



- **Further validation regarding preparatory work for full-scale fuel debris retrieval of Unit 3 and the way forward**
- **Deliberation of preparatory work for fuel debris retrieval of Units 1 and 2**

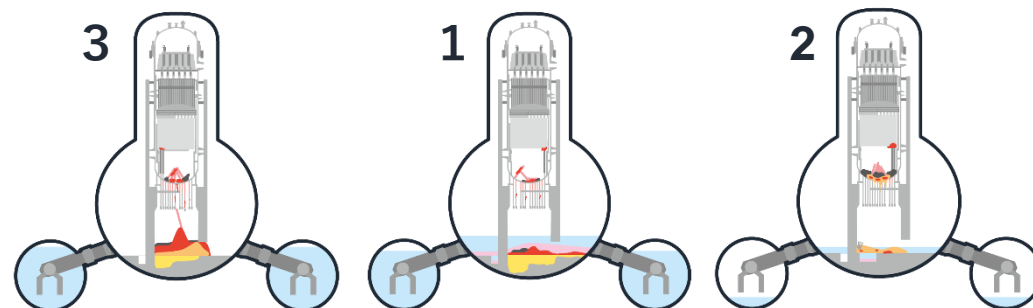


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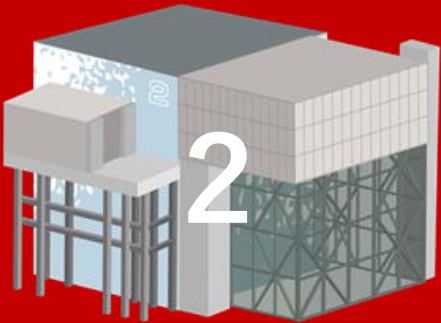
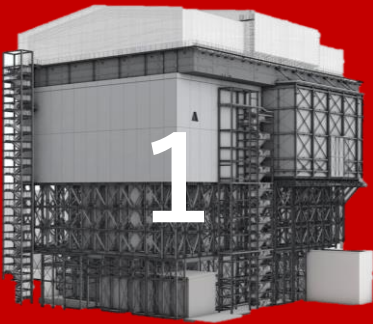
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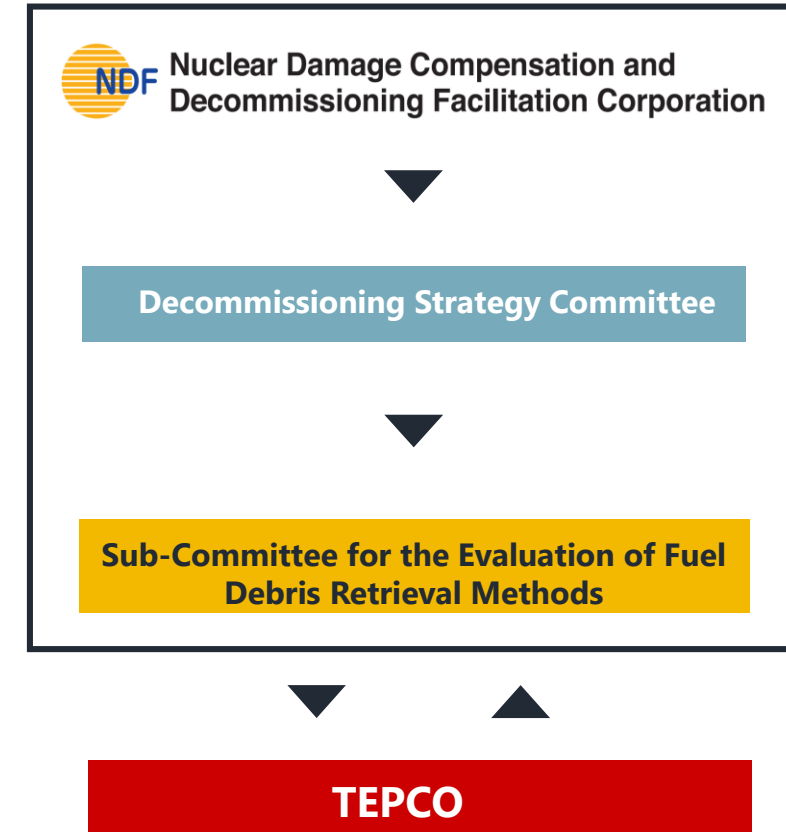
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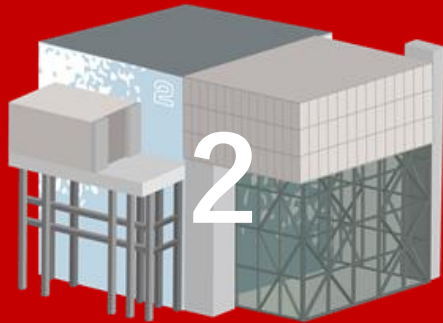
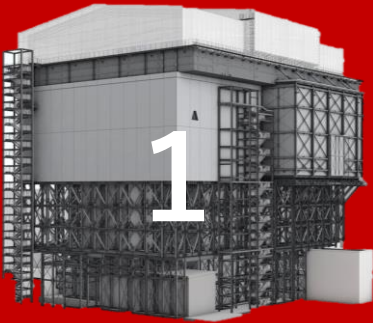
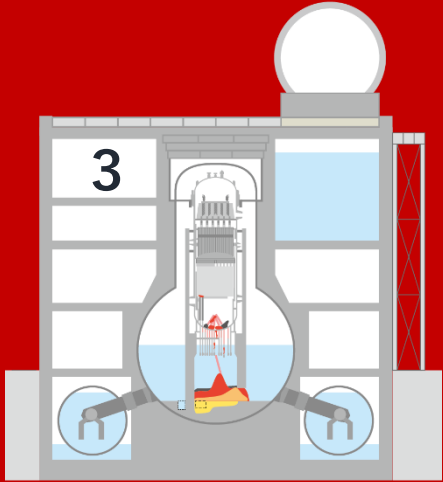


- Under the instructions of the “Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods” (Sub-Committee) established in 2023 at NDF, “full-scale fuel debris retrieval of Unit 3” was deliberated, and “description and process of preparatory work” under certain assumptions were reported in July 2025.
- Items requiring further validation were deliberated, aiming to present an outlook within one to two years, and validation work began upon specifying the validation items with the cooperation of NDF.
- In addition, deliberation of “preparatory work for fuel debris retrieval of Units 1 and 2” also began as suggestions were received to do so.



Based on the above, progress on “further validation regarding preparatory work for Unit 3” and “deliberation of preparatory work for Units 1 and 2” shall be reported.

