Change in Attitude of the Japanese Public and Countermeasures by the Government and the Nuclear Industry after the Criticality Accident

Institute of Social Research
Institute of Nuclear Safety System, Inc,

Ohashi, T., Nishino, S., Kotani, F., Ato, K.,
Takahashi, Y., and Itoigawa, N.

1. Introduction

When we consider about the organizational and management factors for safety operation of nuclear power plants, we can't avoid mentioning the criticality accident in Japan that occurred in 1999. The accident has clearly posed serious problems for the government and the nuclear industry, and revealed a need for safety measures with regard to nuclear power generation.

The purpose of this report is to summarize the changes that have occurred in the attitudes of the Japanese public and the sort of measures the government and the nuclear industry have taken to deal with problems in nuclear organizations and to ensure improve safety, following the occurrence of the criticality accident.

2. Outline of the criticality accident

On September 30, 1999 (Thursday) around 10:35 a.m., the Japan's first criticality accident occurred at a uranium processing plant (auxiliary conversion facility) located at Tokai village, Ibaraki Prefecture. The criticality continued on and off for approximately 20 hours after the first instantaneous criticality.

At 3:00 p.m., the mayor of Tokai village issued a recommendation of evacuation to the residents living within 350 meters radius from the accident site. At 10:30 p.m., the Governor of Ibaraki Prefecture issued a recommendation of sheltering indoors to the residents living within ten kilometers radius from the plant. The end of criticality was confirmed at

8:50 a.m. on October 1. Upon confirmation of safety, the recommendation of sheltering to the public within 10 km radius was lifted at 4:30 pm. In addition, the radiation shield was installed around the facility. The recommendation of evacuation within 350 meters radius was also lifted around 6:30 p.m. on October 2 upon the confirmation of safety.

The casualties of the criticality accident were two workers killed, one seriously ill, and more than 200 exposed to radiation. The number of evacuees was 150 and the number of people ordered to stay indoors was 300,000.

3. Change in public Attitudes

3.1. Results of large-scale survey by INSS

The surveys were directed at the general public—adult men and women from 18 to 79 years of age. The total number of surveys was five—two periodic surveys in 1993 and in 1998 and the spot survey conducted two months after the criticality accident. The sample size was 1500 for each of the periodic surveys and 750 for each of the post-accident surveys. The response rate was above 70 percent for all surveys except the panel survey. We then analyzed the acquired data for each successive survey.

Between 1998, before the accident, and 1999, after the accident, the number of people who felt a high level of anxiety about the risk of accidents at nuclear power facilities increased from 27 to 36 percent—a statistically significant increase. As for opinions on the use of nuclear power, the number of people with a positive view ("good to use") fell slightly. However, this is not statistically significant. We analyzed the trends in attitudes over time, using the data from surveys in 1993, 1998 and 1999. The attitude categories were compared on the basis of overall indexes that included the anxiety about nuclear facility accidents and views on the use of nuclear power. Between 1998, before the accident, and 1999, after the accident, the size of the "very unfavorable" group increased significantly, which suggests that attitudes to nuclear power have become more negative. However, when this data is compared with the results of 1993, we find that there is no significant difference. If we focus on the trend since 1993, we can conclude that the accident has not significantly affected attitudes to nuclear power.

3.2. Results of interviews with a small number of people

This interview arranged about one month after the accident at Tokai Village and surrounding areas. 24 persons participated to the interview as a paid volunteer. The main opinions of this interview are as follows.

- Awareness about emergency situations has fallen as more "accident experience" has been accumulated. The routine occurrence of minor accidents has prevented clear recognition of the differences between major and minor accidents.
- There is a strong public demand for evacuation sites and procedures for responding to nuclear emergencies. Although local governments have prepared comprehensive evacuation facilities for fire and earthquake emergencies, no such places have been designated for nuclear disasters.
- There is a strong demand for the establishment of a well organized system of collaboration between central and local governments for dealing with emergencies. The criticality accident was the first experience of a large-scale nuclear disaster for both central and local governments and the government response immediately following the accident has caused substantial feelings of unease amongst the public.

4. Countermeasures taken by government

4.1. Bill of Amendment of the Nuclear Reactor Control Law

As the lessons of the accident, it was required to thoroughly implement countermeasures for preventing criticality in nuclear fuel processing plants and other similar facilities, and not only to impose duties on nuclear operators but also maintain their sufficient preparedness by checking them regularly. For properly accomplishing these purposes, the bill contains the following measures:

- A periodical inspection system shall be imposed on the processing facilities additionally.
- All the nuclear operators are required to give safety education to employees by themselves.
- An inspection system shall be established to check the nuclear operators conformally with their operational procedures.
- The nuclear-energy inspectors shall be stationed at major facilities.
- A whistle brewing system which prevents the violation of regulation

shall be created.

4.2. Special Law of Emergency Preparedness for Nuclear Disaster

As the lessons of the accident, it is required to strengthen the collaboration between the central and local governments in initial-stage actions, intensify the emergency response structure of the government to cope with the specialty of nuclear-energy disasters and clarify the responsibilities of the nuclear operators for disaster prevention measures. For properly satisfying these requirements, this bill contains the following measures:

- Prompt initial-stage actions and strengthening the collaboration between the central and local governments.
- Strengthening government's institutions.
- Clarifying the responsibilities of nuclear operators for disaster.

5. Countermeasures by the nuclear industry

A number of domestic commercial enterprises, research institutes, etc., have jointly established NS-net (Nuclear Safety Network), an organization dedicated to promoting improved safety measures throughout the entire nuclear industry. NS-net's membership currently comprises 35 enterprises and research organizations in nuclear-related fields.

The NS-net's main activities are focused around a Peer Review program, in which members visit each other's operational facilities and conduct mutual evaluations from the viewpoint of nuclear safety. Along these lines, the NS-net also facilitates information exchange among members, as well as safety-related education and training. The aim is to promote the development of an improved "Safety Culture" throughout the entire nuclear industry.

6. Conclusion

The important organizational and management factors related to the safe operation of the nuclear power generation are the following four: (1) formalization factor that refers to well-defined rules and procedures of work, (2) knowledge factor that refers to the worker's understanding for mechanisms, operation, and events of work, (3) identification factor that refers to the worker's awareness of goals and responsibilities of work, and (4) communication factor that refers to exchange of formal and informal information.

One of the countermeasures taken by the government following the criticality accident at Tokai Village was the placement of nuclear energy inspectors at the power plants. It should potentially contribute to check fulfillment of rules and regulations of the nuclear power generation, which relates to the formalization factor. However, it appears to involve problems with regard to: (1) the workers' understanding of the role and task of the inspector which comprises to the knowledge factor, (2) the workers' awareness of own tasks in relation to the inspectors which relates to the identification factor, and (3) the exchange of information between the workers and the inspectors. Those problems are yet to be properly assessed and solved.