

Advisory Opinion

Proposals from Academia for More Resilient Nuclear Disaster Countermeasures – It is Time to Promote Effective Use of Prediction of Radioactive Material Dispersion



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**Subcommittee on Social Contribution to Earth and
Planetary Science**

Committee on Earth and Planetary Science

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Executive Summary

1. Background and Issues

Twelve years have passed since the accident at TEPCO's Fukushima Daiichi Nuclear Power Station (hereinafter referred to as the "1F accident"). The scars of the disaster are deeply carved in people's minds, and not only is reconstruction still halfway through, but new issues such as the discharge of treated wastewater are also piling up. Learning from the 1F accident, the Japanese government, the Nuclear Regulation Authority (NRA), local governments, and the scientific community have been exploring, through various initiatives, ways to mitigate and avoid disasters caused by the spread of radioactive materials. However, it is still difficult to say that a solution has been found.

The fact that outputs from the SPEEDI (System for Prediction of Environmental Emergency Dose Information) as the rapid and emergency radiological consequence prediction network system, in which government funds were invested, could not be utilized for protective measures against radiation exposure immediately after the 1F accident posed a serious problem to us, the citizens of Japan. The Nuclear Emergency Response Manual (2000) based on the Act on Special Measures Concerning Nuclear Emergency Preparedness (Nuclear Emergency Preparedness Act) stipulates that SPEEDI output is to be used as "basic information when deciding on protective measures such as evacuation of residents," and that it is to be used in determining protective measures in consideration of the actual values measured by "emergency environmental radiation monitoring." However, this information was not utilized at the time of the 1F accident. This indicates that there was a flaw in the process of utilizing the information on the predicted diffusion of radioactive materials for actual protective measures.

In order to ensure the safety of the public, it is essential to collect all scientific information on the diffusion of radioactive materials and use it to make decisions on protective measures. However, the NRA decided in 2016 that SPEEDI would not be used to determine protective measures and that evacuation should be determined based on monitoring data. Japan's protective measures, which rely solely on observational data obtained by monitoring posts, appear to deviate from international standards, as many countries have decided to utilize, in case of accident, predictive information effectively.

The NRA decided not to use forecast information for protective measures on the grounds that "forecast information lacks reliability, and evacuation based on uncertain forecasts may cause confusion and increase the risk of exposure." In response to calls for the use of forecast information from municipalities where nuclear power plants are located, the government subsequently stated that it "does not preclude the use of forecast information on the responsibility of local governments," allowing them to use the information at their own discretion and under their

own responsibility. However, in light of Article 4, paragraph 2 and Article 6-2 of the Act on Special Measures Concerning Nuclear Emergency Preparedness, this is an abnormal situation in which the NRA has not fulfilled its responsibilities to local governments and citizens.

During the past 12 years, our understanding of the accuracy and uncertainty of radioactive material dispersion predictions has undoubtedly improved. Now that a policy shift has been indicated toward the long-term restart of nuclear power plants and the construction of new nuclear power plants, it is urgently necessary to establish guidelines for formulating scientific protective measures, including the use of radioactive material diffusion forecasts, and to review nuclear disaster countermeasures to make them more robust, in order to ensure the safety of the public as a top priority.

2. Opinion

This Opinion expresses the following four views mainly to the Nuclear Regulation Authority (NRA) and the Japanese government as essential requirements to ensure the safety of the public against the problem of dispersion of radioactive materials in the event of a nuclear power plant accident.

Opinion 1: It is highly desirable that protective measures to ensure the safety of the public against the dispersion of radioactive materials be formulated by making maximum use of scientific information and knowledge obtained not only from monitoring data but also from predictions based on numerical simulations.

Though monitoring data provide most reliable actual values, they may not be available at the time of an accident. In addition, monitoring alone cannot provide any future information on the dispersion of radioactive materials, which can be a weak point in protecting internal exposure from radioactive plumes. Prediction of radioactive material dispersion provides useful future information, including quantitative evaluation of uncertainties, even in unforeseen circumstances where monitoring data are not available. Furthermore, the integration of monitoring and forecasting information can lead to more precise estimation of the amount of radioactive material emitted. In other words, the complementary use of monitoring and forecasting will enable provision of optimal protective measures to protect a large number of lives.

Opinion 2: The NRA and Nuclear Regulation Agency should revise the current "Guidelines for Nuclear Emergency Preparedness", unify the guidelines for the effective use of dispersion forecast information, clarify where responsibility lies, and develop and implement optimal protective measures.

The current policy of the NRA is deviated from the voices of local governments calling for the utilization of predictive information on the dispersion of radioactive materials. Leaving such situation of deviation unaddressed is tantamount to leaving the public at risk in evacuation and protection, while leaving the responsibility for protective measures unclear. Thus, it is desirable that the current "Nuclear Emergency Response Guidelines" be revised to clarify where the

responsibility for evacuation and protection lies and to unify the guidelines for formulating protective measures, so that the government, the NRA, and local governments can work together to formulate and implement the most appropriate protective measures.

Opinion 3: The NRA should make full use of the capabilities of scientists and experts. It is necessary to establish a mechanism and system to ensure that appropriate scientific advice from scientists and experts in related fields, including forecasts of radioactive material dispersion and meteorology, is provided to the NRA and the government and that in case of emergency their advice should be used effectively.

Opinion 4: The Japanese government, the NRA, local governments, the scientific community, and citizens should cooperate together to formulate protective measures from public perspective and be prepared to ensure their operation in emergency situations. In order to ensure the safety of the public in emergency situations where the severity of radioactive materials dispersion changes from moment to moment, it is necessary to publicize and inform local governments and citizens of the risks, seek their understanding, and formulate and operate protective measures through the concerted efforts of the Japanese government, the NRA, local governments, the scientific community, and citizens. Even in normal times, it is necessary to prepare for the formulation and operation of protective measures through cooperation at various levels, not bound by conventional frameworks, by disclosing the latest data and conducting drills based on the use of advanced scientific and technological knowledge.