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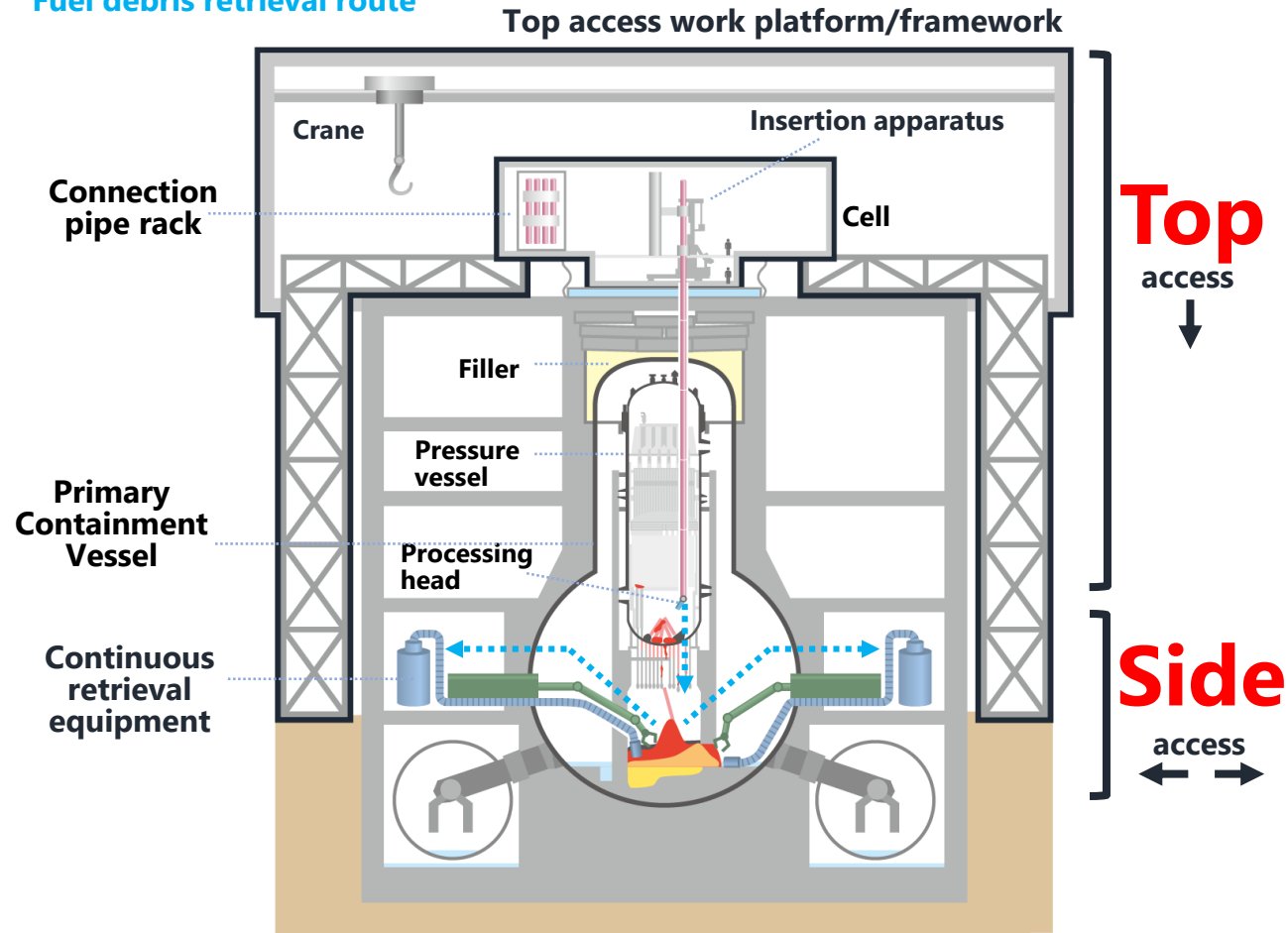
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Further validation regarding preparatory work for full-scale fuel debris retrieval

Of preparatory work for full-scale fuel debris retrieval of Unit 3, the following four points were organized as items requiring further validation. Each item shall be validated.

.....→
Fuel debris retrieval route



Side

access
← →

- Dose reduction of reactor building
⇒ Whether the planned decontamination work can reduce radiation doses

