

Risk Management Activities at Tomari Nuclear Power Station

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Abstract: Based on the lessons learned from the accident at the Fukushima Daiichi Nuclear Power Plant in the Great East Japan Earthquake of 2011, Japanese nuclear power companies have decided to face the risks of nuclear power generation head-on and have started to improve our risk management capabilities. At Tomari Nuclear Power Plant, we have established a risk management process to identify and address the various risks and applied the process to our daily activities.

At Tomari Nuclear Power Plant, we have developed the risk management process by using ISO 31000:2018 as a reference. In addition to the nuclear safety risks and the radiation safety risks that were targeted at the time of introduction in 2020, risk management activities are implemented also addressing the environmental risks. Besides, we established “Risk Management Fundamentals,” in 2023 which describes “Principles for daily activities” to make the risk management activities more effective and to develop common understand as to the risk management activities among Tomari Nuclear Power Plant employees.

This article introduces the risk management efforts at Tomari Nuclear Power Plant.

Keywords: Risk Management, Nuclear Power Plant

1. INTRODUCTION

We established “Risk Management Plan” as a manual on risk management in 2020. This manual specifies internal processes for risk assessment and risk treatment related to safety activities, focusing on nuclear safety risks and other risks, with reference to ISO31000:2018[1], which is an international standard for risk management.

In the risk assessment process, levels of risk are classified into “high” (unacceptable), “medium” (undesirable), and “low” (acceptable by managing) based on the potential impact if they actually occur, and risk treatment decisions are made according to the level of risk.

In addition to nuclear safety risks and radiation safety risks initially covered at the time of introduction of this manual, environmental risks related to the environmental impact generated during power plant operations were added as managed risks in 2022.

Furthermore, in 2023, the “Risk Management Fundamentals” were established, which describes “Principles for daily activities” in order to promote more effective risk management activities and develop common understanding of risk management among Tomari Nuclear Power Plant personnel. We aim to further minimize risks by clearly sharing these principles.

2. PROCESS TO IDENTIFY AND DEAL WITH RISKS

In 2020, “Risk Management Plan” was established at Tomari Nuclear Power Plant as an internal manual for conducting risk assessments and risk treatment by referring to ISO31000:2018.

In the context of ISO 31000:2018, “risk” is defined as the “effect of uncertainty on objectives”. In the risk management activities at Tomari Nuclear Power Plant, we interpret “effect of uncertainty” as “undesirable events that may occur” and define “risk” as “undesirable events that could occur in the future, affecting the organization’s objectives”.

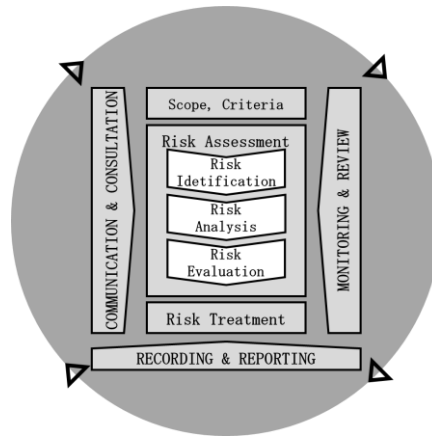


Figure 1. Risk Management Process (Conceptual diagram)
 (Quoting with partial modifications to the diagram from ISO 31000-2018)

2.1. Risk Assessment

We set up “Risk Identification”, “Risk Analysis”, and “Risk Evaluation”, which are parts of the risk assessment process, as follows.

Risk Identification: The process of considering whether there is a possibility that risks may occur in the work being carried out.

Risk Analysis: The process of considering specific scenarios that will lead to risks occurrence, determining the level of risk and checking the existing countermeasure if a potential risk is found by “Risk Identification”.

Risk Evaluation: The process of assessing the effectiveness of the existing countermeasure confirmed by “Risk Analysis”.

2.2 Level of Risk and Risk Criteria

Level of risk and criteria are divided, based on the potential impact if they actually occur through the risk assessment process, into three levels: high (unacceptable), medium (undesirable), and low (acceptable by managing). The concept of risk standards applied to risk management is shown in Table 1.

