



2019 IAEA General Conference, Side Event

Fukushima Daiichi Decontamination and Decommissioning Current Status and Challenges

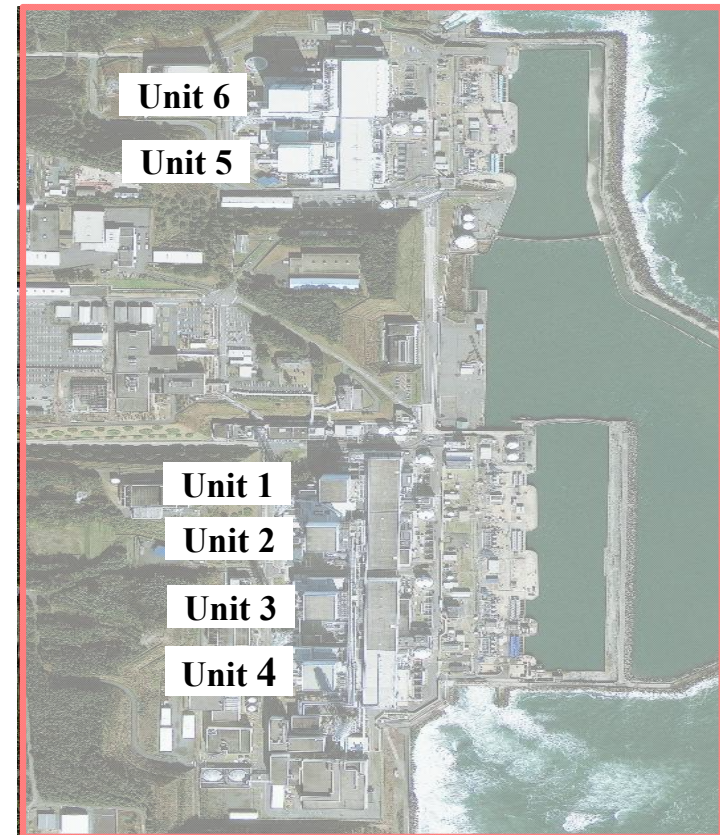
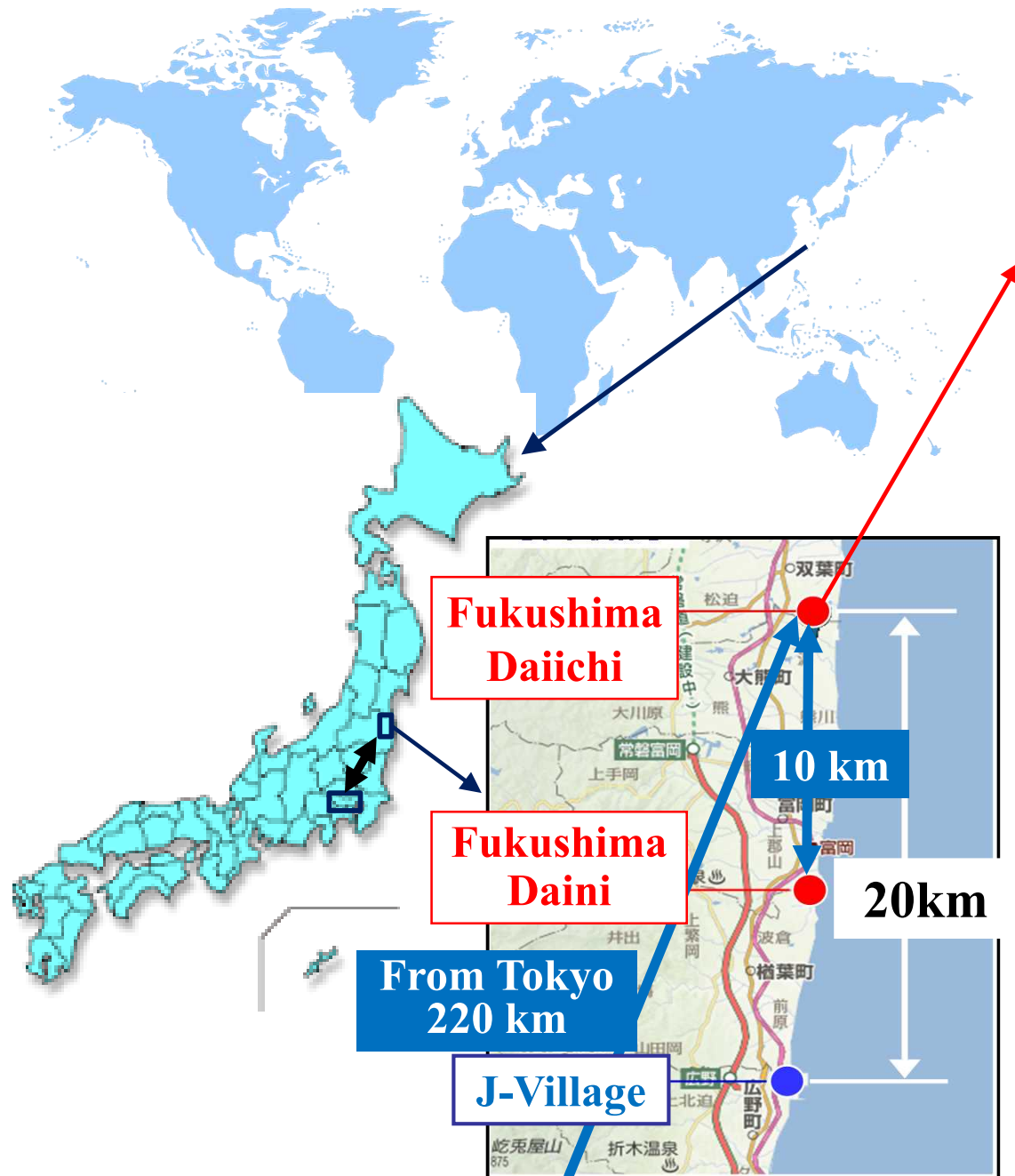
September 16, 2019