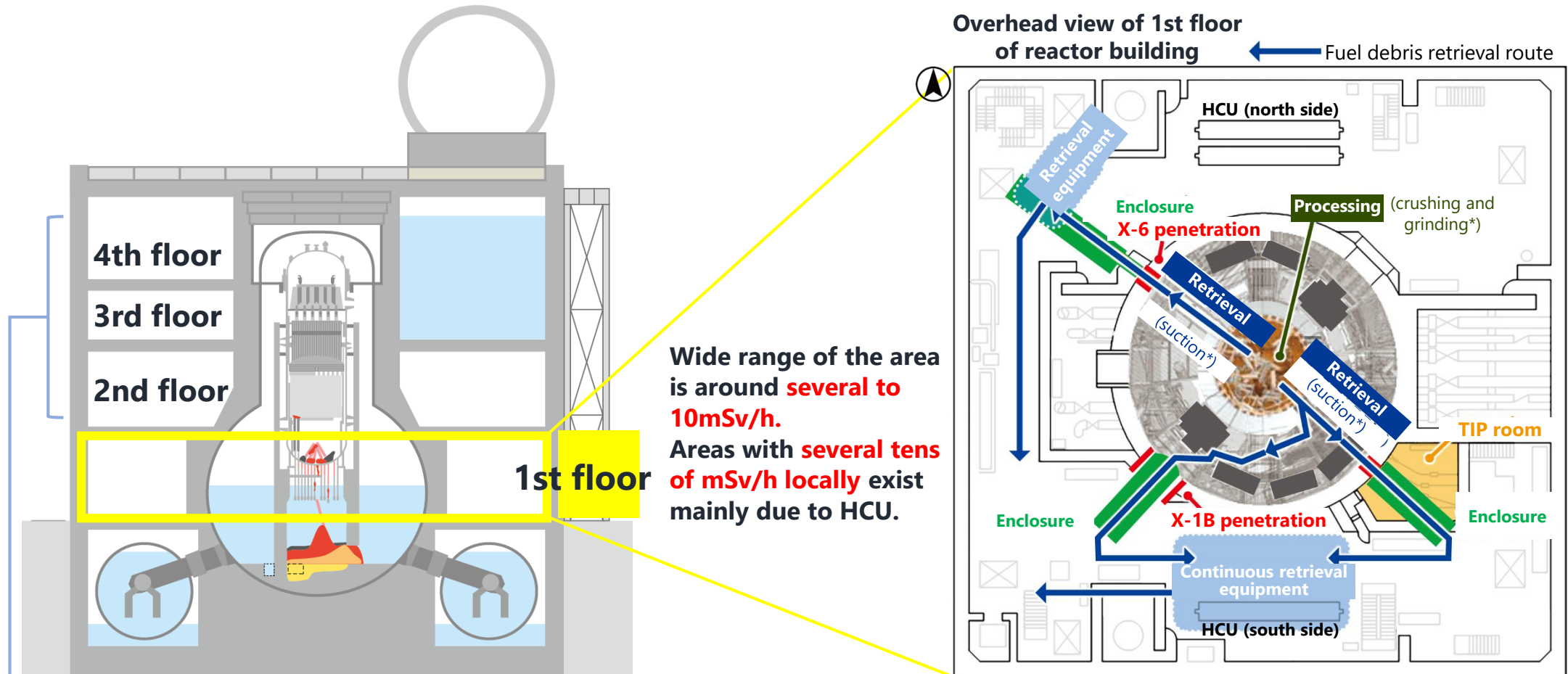
Top

access
↓

- Support structure for top access
⇒ Whether it can safely accommodate the top access equipment with sufficient margin
- Treatment of shield plug
⇒ Whether a method that avoids removing the shield plug by filling the well can be implemented
- Demolition and removal of Unit 3 radioactive waste treatment building (radwaste building)
⇒ Whether it is feasible to carry out the relocation and removal of the accumulated water transfer system and equipment, and the retrieval of used resin in parallel

Dose reduction of reactor building (policy for further validation)

For side access fuel debris retrieval, dose needs to be reduced for the 1st floor of the reactor building where “side access equipment” is to be installed.



*Assumed at present. Adoption to be determined based on “validation of processing and retrieval technology, etc.”

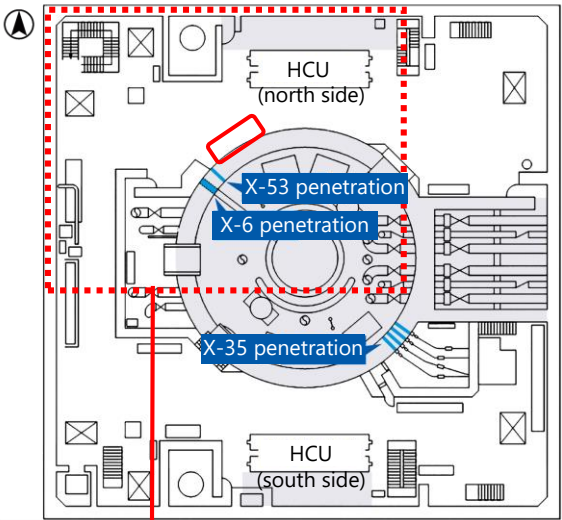
4th floor: Part of the ceiling has collapsed. Both the rubble and dose levels are more severe than the 3rd floor, and it is inaccessible by humans.

3rd floor: The site cannot be investigated due to much rubble, and dose is higher than the 2nd floor.

2nd floor: Rubble remains. Although it is several mSv/h in some areas, range with several tens of mSv/h is wider than the 1st floor.

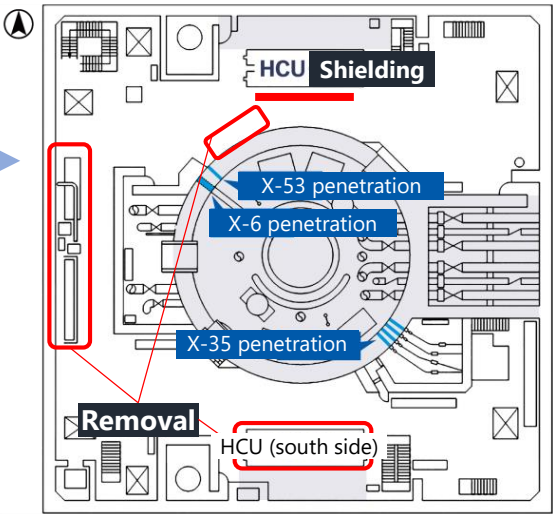
“Detail the volume and scope of the dose reduction work” and “simulate the effectiveness of the dose reduction work” to quantify “the workload required for dose reduction”.

Dose reduction work and simulation image (1st floor of Unit 3 reactor building)

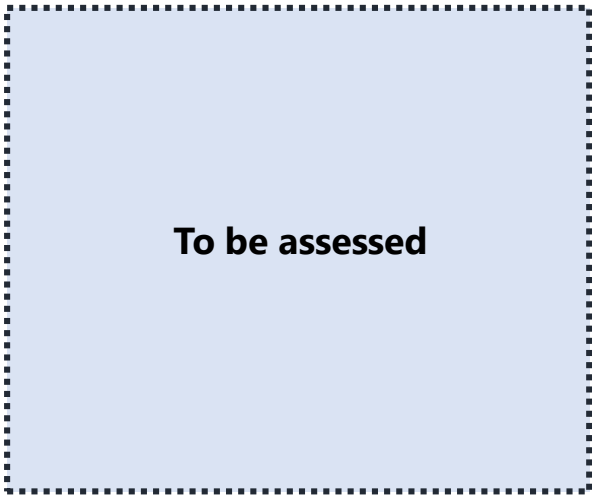


Detailing of dose reduction work

- Shielding
- Removal etc.



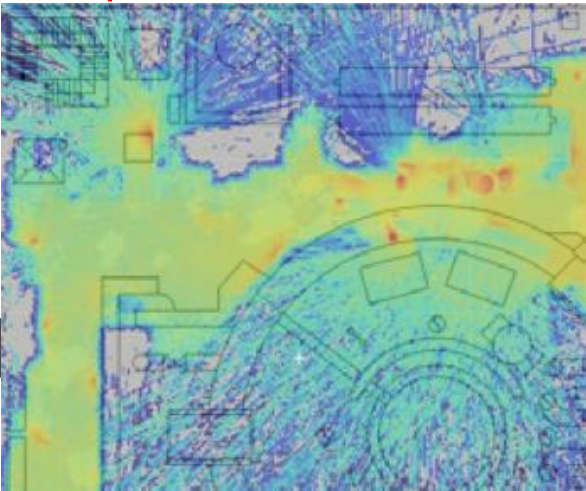
Simulation



Distribution of air dose rate ($\mu\text{Sv/h}$)



