

Decommissioning Process “Fuel Debris Retrieval”**Investigation Subject “Criticality Prevention/Cool/Hydrogen (maintaining stable conditions)”****Issue “Maintaining cooling function”**

Needs

1. Maintaining the integrity of the cooling system, including the water injection piping

Fuel Debris Retrieval : [Short]

Desired state and reasons for it

- In order to maintain cooling of the fuel debris and ensure that the fuel debris retrieval system, etc. soundly for a long period of time, it is desirable to evaluate the integrity of the cooling system, including the effects of corrosion and aging.

Current state against ideal

- Carbon steel, which has low corrosion resistance, is mainly used as the structural material of the cooling system piping. At present, the PCV is filled with nitrogen, and the oxygen and hydrogen peroxide concentrations in the water are expected to decrease due to a decrease in the oxygen concentration in the gas phase, so the corrosion is controlled to some extent.
- However, in fuel debris retrieval in the future, it is assumed that the atmosphere containing oxygen will flow inside the PCV under negative pressure control.

Issues to be resolved

- It is important to obtain knowledge on the corrosion of carbon steel in the presence of air considering accident history.

2. Evaluating fuel debris for cooling

Fuel Debris Retrieval : [Short]

Desired state and reasons for it

- In order to investigate a reasonable cooling method for fuel debris, it is desirable to conduct a safety assessment for each cooling method, such as air cooling and water injection, considering the decay heat of fuel debris and natural heat radiation.

Current state against ideal

- Up to now, the confirmation test of the cooling status of fuel debris, which temporarily stops reactor water supply, has been carried out in Unit 1 to Unit 3.
- There was no significant temperature increase in the RPV and PCV during the test, and there was no effect on dust concentrations or noble gas concentrations. Judging from this, a temporary reactor water supply stoppage will not interfere with the cooled status of fuel debris.

- The temperature of the RPV bottom and the PCV can be generally evaluated by the heat balance evaluation (see references for details), including the transient cooling conditions such as the water injection shutdown.
- The largest temperature increase rate of about 0.2 °C/h was observed in Unit 2 during water supply stoppage. Based on this temperature increase rate, the time margin for water supply stoppage is about 10 days or more, much longer than the previous estimate of about 10 hours.

Issues to be resolved

- Because the time margin for water supply stoppage is much larger than previously evaluated, the new evaluation according to the actual condition shall be reflected in the procedure. This will provide a procedure for properly determining safety priorities when multiple incidents occur simultaneously.
- Since there was no problem with the cooled status of fuel debris due to a temporary water supply stoppage, the operation method for reactor water supply stoppage shall be reviewed.
- Considering that the temperature of the RPV bottom and the PCV can generally be evaluated by heat balance evaluation, the in-core temperature monitoring method shall be reviewed.

Relevant Issues

- FDR-208 "Understanding status of fuels for maintaining stable conditions"