Fukushima Daiichi Nuclear Power Station
Unit 2 Telescopic Fuel Debris Trial Retrieval Device

TEPCO

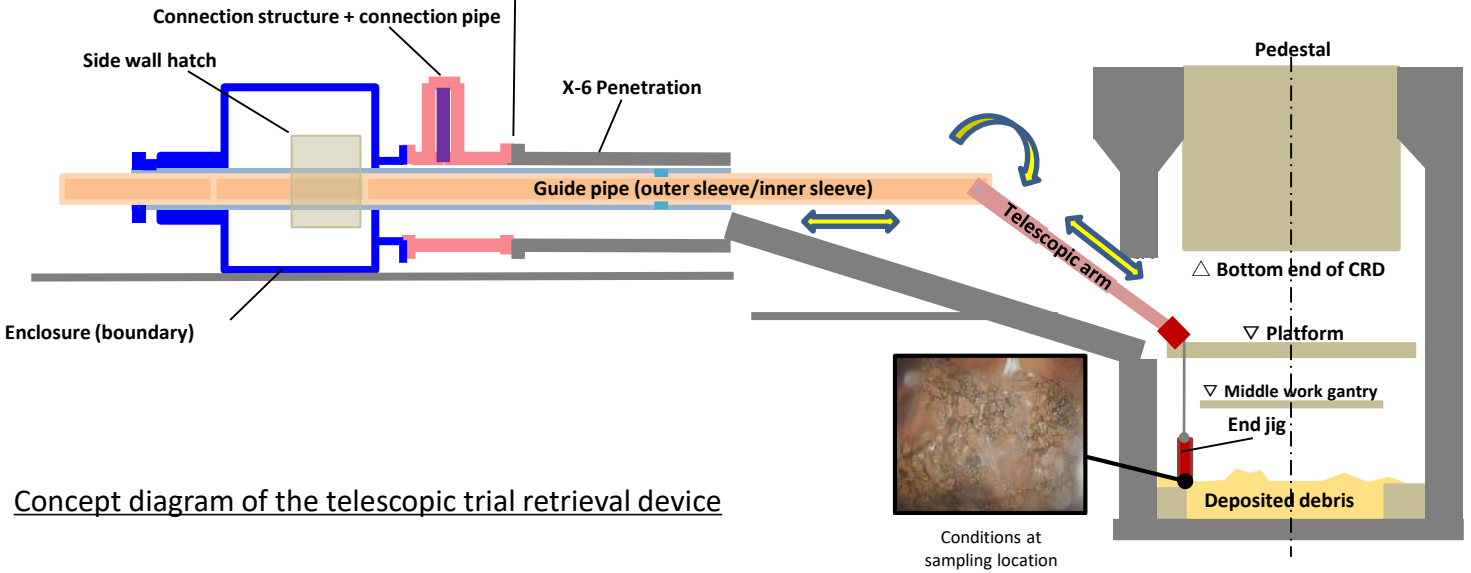
February 16, 2024

Tokyo Electric Power Company Holdings, Inc.

1. Foreword

- During preparations to open the Unit 2 X-6 penetration, we discovered in June 2023 that the hatch bolts were seized.
- We intend to conduct trial retrieval using a method that enables access even if the deposit inside the penetration could not be completely removed.
- On February 16, we applied for revision of Chapter V of “Implementation Plan for Fukushima Daiichi Nuclear Power Station Specified Nuclear Facility” to enable the use of a telescopic trial retrieval device. This device has been confirmed to be accessible to the bottom of the pedestal through past investigations, and its structure and control are relatively simple.