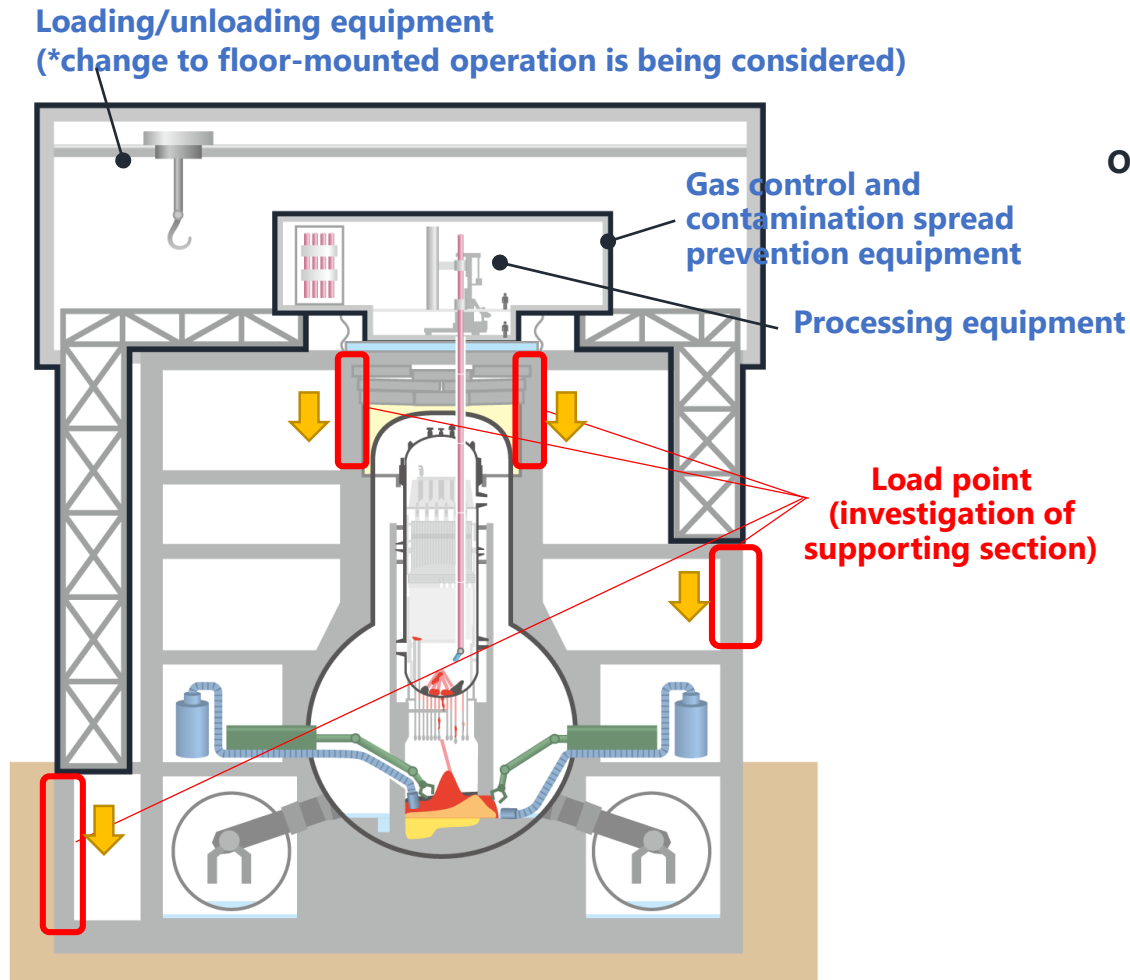
*This result is under development and may change in the future.



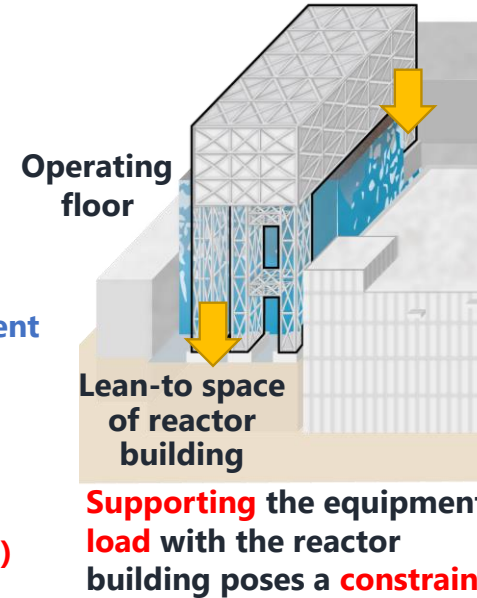
Support structure for top access (policy for further validation)

In the east-west framework plan, the reactor building will support the framework and top access equipment. Load margin for the supporting section of the reactor building shall be validated.

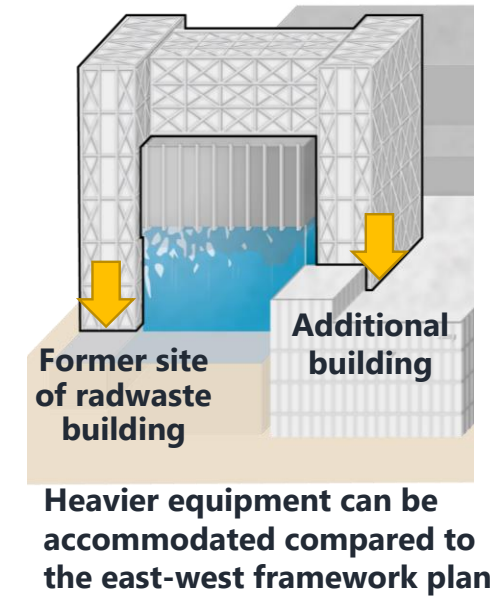
▼ Image of top access equipment in the east-west framework plan



East-west framework plan



South-north work platform plan



● Deliberation of top access equipment

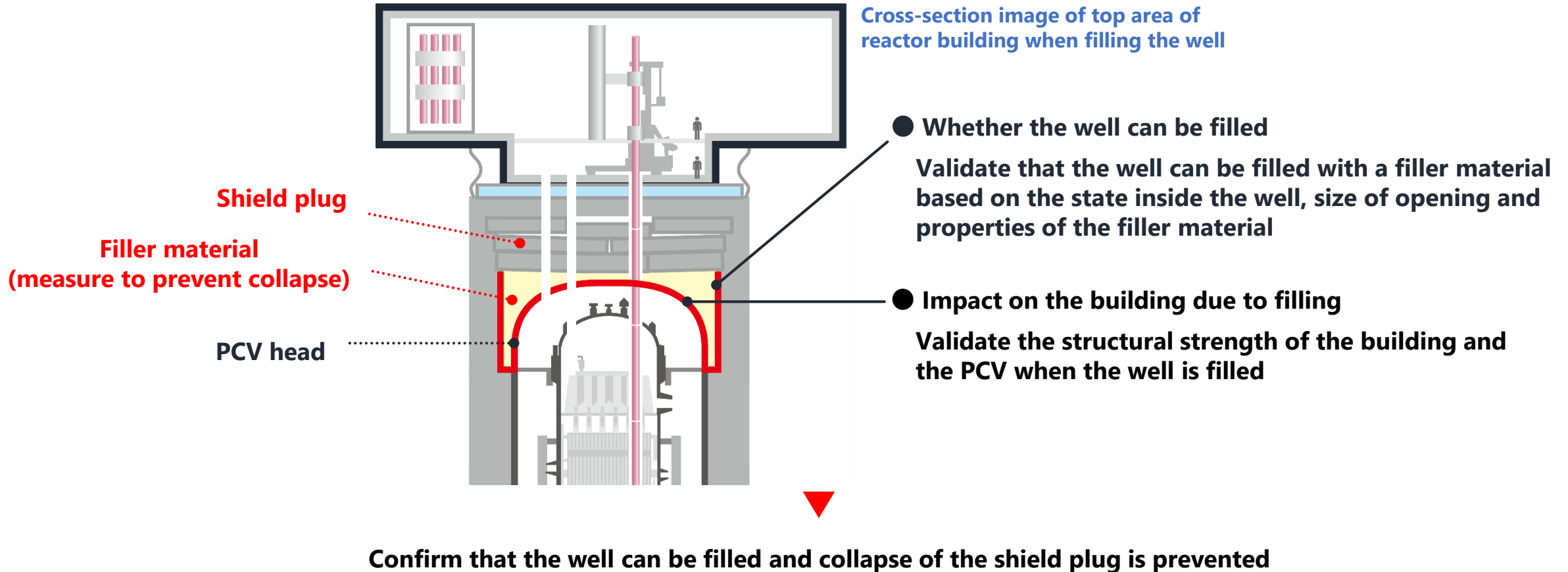
Deliberate configuration and approximate load of top access equipment