Akira ONO

Chief Decommissioning Officer

**President of Fukushima Daiichi Decontamination and
Decommissioning Engineering Company,
Tokyo Electric Power Company Holdings, Inc.**

Map of Japan and location of Fukushima Daiichi



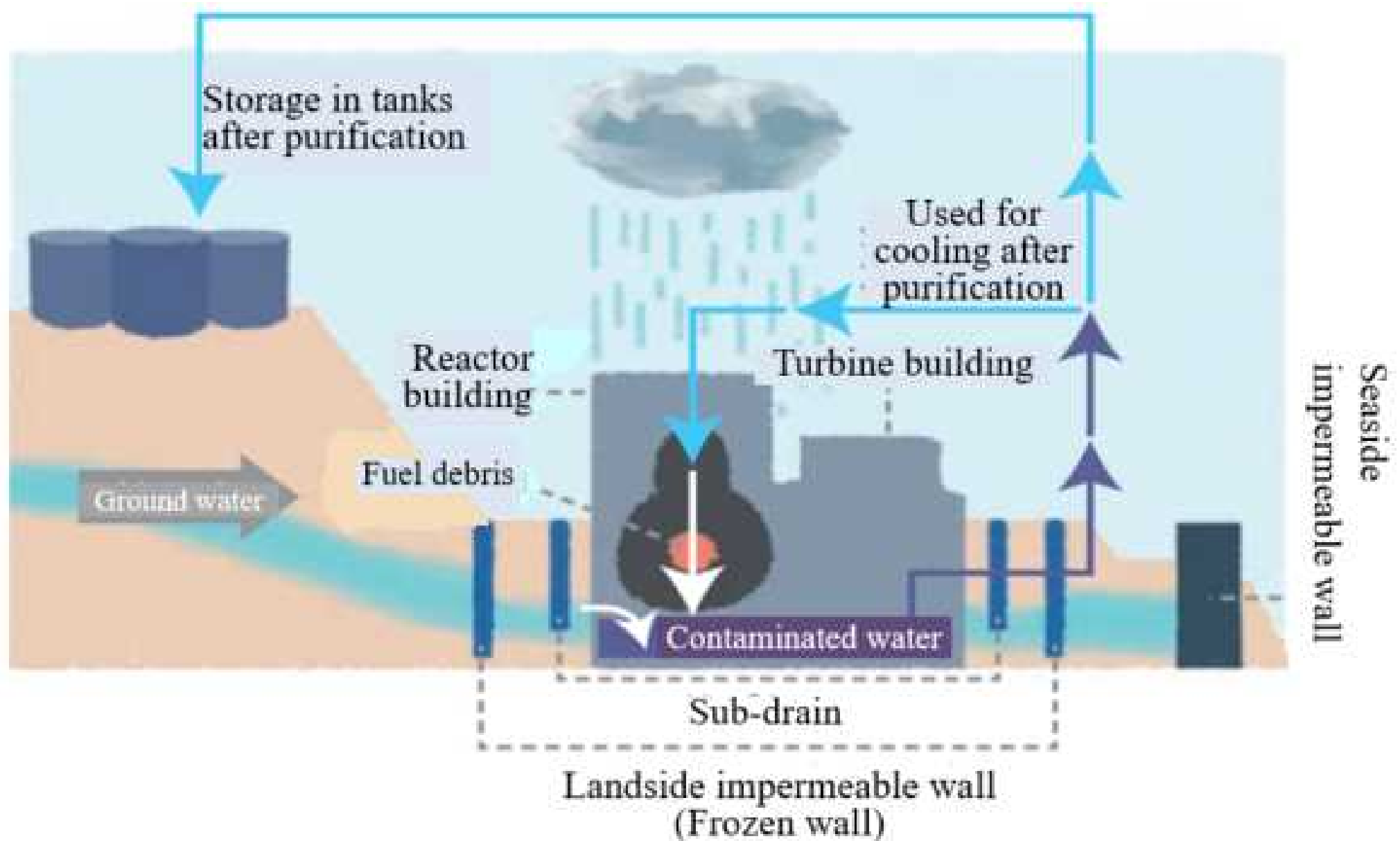
**Total output (4.7GW)
could power more than
10 million households.**