Conditions inside the X-6 penetration
(after laser cleaning the flange surface)



Concept diagram of the telescopic trial retrieval device

: Scope approved for detailed PCV internal investigation

: Scope of the application submitted on Feb. 16

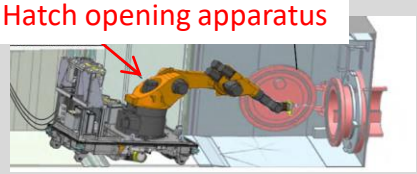
2. Steps of the trial retrieval and scope of application (1/2)

1 . Isolation chamber installation

An isolation chamber is installed prior to the opening of the hatch

2 . Opening X-6 penetration hatch

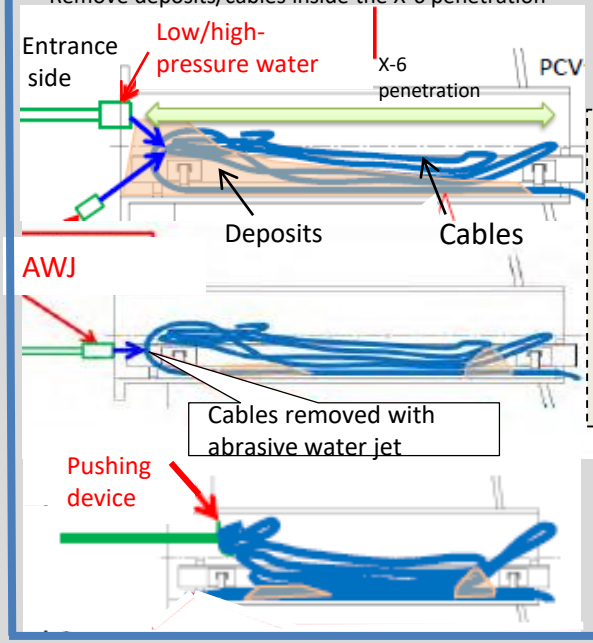
Hatch opening apparatus



The hatch is opened using a hatch opening apparatus

3 . Removal of deposits from inside X-6 penetration

Remove deposits/cables inside the X-6 penetration

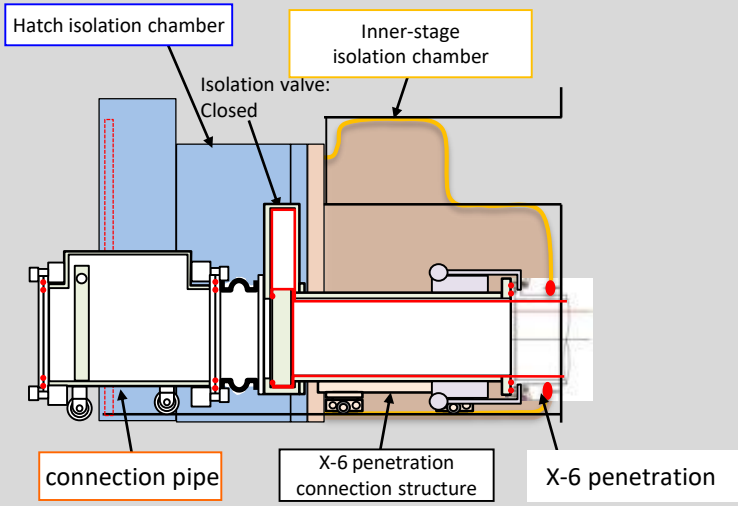


Push deposits with[Low/high-pressure water]

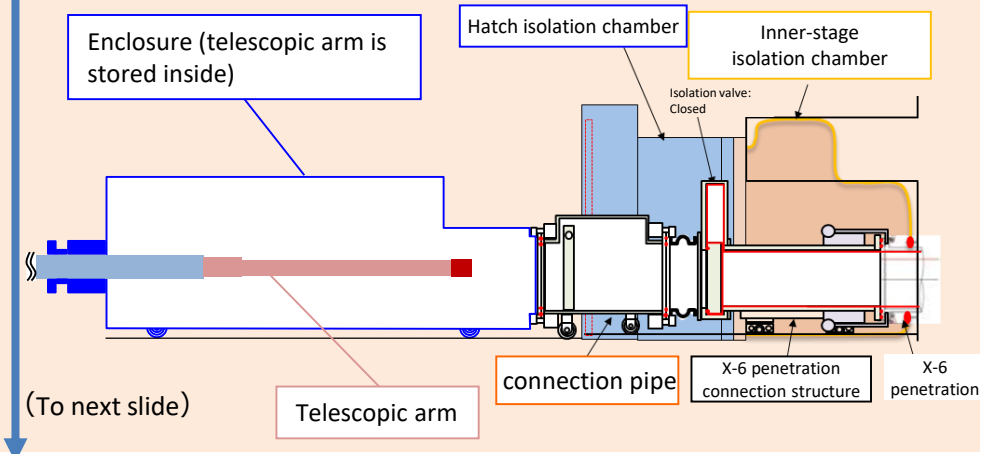
Remove cables with [AWJ]