● Investigation of supporting section in east-west framework plan

Check for any significant damage on the assumed supporting section of the framework

Check if the east-west framework plan can be selected according to deliberation of equipment and investigation of supporting section

Fuel debris retrieval will be carried out by drilling multiple holes in the shield plug. In order to prevent the shield plug from collapsing during the operation, we plan to fill the well (between the shield plug and the Primary Containment Vessel (PCV) head) with a filler material. It shall be validated whether the well can be filled from the following aspects.

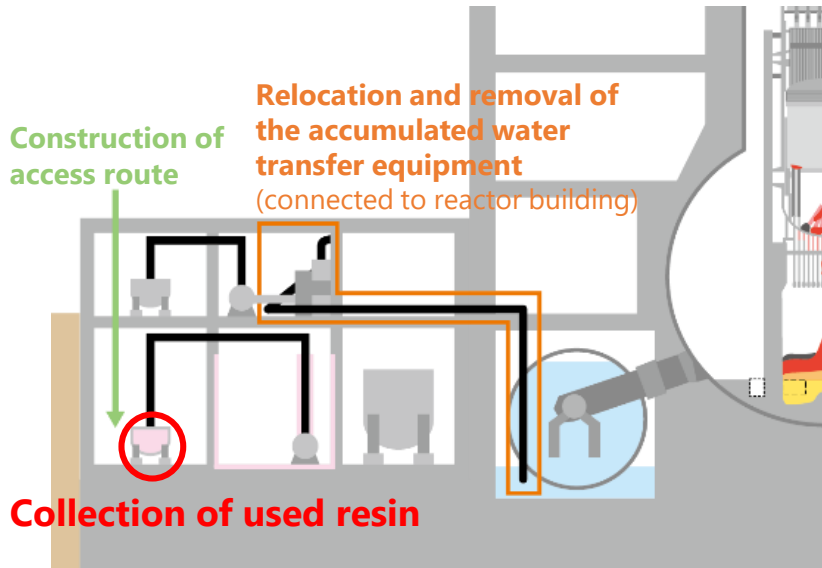


Demolition and removal of radwaste building (policy for further validation)

For the demolition and removal of the Unit 3 radwaste building, the following shall be carried out.

- Creation of a detailed workflow for the demolition and removal of the entire building
- Validation regarding the parallel work of “relocation and removal of the accumulated water transfer equipment”, “collection of used resin” and “demolition and removal of other equipment”

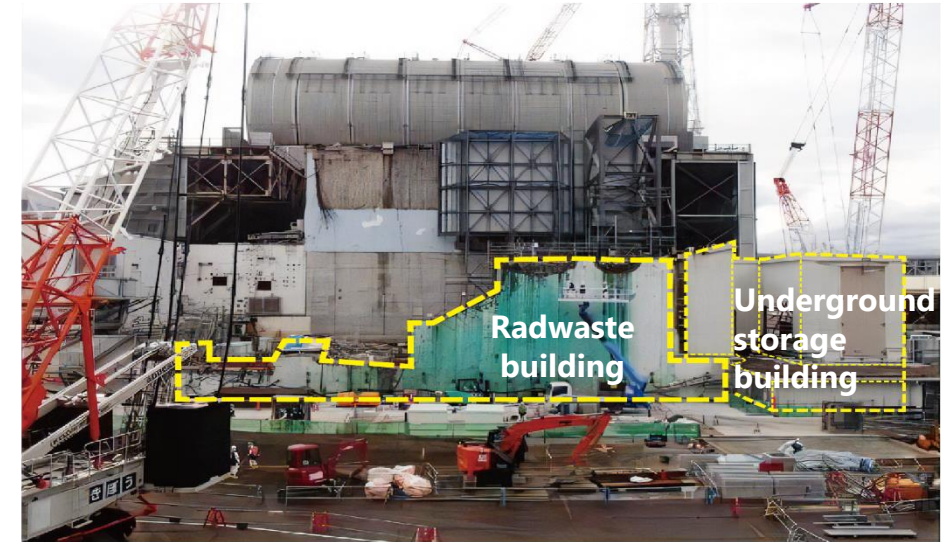
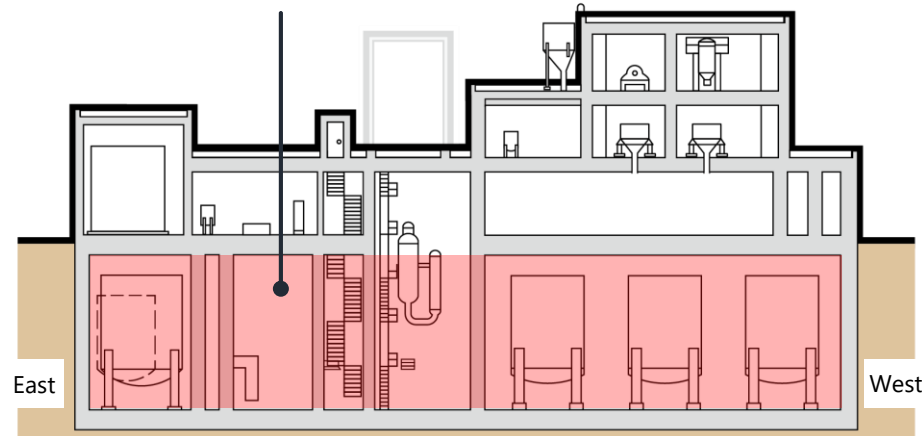
▼ Cross-section image of Unit 3 radwaste building (left) and reactor building (right)



▼ Cross-section image of Unit 3 radwaste building

Demolition and removal of other equipment

(Since the basement floors are under high dose, equipment removal work needs to consider dose reduction and use of remote-control devices)