Agenda

1. Contaminated Water Management
2. Fuel Removal from Spent Fuel Pools
3. Dismantlement of Unit 1/2 Stack
4. Toward Fuel Debris Retrieval

The background image shows an industrial site, possibly a refinery or chemical plant, with several tall distillation columns and large storage tanks. In the foreground, there is a body of water, likely a river or bay, with a dark, silty appearance. The sky is overcast with grey clouds. The entire image has a blue color overlay.

1. Contaminated Water Management



Source: Based on the handout for public hearings held by METI in 2018

Three Principles

① Removing source of contamination

② Isolating fresh water from contaminated areas

③ Preventing leakage of contaminated water

① Multi-nuclide removal equipment (ALPS)

Water treatment facility for Subdrain & Groundwater drain

Temporary storage tanks

③ Augmentation of tanks (replacement with welded tanks)

② Paving

② Groundwater Bypass wells

② Subdrain Wells

② Ice Wall (frozen soil wall)

③ Ground improvement with liquid glass

Upper permeable layer

Low-permeable layer

Lower permeable layer

Low-permeable layer

Reactor Bldg.

Turbine Bldg.

Unit 1

Unit 2

Unit 3

Unit 4

Water collecting tanks

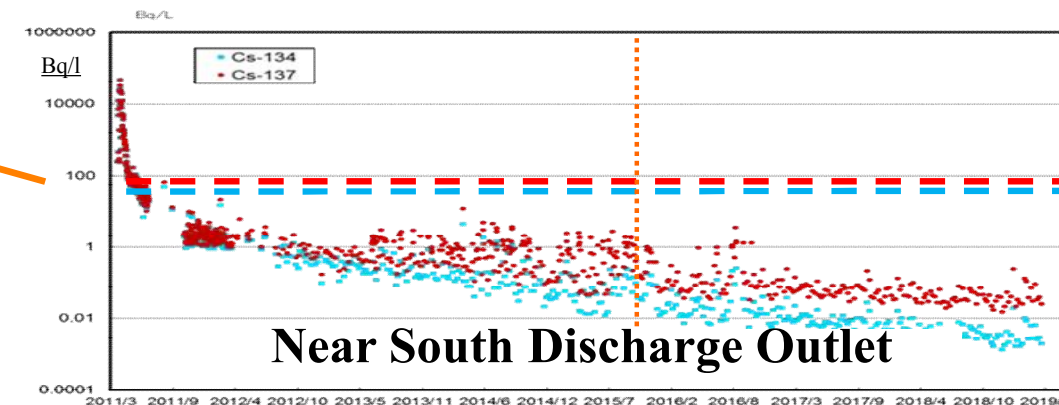
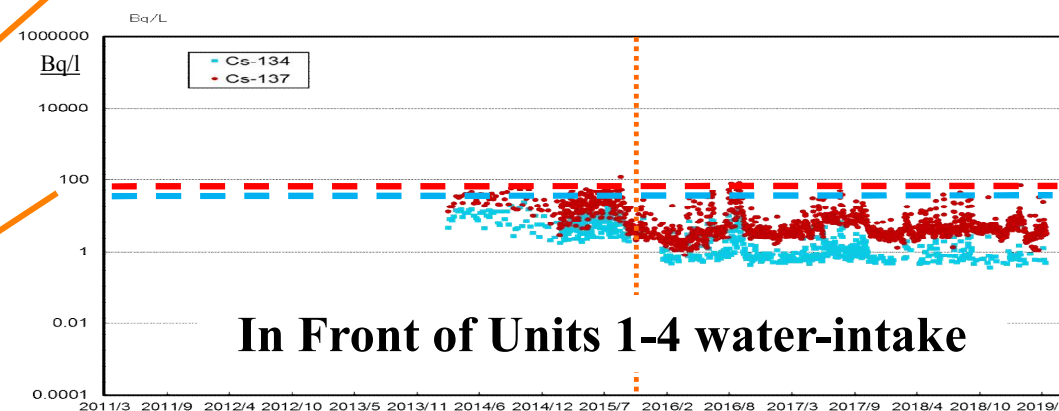
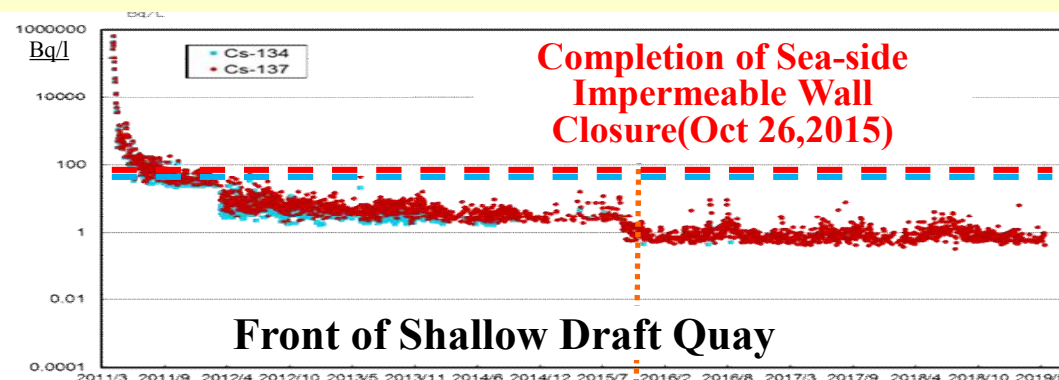
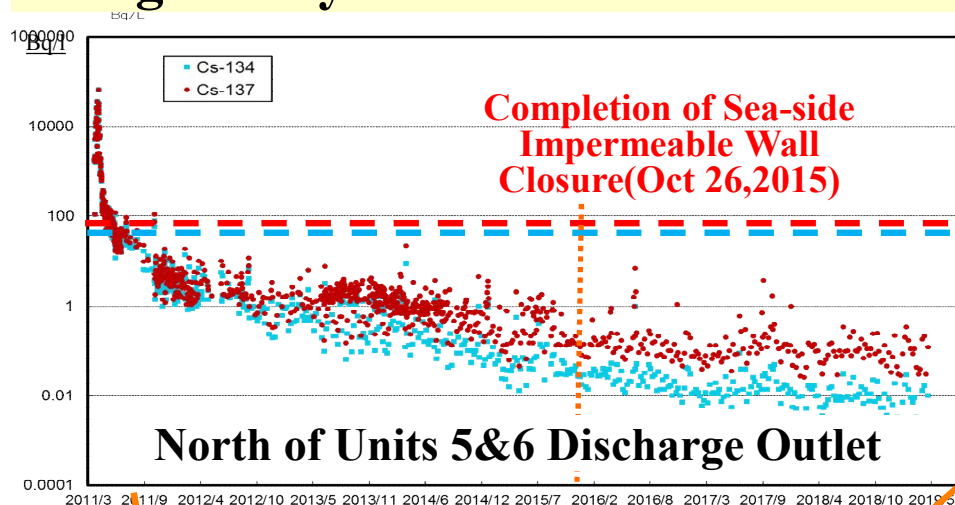
Sea