Push cables with[Pushing device]

4 . X-6 penetration connection structure and connection pipe installation



5 . Telescopic trial retrieval device installation



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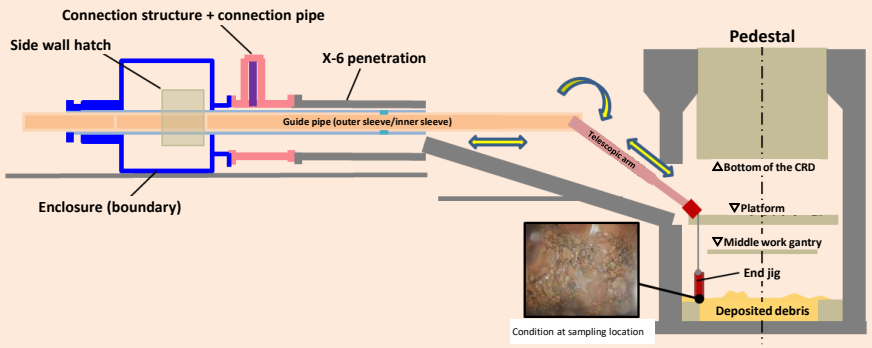
: Scope approved for trial retrieval using robotic arm access and investigation apparatus

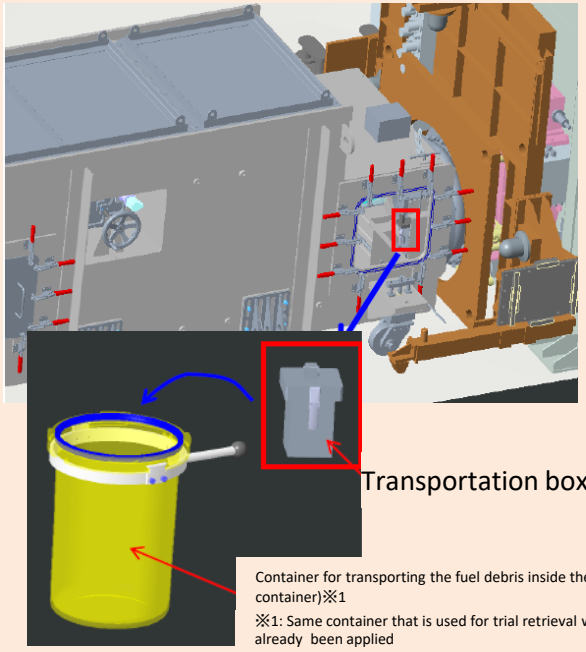
: Scope of the application submitted on Feb. 16

2. Steps of the trial retrieval and scope of application (2/2)

6 . Trial retrieval work



7 . Storage of fuel debris

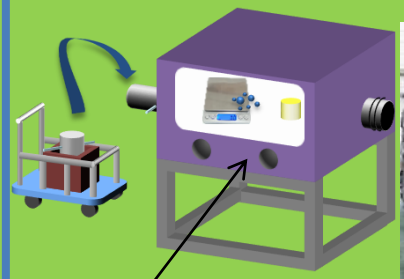


Transportation box

Container for transporting the fuel debris inside the building (DPTE container)※1

※1: Same container that is used for trial retrieval work that have already been applied

8 . Putting the fuel debris in a glove box and measurement

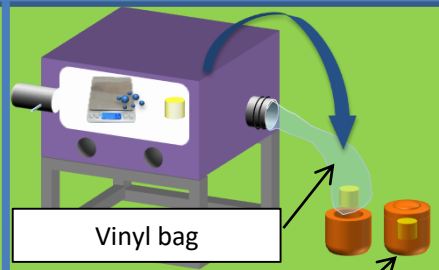


Glove box

<External view of the glove box>

- The fuel debris is put in a globe box under negative pressure
- The fuel debris is measured and put into the container inside the glove box