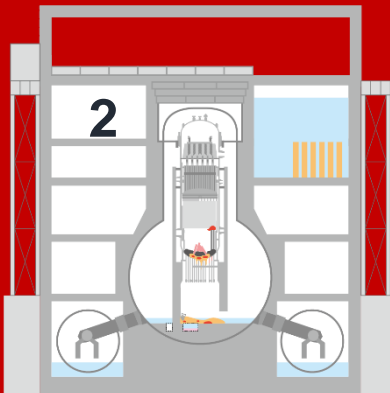
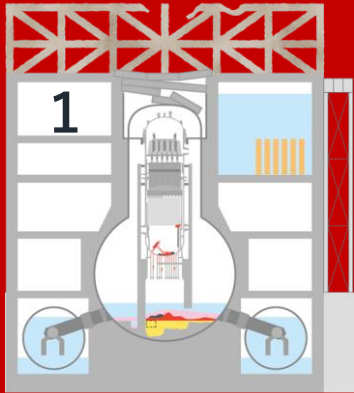


Confirm that parallel work for Unit 3 radwaste building can be conducted as well as its workload

Current progress is as follows. We will continue to move forward while receiving advice from the Sub-Committee and related guidance.

	Current progress	Further validation going forward
<div>Side access ← →</div> <div><ul style="list-style-type: none">● Dose reduction of reactor building</div>	<p>Volume of interfering objects to be removed for retrieval from the X-6 penetration was estimated.</p> <p>⇒ Confirmed that it is largely within the anticipated range (dose reduction simulation is ongoing)</p>	<p>Evaluate the effectiveness of dose reduction by each work</p>
<div>Top access ↓</div> <div><ul style="list-style-type: none">● Support structure for top access● Treatment of shield plug● Demolition and removal of Unit 3 radwaste building</div>	<p>As functions needed for top access equipment, containment function and equipment loading/unloading function were organized in addition to retrieval</p> <p>Multiple existing openings inside the well were identified from drawings</p> <p>The situation of aboveground floors was investigated, and the removal workflow was organized</p>	<p>Review the load of access device and evaluate the impact on support structures</p> <p>Confirm whether the well can be filled and whether there is any impact on the well due to filling</p> <p>Refine removal work on aboveground floors</p> <p>Organize the removal workflow for basement floors</p> <p>Deliberate overall construction plan</p>

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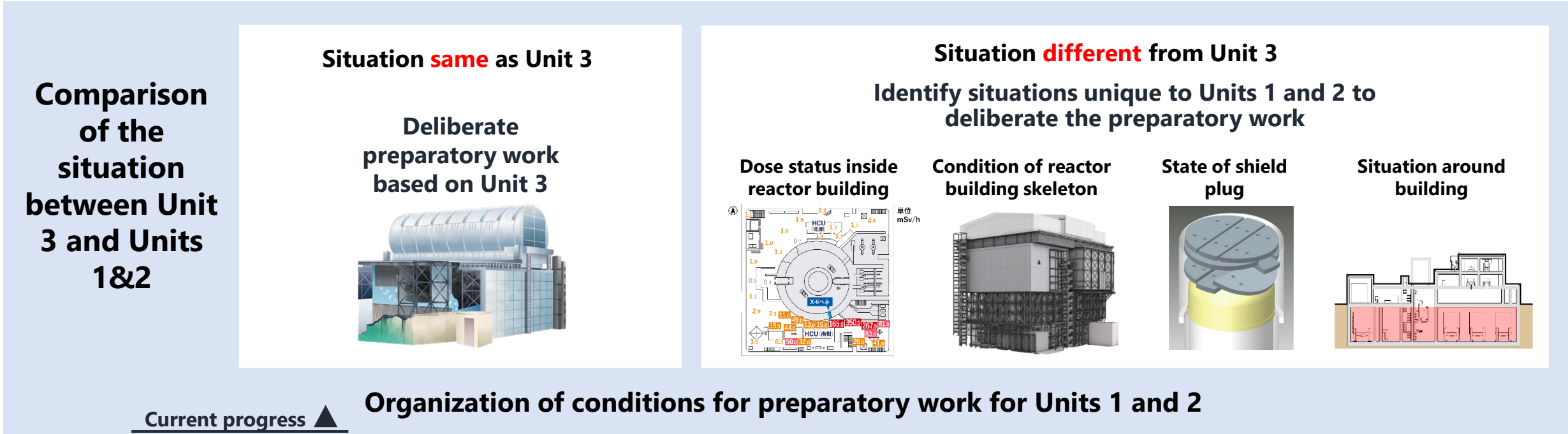
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Deliberation of preparatory work for fuel debris retrieval of Units 1 and 2

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Conclusion

As the policy is to utilize the preceding deliberation for Unit 3 for the preparation process for Units 1 and 2, situations different from Unit 3 shall be deliberated.
The following flow shall be implemented along with the validation period with Unit 3 over the past year or two.

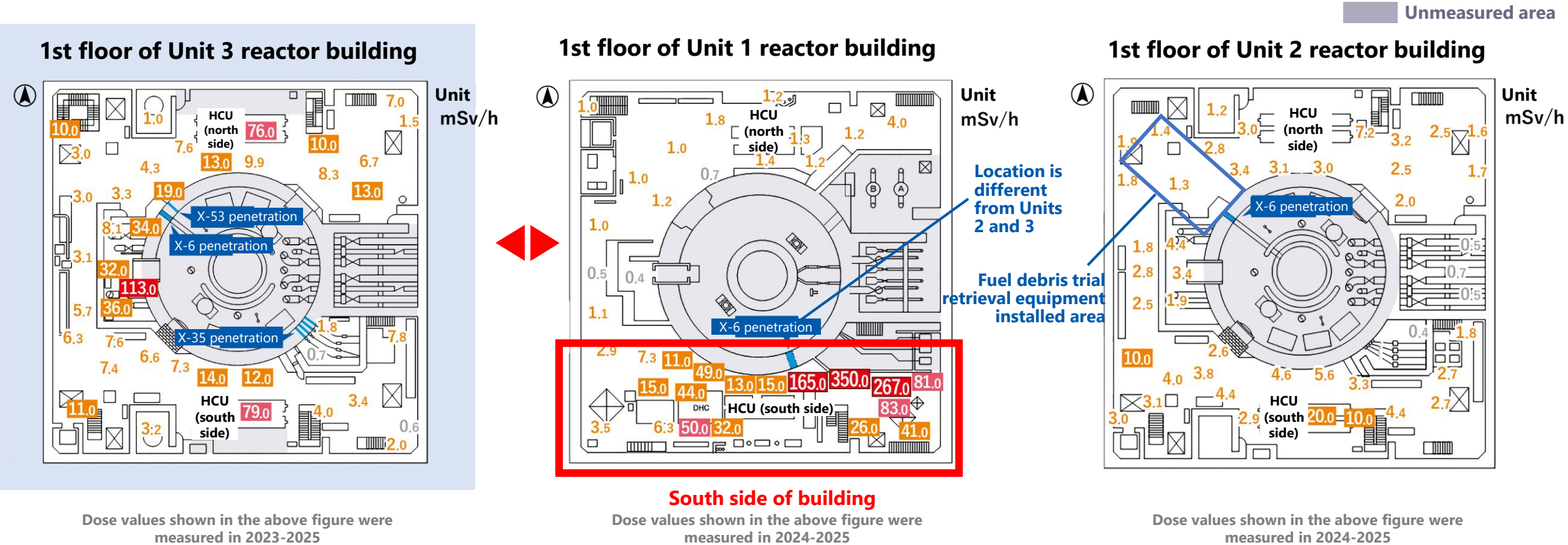


Comparison and deliberation regarding conditions inside the reactor buildings

The first floor of the respective reactor buildings has the following characteristics.