① Removing contaminated water from trenches

③ Sea-side Impermeable Wall

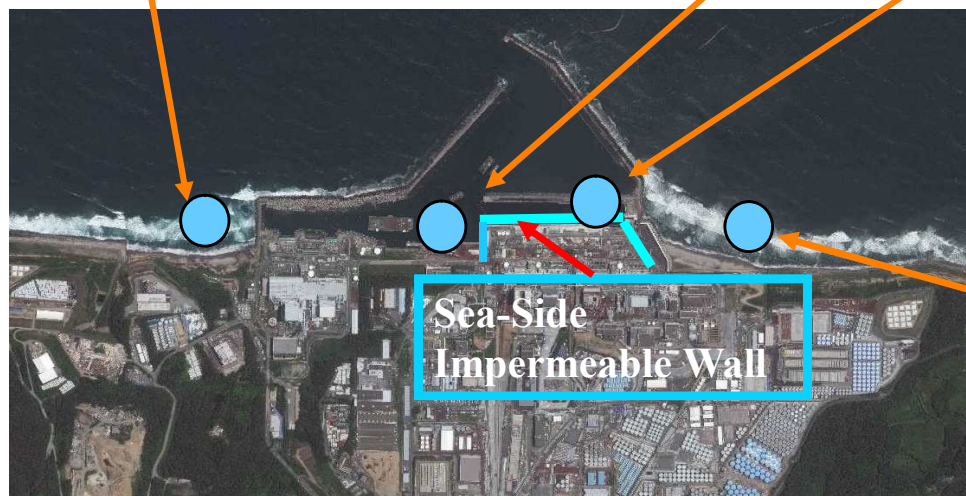
③ Groundwater drain

- Compared to the situation just after the accident, the current level of radioactivity has been lowered to less than parts per million at the lowest.
- The concentrations outside the port are substantially below the Japanese regulatory limits.