9 . Taking out the container, putting into a transportation container and transporting it



Vinyl bag

Off-site transportation container※2

Transported to off-site analysis facility

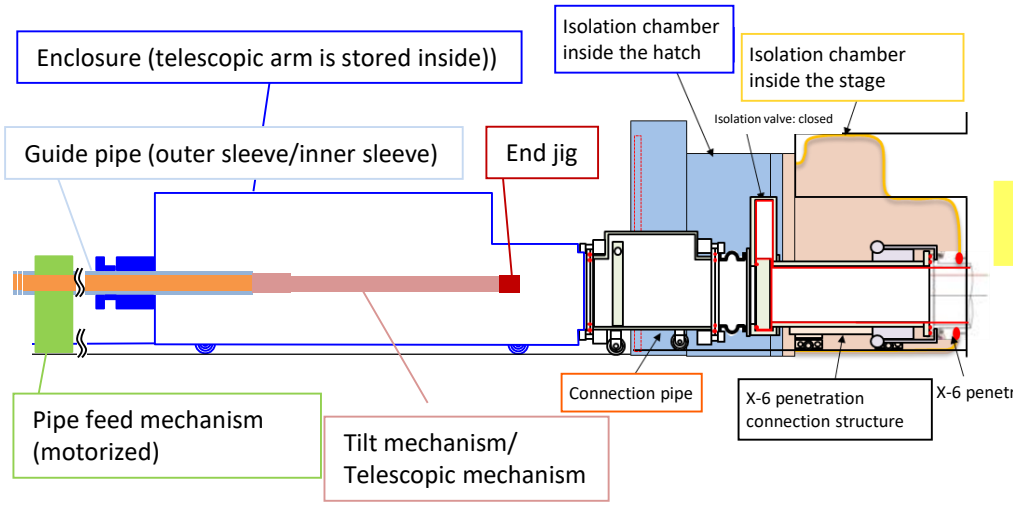
- The container is taken out using a vinyl bag to prevent the spread of contamination
- The container is put into an off-site transportation container and sent to an off-site analysis facility

※2: Prior to transportation, the surface dose/contamination density, etc. of the item to transport is measured to ensure that these measurement results fall below regulatory standards

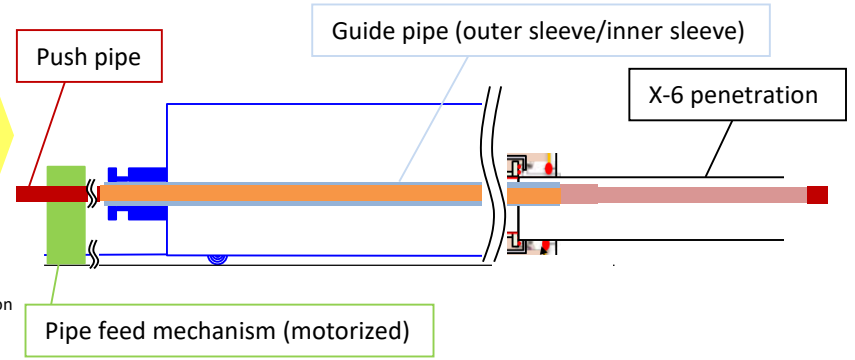
10. Withdrawal of telescopic trial retrieval device

