

Concept Study of Innovative Approach for fuel debris retrieval

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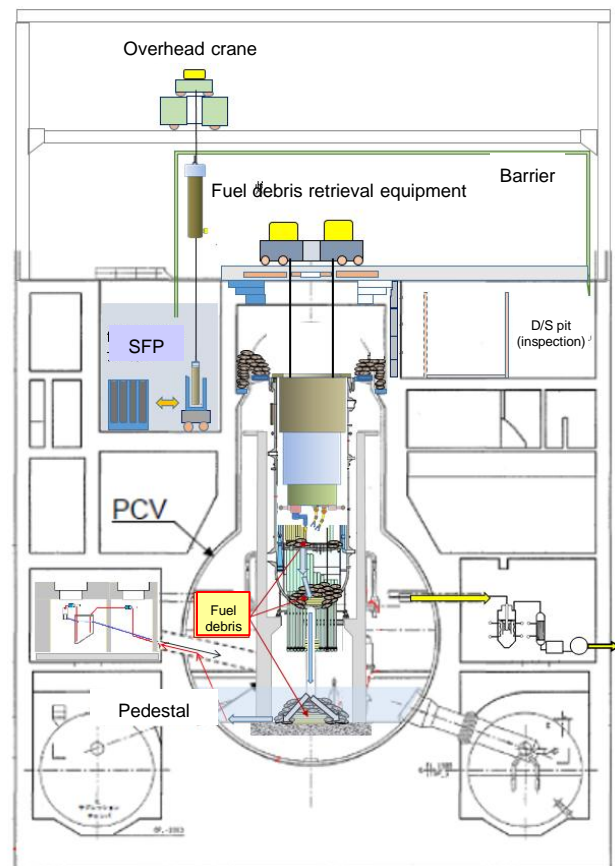
Purpose and Goal

As a method to retrieve fuel debris accumulated inside the reactor vessel and containment vessel (pedestal, floor etc.) at Fukushima Daiichi NPS, dry method is requested as alternative method for the case when the submersion method is not feasible.

The purpose of this subsidized project is to conduct C/S regarding the “shielding material injection and fuel debris retrieval method in the air using fuel debris retrieval equipment(extension and rotation platform with manipulator equipment)”.

Overview and Feature

- This method retrieves fuel debris as we insert the retrieval equipment from the top of the reactor under the condition where fuel debris are covered by the shielding material (steel balls or shielding bags filling with steel balls etc.) to shield the radiation in the air. This project focuses on this retrieval method.
- Fuel debris retrieval equipment are installed on the 5th floor of operating floor in the reactor building and consists of manipulator equipment, and crane equipment(gantry crane or traveling crane type) that hoisting and transferring those.
- Manipulator equipment is structured as cylinder or telescopic multiple cylinder with the platform equipped with debris cutting equipment and manipulator etc. It is lowered down inside the reactor vessel to the containment vessel pedestal floor using crane equipment, and cut and retrieve the fuel debris and internal structure etc.
- Cut fuel debris are stored in the canister, and is loaded in the transferring container with shielding. Those will be lifted up and transferred to the spent fuel pool using overhead crane, then stored in the storage rack.



Output so far/Output expected

Following items are implemented for the study of alternative method for fuel retrieval in the air, and technical feasibility of this method is demonstrated.

- a) Fuel debris retrieval scenario and procedures
 - Study the scenario and procedures for the removal of PCV lid, RPV upper head and internal structures etc. and fuel debris retrieval for the core and bottom part of the containment vessel pedestal focusing on basic scenario including the options.
 - Add and review the scenario and procedures corresponding to the progress of the study for the retrieval equipment and facilities.
- b) Study the fuel debris retrieval equipment and facilities
 - Study the basic concept for the major equipment and facilities required for fuel debris retrieval.
 - Establish the concept structure for major equipment and facilities based on the basic concept.
- c) Study the concerns on the safety
 - Study the evaluation model and conditions etc. related to the radiation shielding, criticality safety and debris coolability.
 - Analyze and evaluate the model and conditions which has been set and prove the safety for the method.
- d) Study the development issues and development plan
 - Extract the technology development issues for practical application of major equipment and facilities and start study work.
 - Study the development and test plan relating to the development issues and summarize the results.

Overall Schedule