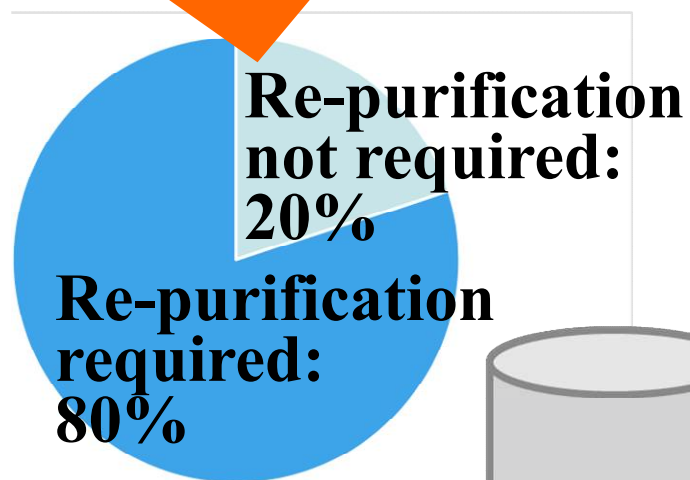
Japanese Regulatory Limit

- Cesium 137: 90Bq/L
- Cesium 134: 60Bq/L

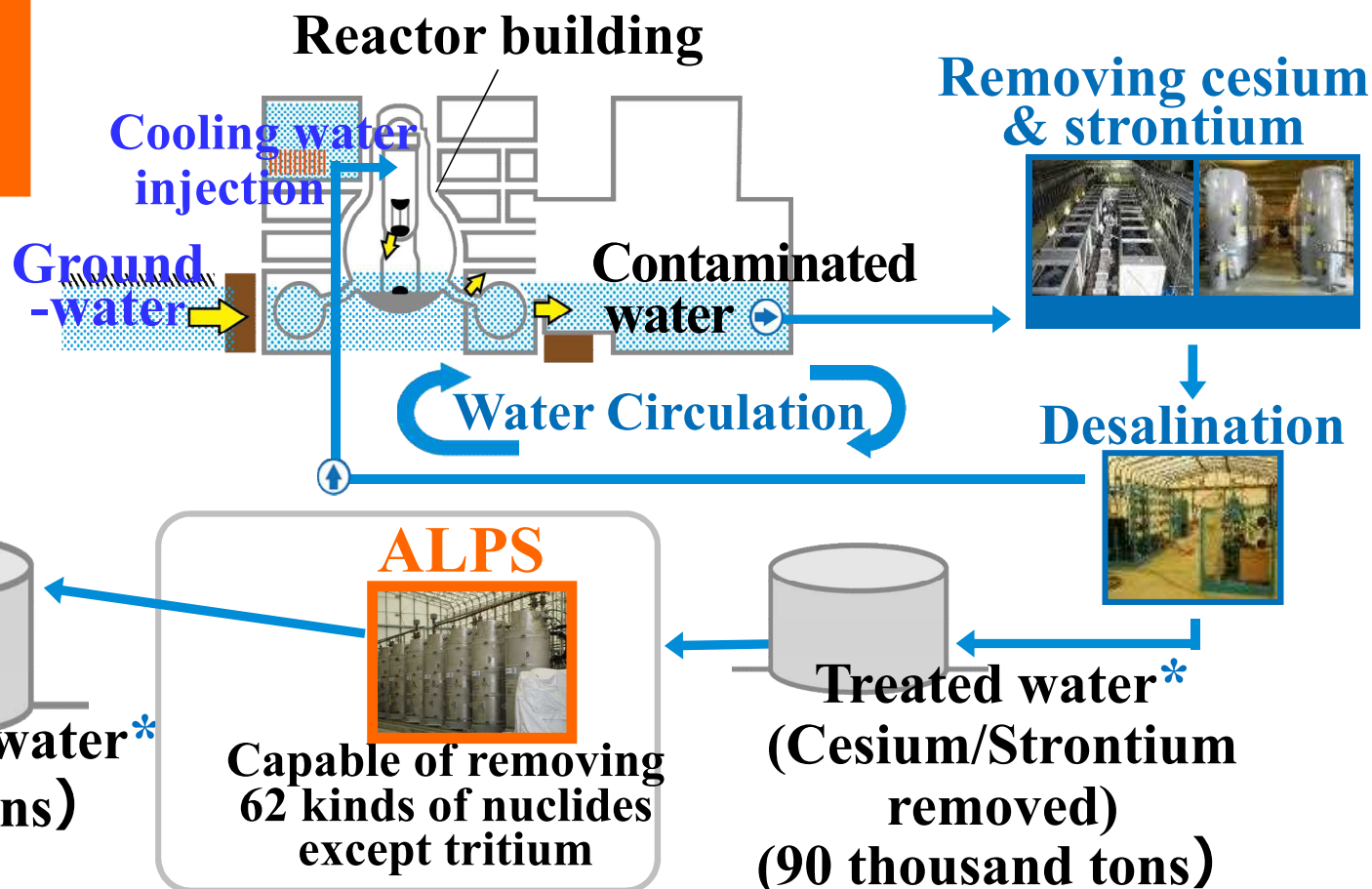


- The aim of water purification using ALPS is to meet the criteria for the site boundary (less than 1mSv/year).
- If we are to discharge the treated water into the environment, the water should be re-purified in order to meet the required criteria.
(The percentage of water to be re-purified is 80%.)