- Unit 3: Radiation level is high overall, and the dose rates around the north and south HCU are several tens of mSv/h
- Unit 1: Radiation level is low overall, but the dose rates on the south side where the X-6 penetration locates are several tens to hundreds of mSv/h
- Unit 2: Radiation level is in between that of Units 1 and 3 overall, and dose reduction has relatively advanced on the west side

Based on the above, **dose reduction work for the south side of the 1st floor of Unit 1 shall be deliberated.**



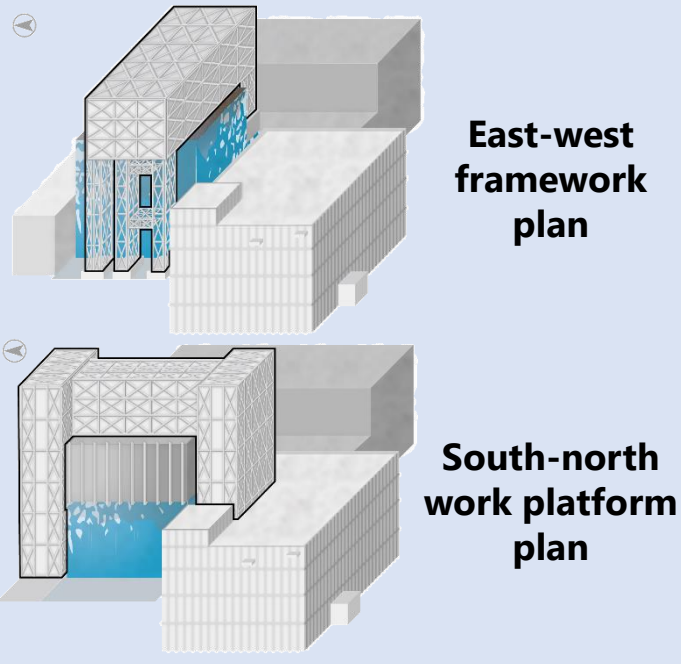
Comparison and deliberation regarding top access support structure

“Condition of the reactor buildings” and “fuel removal from spent fuel pool” have the following characteristics.

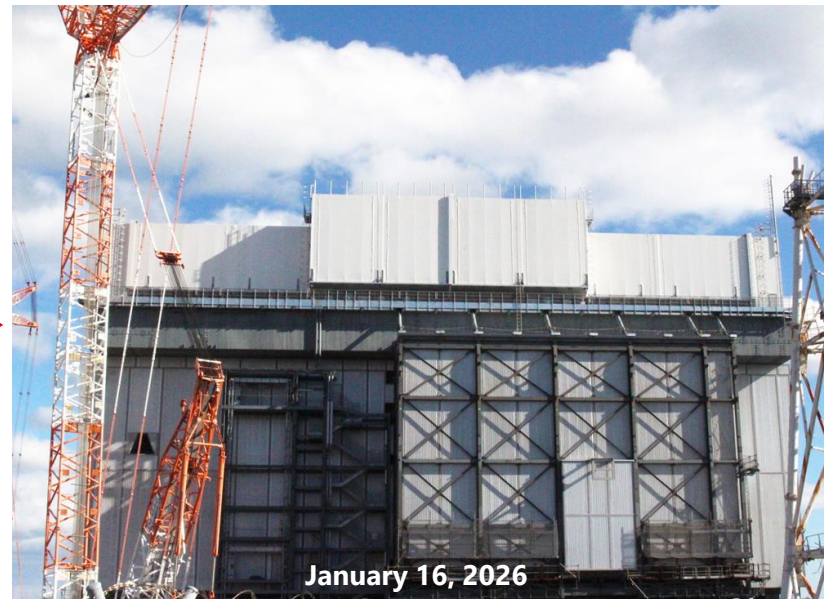
- Unit 3: Floors above the third floor were damaged due to the explosion. A fuel removal cover has been installed, and fuel removal from spent fuel pool has been completed
- Unit 1: The top of the operating floor has collapsed due to the explosion, but levels below the operating floor remain. A large cover has been installed for fuel removal from spent fuel pool and rubble removal
- Unit 2: There was no explosion and a work platform for fuel removal from spent fuel pool has been installed

Since the situation of the operating floors and structures related to fuel removal from spent fuel pool differ among Units 1-3, **outline plan shall be deliberated for fuel debris retrieval equipment for both Units 1 and 2.**

Plan for Unit 3 reactor building



Situation of Unit 1 reactor building



Situation of Unit 2 reactor building



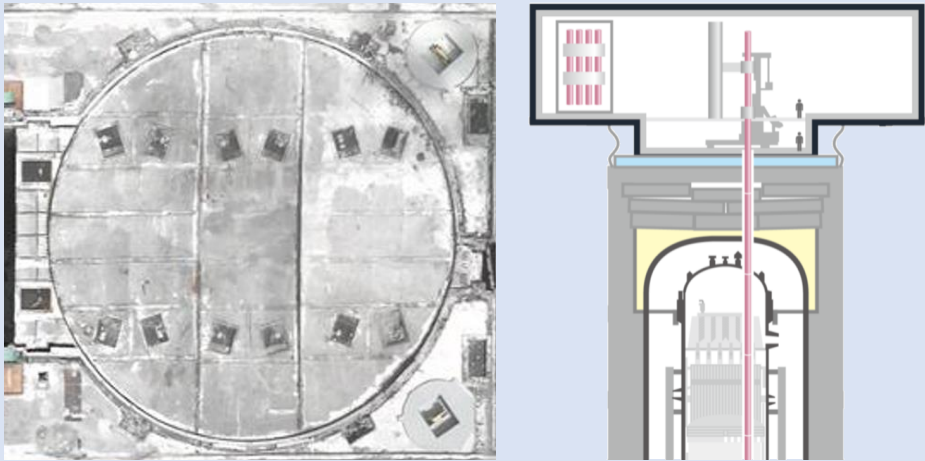
Installation of large cover

The conditions of the shield plugs have the following characteristics.