We are considering introduction of a concept of frequency, such as probabilistic risk assessment (PRA), as a part of future enhancement.

Table 1. Concept of risk criteria applied to risk management

Risk Level Item	High	Medium	Low
Risk Criteria	Unacceptable	Undesirable	Acceptable by managing
Risk Treatment Policy	Always implement risk treatment (Do not allow risks to occur)	Always implement risk treatment (Strive to prevent risks from occurring)	Implement risk treatment as much as possible (Try not to make risks occur)

2.3 Risk Treatment

A series of processes has been established to respond to risks by confirming whether the measures taken to prevent risks from occurring are sufficient before making and implementing risk treatment decisions based on the result of the risk assessment. New measures will be devised if the existing measures are deemed to be insufficient.

Decisions are made according to the three levels of risk: “high”, “medium”, and “low”, which are evaluated through the risk assessment process. For operations with “low” or “medium” risks, the relevant department makes decisions regarding risk treatments and carries out the necessary actions. On the other hand, for operations categorized as “high” risks, risk treatments are discussed at the risk management meeting attended by the plant director and other upper management before implementation. For “high” risk events, risk

treatments are always implemented, and their occurrence are unacceptable based on the idea that they will never be allowed to occur. Figure 2 illustrates the flow from risk assessment to risk treatment implementation.

Furthermore, 3H (first time, change, first time in a long time)¹ operations, where risks are likely to occur, will be treated the same as “high” risks even if they are assessed as “medium”.

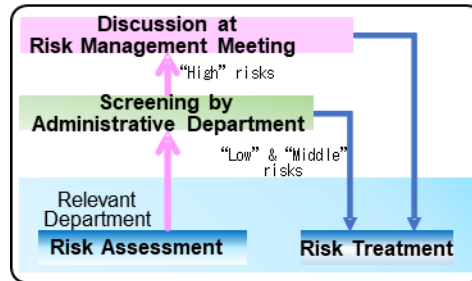


Figure 2. Flow from risk assessment to risk treatment implementation

3. RISKS SUBJECT TO RISK MANAGEMENT

There are eight types of risks related to nuclear power generation defined in WANO SOER 2015-2 “Risk Management Challenges”[2]. These include “Nuclear risk”, “Radiological risk”, “Operational risk”, “Generation risk”, “Personnel (industrial safety) risk”, “Environmental risk”, “Project risk” and “Business risk”. In JANSI-RMG-01-4th edition "Excellence Guidelines for Risk Management"[3], the policy of prioritizing treatments to nuclear and radiation risks and gradually expanding the target risks is indicated. In accordance with JANSI guideline, we initially targeted nuclear safety risks (“Nuclear risk” and “Operational risk”) and radiation safety risks (“Radiological risk”) when an internal manual “Risk Management Plan” was established, and we added environmental risks related to the environmental impact in 2022. For nuclear safety risks and radiation safety risks, the levels of risk are evaluated based on the CAQ impact levels if the assumed risks were to occur. For environmental risks, the levels of risk are evaluated based on the degree of risks of exceeding the predefined environmental parameters specified in the safety agreement².

4. RISK MANAGEMENT FUNDAMENTALS

The “Risk Management Fundamentals”, which describes “Principles for daily activities”, was developed to clearly share principles for risk management activities, aiming to make personnel conscious of it and minimize risks within our power plant. “Risk Management Fundamentals”, which was developed with reference to WANO SOER 2015-2" Risk Management Challenge ", is structured with as general and simple expressions as possible to be understood at a glance in order to make it easier to take root within the plant. We will also provide explanations through in-house training on “Risk Management Fundamentals” and display posters in the plant.

¹ “3H” is “Hajimete”, “Henkou” and “Hisashiburi”, which respectively mean “first time”, “change” and “first time in a long time” in English.

² Safety Agreement concluded with local governments and related internal manuals.