3.1 Work overview (1/3)

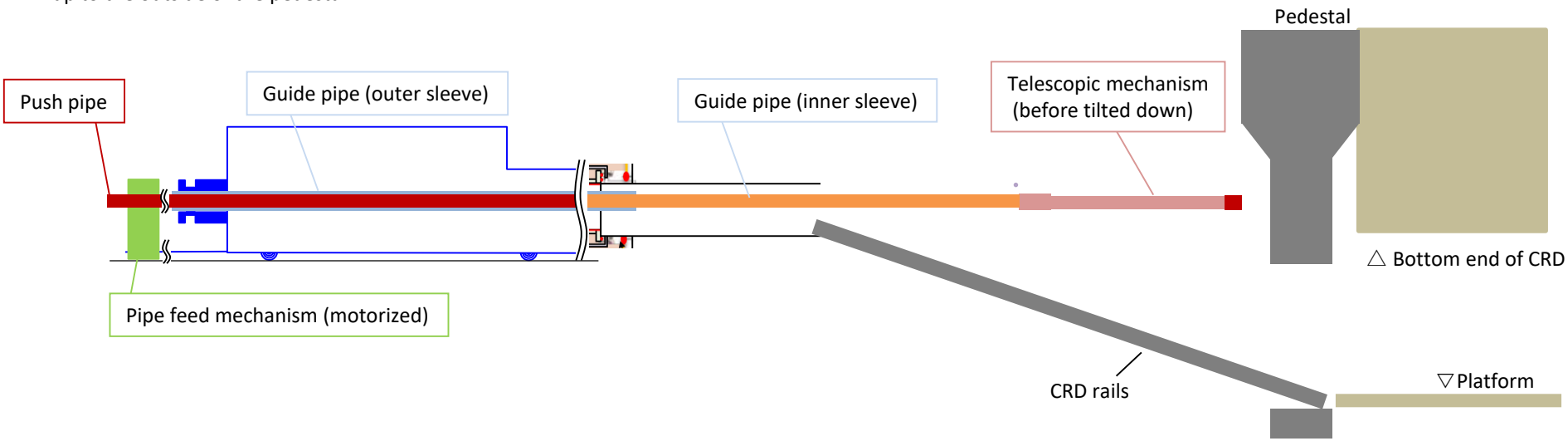
①An enclosure is installed behind the X-6 penetration connection structure and connection pipe



② The guide pipe (outer sleeve/inner sleeve) is pushed (push length: 6.5m) (when pushing to the end of the enclosure, the push pipe is pushed by motorized mechanism, after it is attached manually to the inner sleeve of the guide pipe)