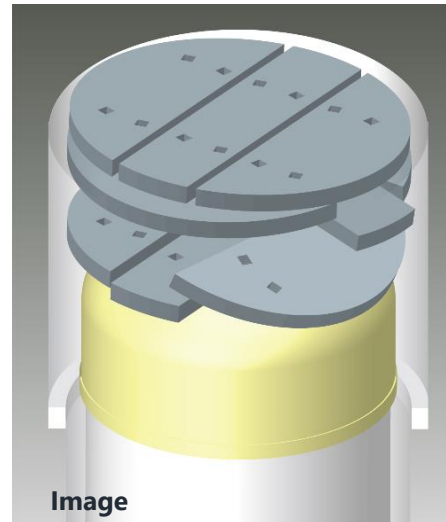
- Unit 3: The shield plug has deformed due to the explosion (Estimated contamination level: 30 PBq)
- Unit 1: The bottommost shield plug has collapsed into the well due to the explosion and has deformed (Estimated contamination level: 0.1–0.2 PBq)
- Unit 2: There is no deformation as there was no explosion, and it exists in a sound state (Estimated contamination level: 40–70 PBq)

Unlike Units 2 and 3, the **shield plug of Unit 1 has collapsed**. Therefore, **treatment of the shield plug shall be deliberated** based on the condition of the reactor building for each unit.

Top of Unit 3 reactor well



Unit 1 shield plug



Image

Top of Unit 2 reactor well



- Since the installation of additional buildings and top access support structures is assumed in the future, **demolition** of “Units 1 and 2 radwaste buildings” is considered necessary in order to conduct decommissioning work in a limited work site. For the demolition, “Units 1 and 2 stack” and “high-dose SGTS piping” located on the west side will need to be **removed**.

Deliberation shall be advanced regarding **environmental improvement around the buildings** and layout of additional buildings and top access support structure.

Situation of the area around Units 1 and 2 reactor buildings

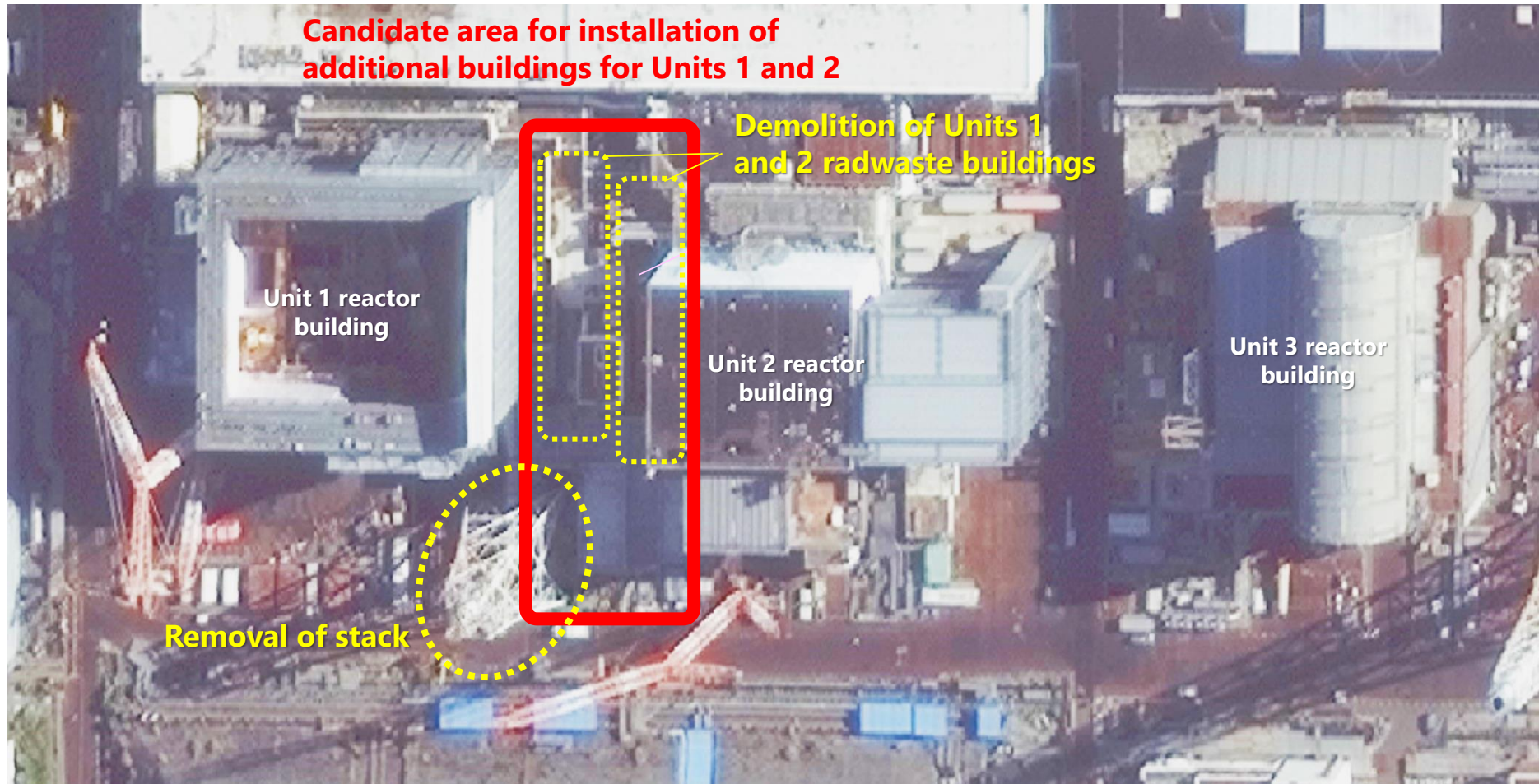


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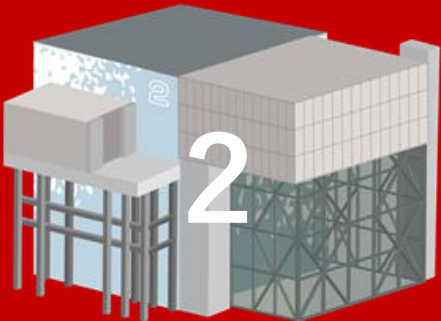
Further validation regarding preparatory work for full-scale fuel debris retrieval of Unit 3

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Deliberation of preparatory work for fuel debris retrieval of Units 1 and 2

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Conclusion



- Items in preparatory work for full-scale fuel debris retrieval of Unit 3 that require further validation began to be deliberated, and the policy, current progress and the way forward were summarized.
- “Deliberation of preparatory work” for full-scale fuel debris retrieval of Units 1 and 2 also began.

Going forward, work will be moved forward according to the plan, and the status will also be reported to the Sub-Committee to receive advice and other guidance.

The above has been under deliberation since July 2025, and the results will be compiled and reported within the next 1–2 years.

