Dismantling Scenario of Reactor Vessel (RV) in KORI 1

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1. Introduction

Kori 1 has not been operated since it was shut down in 2016. The contaminated components in reactor building will be dismantled after 2022 or 2023. The dismantling of Kori 1 is the first to be dismantled in Korea. Also there is no dismantling experience. So we need to develop core dismantling technology.

In order to solve the problem, we are performing the dismantling technology development of RV using the government fund. We has developed dismantling scenario of RV in Kori 1.

2. Dismantling scenario for RV of Kori 1

2.1 RV of Kori 1

The main dimensions of RV in Kori 1 shows in table 1. The outer diameter of RV is 3994mm. The maximum thickness is 480mm. Due to this thickness of RV, a suitable cutting method is required. The weight of RV is 180 ton. The inside wall and the flanges are clad in stainless steel and its thickness is about 6mm.

The RV is installed in cavity, which is concrete structure. The Fig. 1 shows the installed state.

Table 1. The main dimensions of RV

Items	Size (mm)
Height	9718.1
Outer diameter of shell	3525.3
Inner diameter of shell	3352.8
Max. thickness	480
Radius of bottom head	1685.8

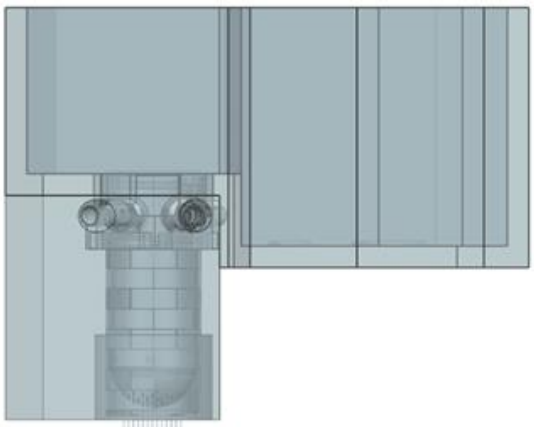

Fig. 1. Reactor and Cavity.

2.2 Dismantling Scenario of RV in Kori 1

The developed Kori 1 RV dismantling scenario is basically to cut by raising the RV in the air environment using the thermal cutting method. This dismantling of RV in an air environment is a proven technology. In overseas application, there are Zion[1], Stade[2] NPP etc.

The process of RV dismantling for Kori 1 shows in Fig. 2.

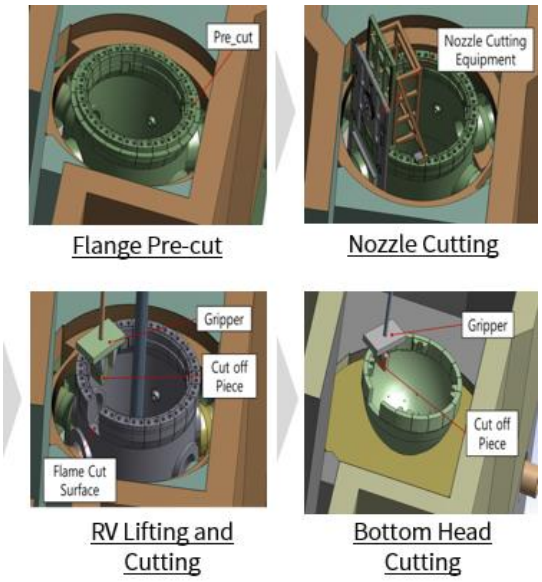

Fig. 2. Process of RV Dismantling.

The pre-cut process using the mechanical cutting method is for cutting the stainless steel cladding on the flange of RV. And then nozzle cutting of RV is performed using the mechanical cutting method. Once the preparations for lifting the RV are completed, dismantling of RV shell is performed using the thermal cutting method. When the RV shell dismantling is finished, the rigging tool is disassembled and the RV bottom head is dismantled. Finally, the insulation structure is dismantled using the mechanical cutting method.

2.3 Review the Risk of RV Dismantling Process

We reviewed the risk factors in the developed process. The risks are radiological, chemical, physical & biological factor. The chemical & biological risks are expected to be absent in the developed process. Therefore we should consider radiological & physical hazards.

The physical hazards are expected to follow the industrial safety regulations. However radiological hazards must take into account the effects on the public as well as the operators. So the consideration is the diffusion of aerosol during the thermal cutting. In order to prevent the condition, the special ventilation equipment is required, and this should be connected to the NPP ventilation system.

3. Conclusion

We has developed dismantling scenario of RV in Kori unit 1. This dismantling scenario for RV of Kori unit 1 is proven technology and method. In the course of developing the dismantling scenario, we considered safety aspects such as ventilation, process simplification and so on.

In the future, we plan to upgrade dismantling process by reviewing safety aspects while the developing technology. Also for the safety reasons, when the operation of ventilation system is stopped, thermal cutting operation is stopped at the same time.

REFERENCES

[1] A.Loeb, D.Stanke, “Decommissioning of the reactor pressure vessels by remote controlled thermal cutting segmentation facilities of the Zion nuclear plant at Zion”, WM2016 Conference, 2016.

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