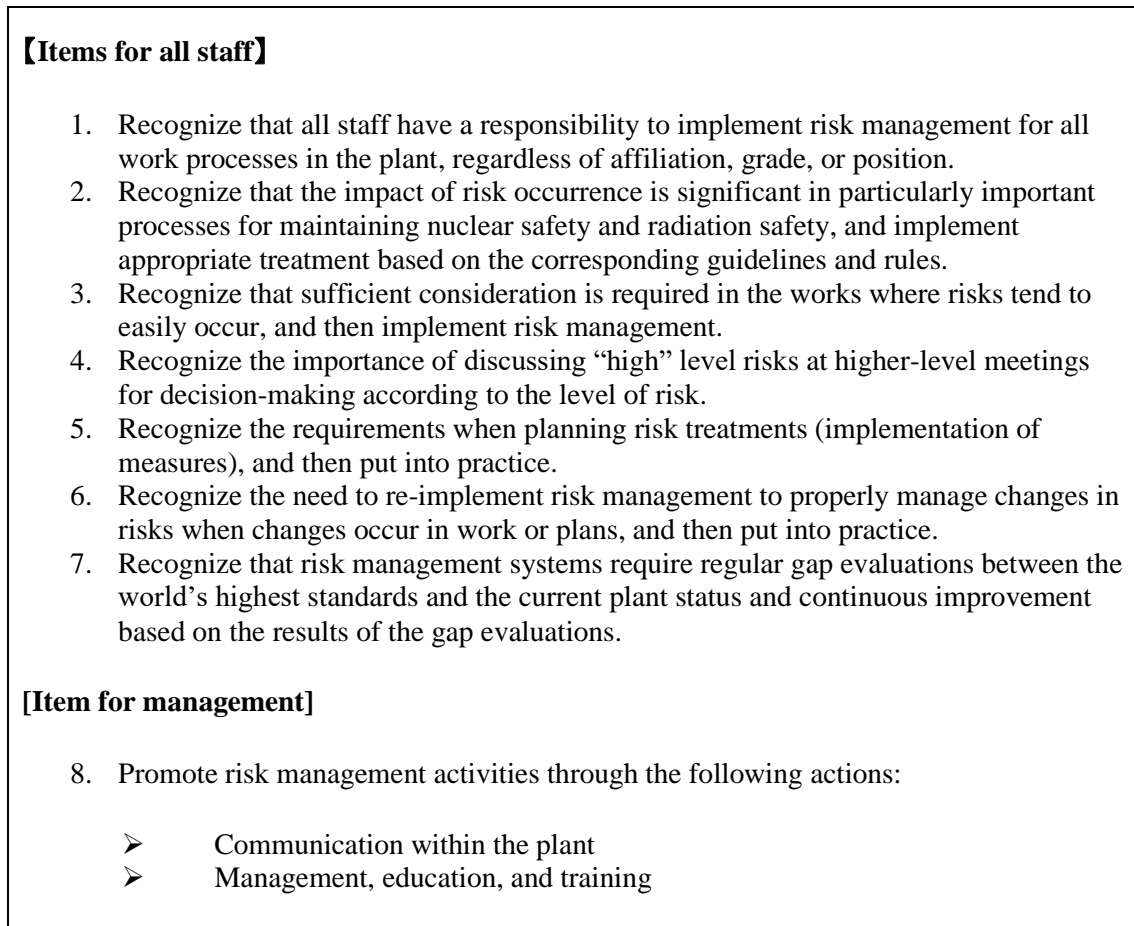


Figure 3. Risk Management Fundamentals in Tomari Nuclear Power Plant

5. CONCLUSION

Based on the lessons learned from the accident at the Fukushima Daiichi Nuclear Power Plant during the Great East Japan Earthquake in 2011, Tomari Nuclear Power Plant has established a risk management process to identify and address various risks, and is working to prevent risks from occurring. We will continue to expand the target risks step by step, and consider introducing the concept of frequency that takes into account probabilistic risk assessment for the continuous improvement of safety at Tomari Nuclear Power Plant.

References

- [1] International Organization for Standardization, Risk management-Guidelines, ISO31000:2018, 2018
- [2] World Association of Nuclear Operators, Risk Management Challenges, WANO SOER 2015-2, 2015
- [3] Japan Nuclear Safety Institute, Excellence Guidelines for Risk Management, JANSI-RMG-01-4th edition, 2019