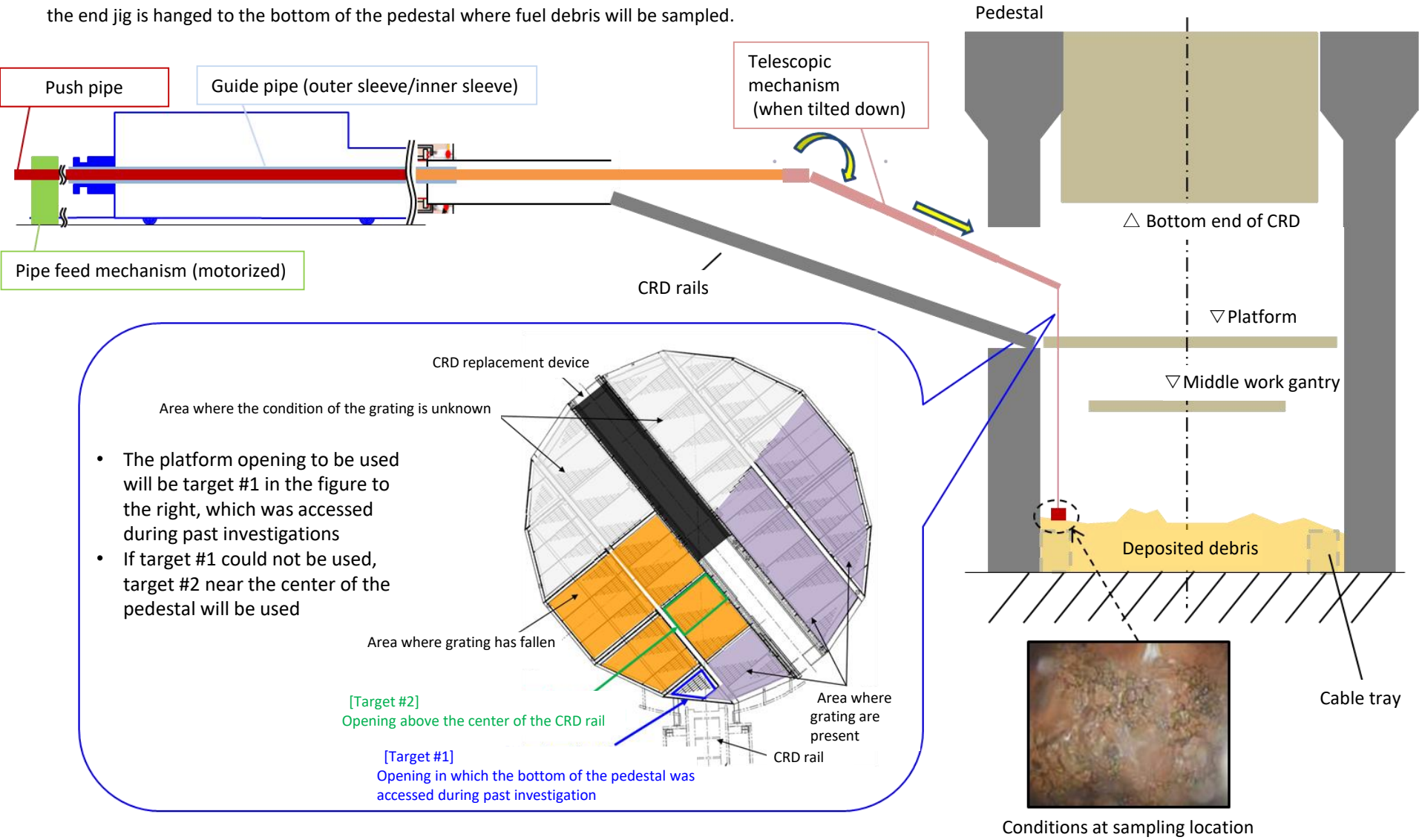


③ Push pipe is successively connected and fed in to push only the inner sleeve of the guide pipe (push length: 5.0m), pushing the telescopic arm right up to the outside of the pedestal



3.1 Work overview (2/3)

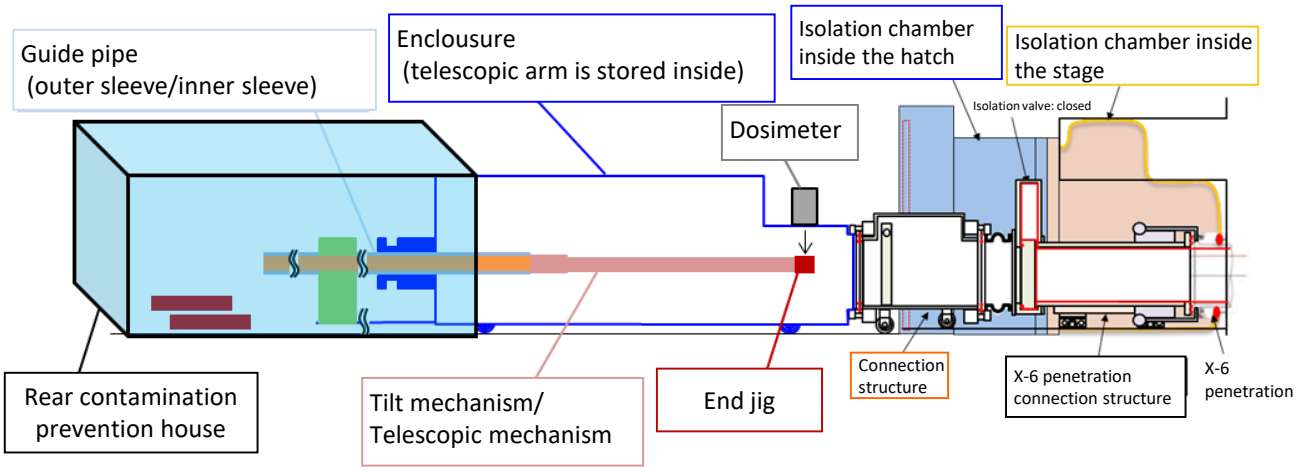
④ A tilting mechanism is used to lower end jig and insert the telescopic arm into the pedestal. Thereafter, the end jig is hanged to the bottom of the pedestal where fuel debris will be sampled.