If treated water is to be discharged into the environment,



ALPS-treated water*
(1.05 mil tons)



*Capacity of tanks will be increased to 1.37 mil tons in 2020, but we may not be able to accommodate additional treated water after summer 2022.

2. Fuel Removal from Spent Fuel Pools

燃料をキャスク

- Fuel removal at Unit 4 was completed in December 2014.
- Fuel removal at Unit 3 started in April 2019.
- Preparations are underway at Units 1 and 2.

▼ Units 1 & 2

▼ Unit 3

▼ Unit 4

Removal of rubble & decontamination

Installation of fuel removal facility

Fuel removal

Storage & transportation

Unit 1



Unit 2



Unit 3



■ Fuel removal started on April 15, 2019.



Fuel removal

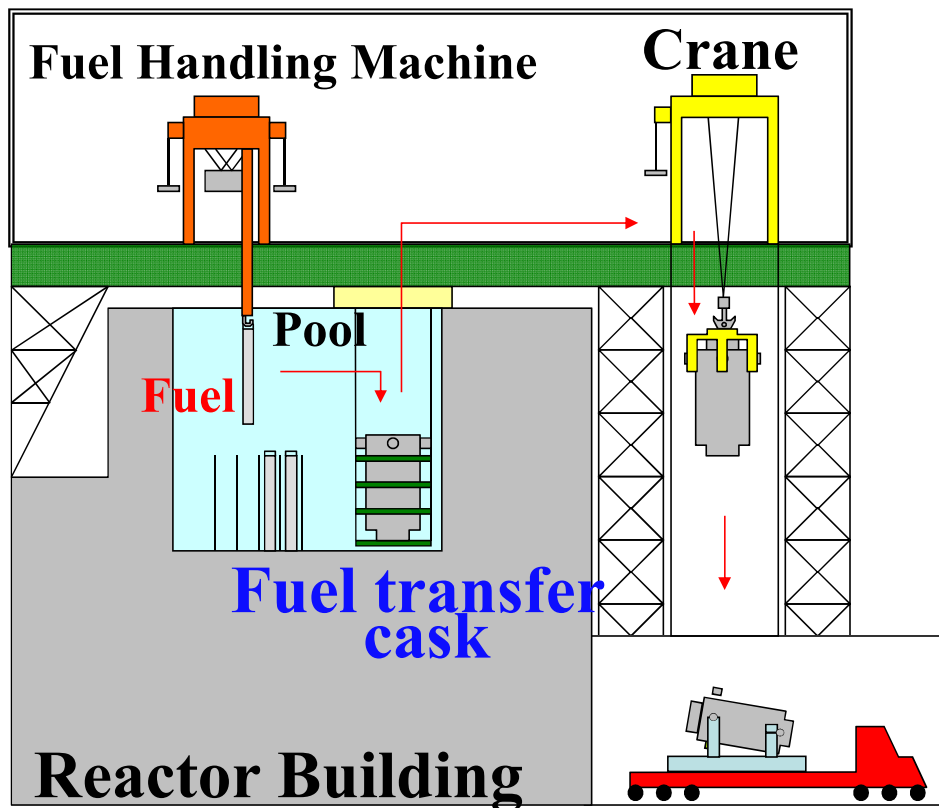


Loading onto the fuel transfer cask

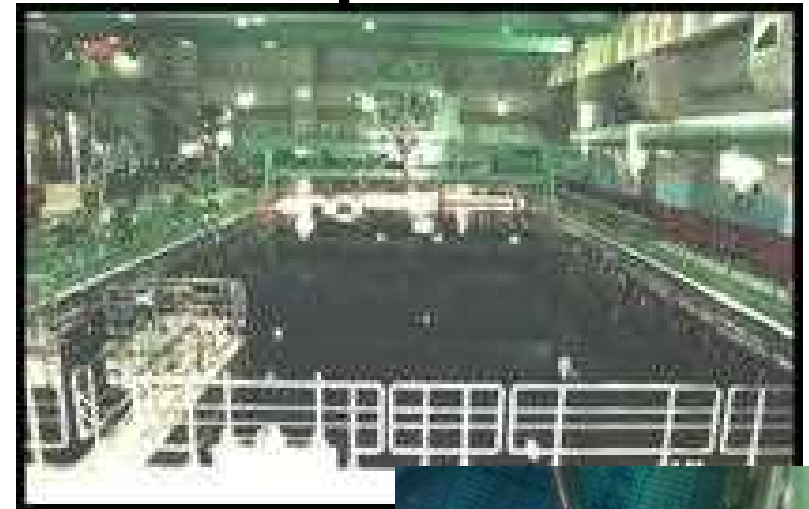


Remote control room

- After loading onto the fuel transfer cask, the fuel is transported to the on-site common pool and stored in the fuel rack.



