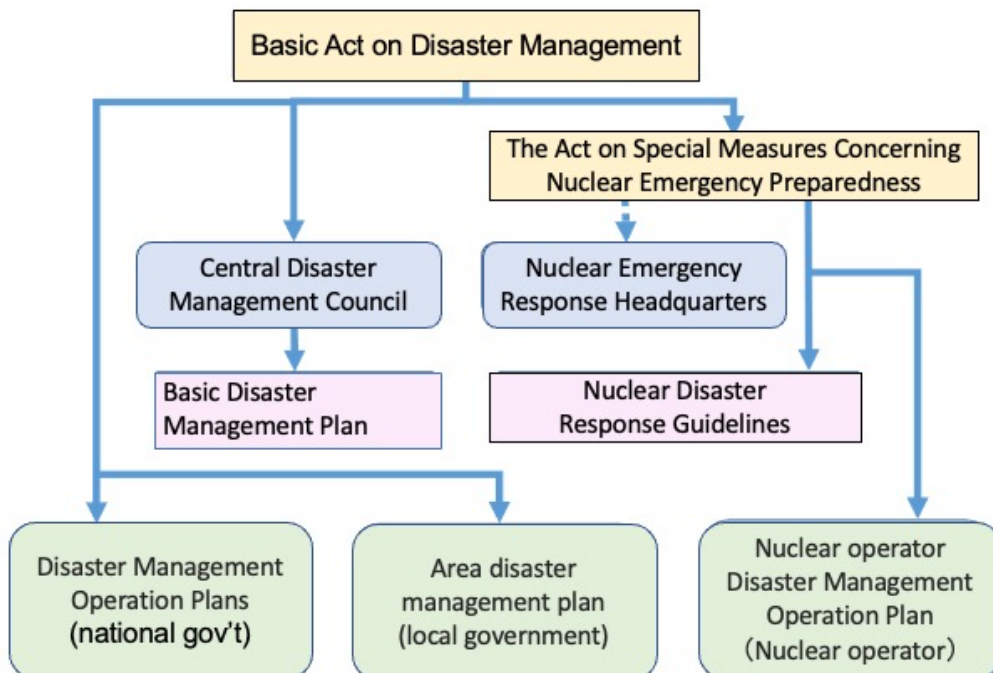


Figure 7-3. The current Nuclear Disaster Prevention System

Conclusion - from the author

The Basic Act on Disaster Management, enacted in 1961 in response to the 1959 Ise Bay (located between Mie and Aichi Prefectures) typhoon, is the central law for disasters in general (Figure 7-3). Based on the Basic Act on Disaster Management, the Central Disaster Management Council established in the Cabinet Office formulated the Basic Disaster Management Plan (Figure 7-3) (Central Disaster Management Council, 2020). In the Basic Disaster Management Plan, preparations for nuclear disasters are described in detail in Volume 12 as the Nuclear Disaster Countermeasures (Central Disaster Management Council, 2020). The Nuclear Emergency Response Headquarters, established under the Act on Special Measures Concerning Nuclear

Emergency Preparedness, a related law to the Basic Act on Disaster Management, is located in the Cabinet Office and is responsible for promoting emergency response measures (Figure 7-4). In normal times, the Nuclear Emergency Preparedness Council, which is based on the Nuclear Basic Law, is set up in the Cabinet (Figure 7-4). Thus, laws and regulations related to nuclear disaster countermeasures in Japan are based on the Basic Act on Disaster Management, with the Cabinet Office and the Cabinet taking the lead. According to the law, nuclear disasters are considered to be a part of general disasters.

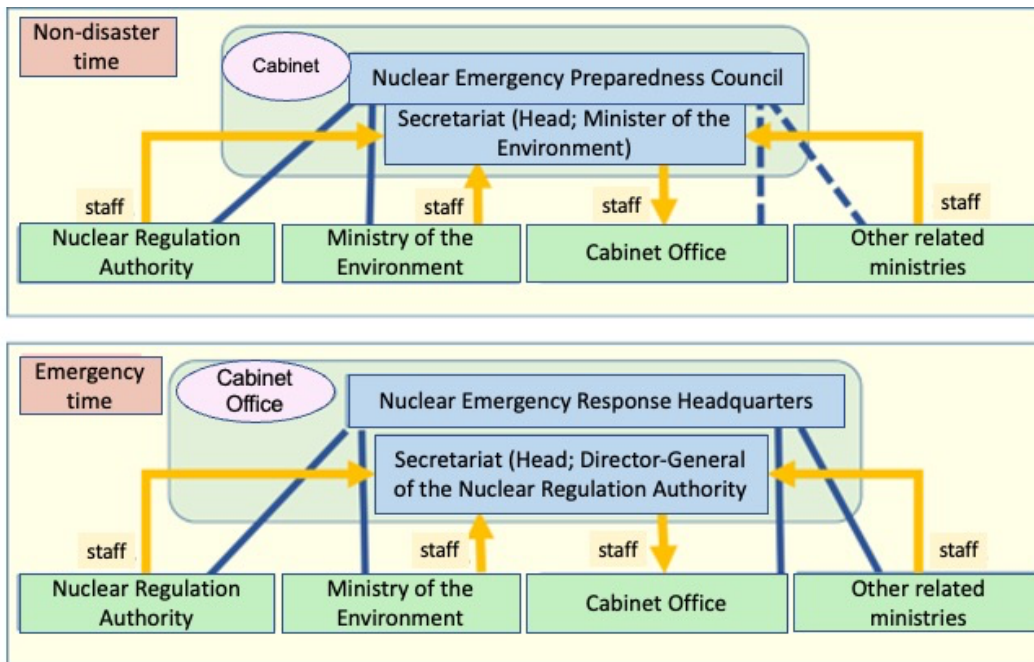


Figure 7-4. Nuclear emergency preparedness, the division of duties and positioning of related administrative organs

References

Central Disaster Management Council. (2020). Basic Plan for Disaster Prevention.

https://www.soumu.go.jp/main_content/000650514.pdf (In Japanese)

Nuclear Regulatory Commission. (2019). Guidelines for Nuclear Emergency Preparedness.

<https://www.nsr.go.jp/data/000024441.pdf> (In Japanese)

Nuclear Safety Commission. (2008). *Emergency Medical Treatment for Radiation Exposure*. (In Japanese)