- The platform opening to be used will be target #1 in the figure to the right, which was accessed during past investigations
- If target #1 could not be used, target #2 near the center of the pedestal will be used

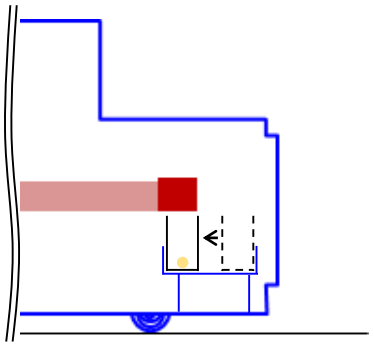
3.1 Work overview (3/3)

⑤ After the installation of a rear contamination prevention house (hereinafter referred to as, “rear house”) behind the enclosure, the telescopic arm will be withdrawn by the opposite procedure from insertion, and the isolation valve will be closed. After that, the dose of the sampled fuel debris will be measured to confirm that it is at a dose level that can be handled.

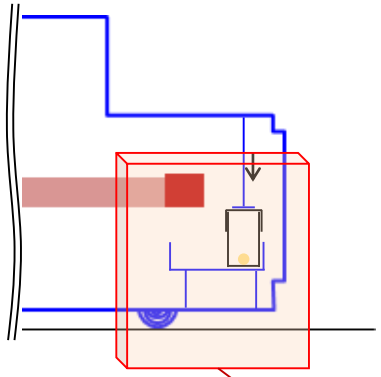


※**D**ouble **P**orte pour **T**ransfer **E**tanche (French) is a system that enables the lid and a dedicated port to be open/closed at the same time in order to prevent the spread of contamination.

⑥ The transportation box will be moved remotely to underneath the end jig and the fuel debris will be put inside the transportation box

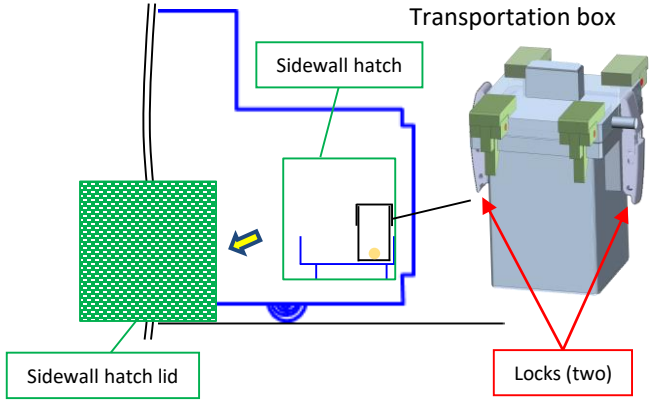


⑦ The transportation box will be moved remotely to underneath the lid. The lid will be firmly attached to the transportation box to ensure that no further dust will rise. After that, sidewall hatch contamination prevention house (hereinafter referred to as, "sidewall house") will be installed.



Sidewall hatch contamination prevention house

⑧ The enclosure sidewall hatch will be opened through the sidewall house and the transportation box will be removed after securing its lid. The transportation box will then be inserted into a DPTE※ container and transported to the glovebox.



(The diagram of sidewall is omitted)

4. Future schedule

- There are uncertainties of removing deposits with low pressure water and the future use of high pressure water/AWJ. In addition, we know through tests using the mockup that it will take time to construct an access route for the robotic arm. Furthermore, we must conduct additional tests to confirm the reliability of the robotic arm that will be used for the first time inside the primary containment vessel of a reactor that has suffered an accident. In light of these situations, to ascertain the attributes of fuel debris quickly and steadily, we will use the telescoping device that was successful during past internal investigations and can be inserted into the PCV without completely removing all of the deposits, to sample fuel debris. Thereafter, we will continue initiatives pertaining to fuel debris retrieval in order to perform internal investigations and sample fuel debris with the robotic arm.
- Prior to constructing an access route for the robotic arm, we will use the telescopic device to confirm conditions after the removal of deposits from inside the PCV thereby improving the certainty that robotic arm tasks can be performed.
- We plan to begin the trial retrieval of fuel debris by October 2024 at the latest.
- We will continue to steadily move forward and prioritize safety during the removal of deposits and the trial retrieval of fuel debris.