Common pool



Site transfer



Store in fuel rack



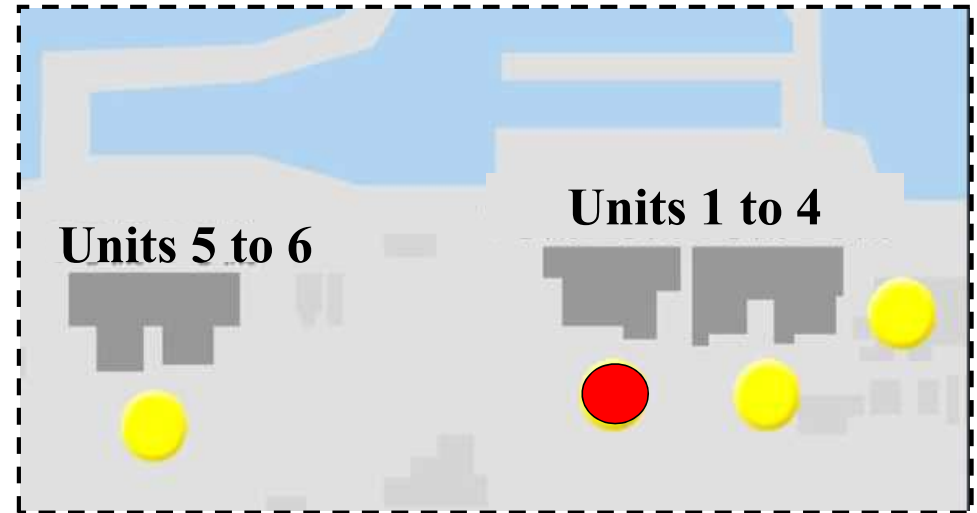
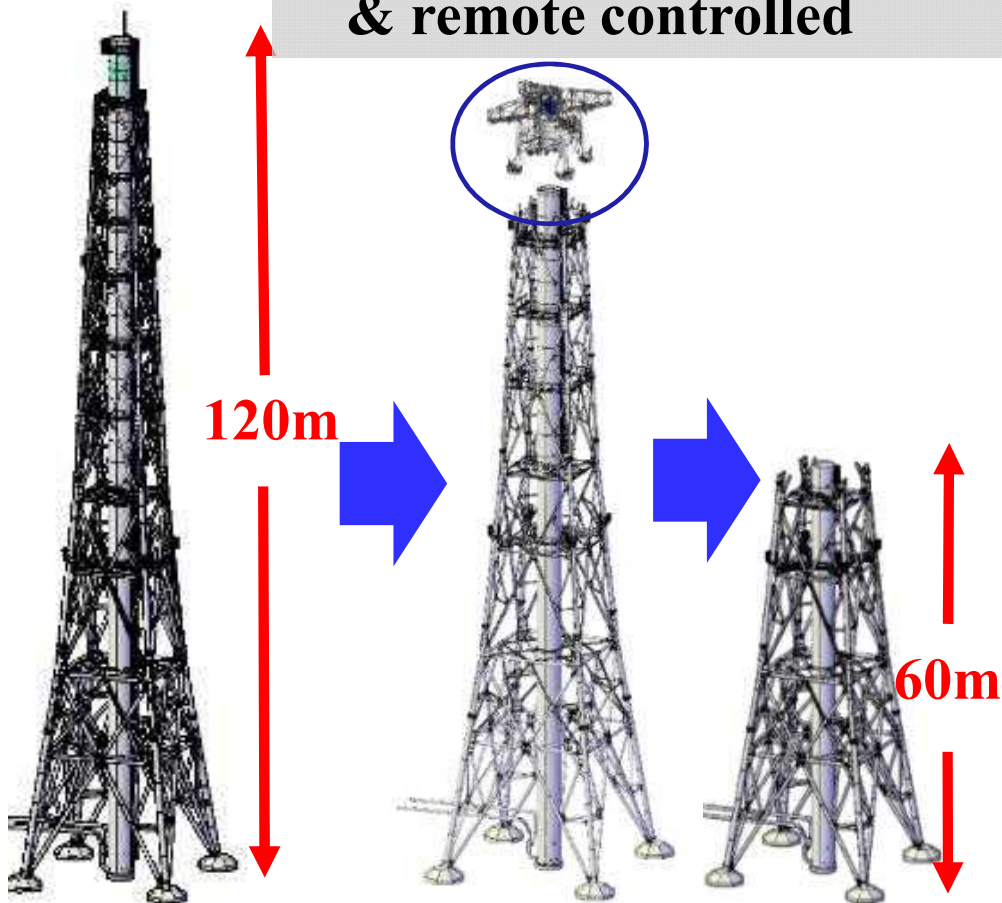
3. Dismantlement of Unit 1/2 Stack



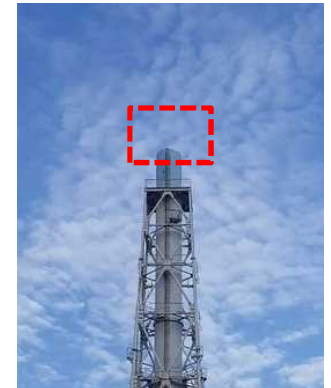
- The upper parts of the exhaust stack for Units 1 and 2 will be dismantled to further reduce risk, because the stack has damaged parts.

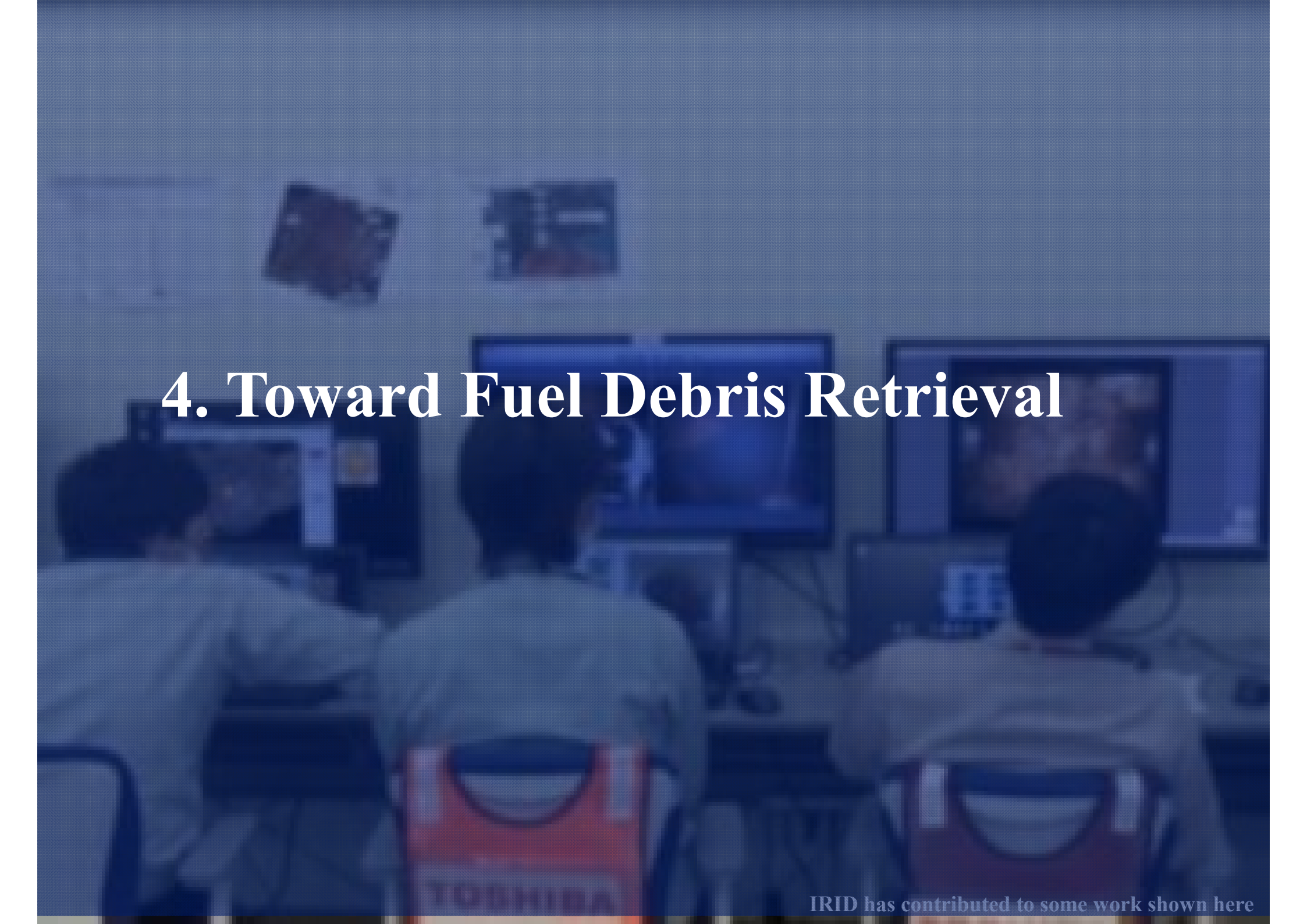
Work flow

Dismantlement device:
hung by large-scale crane
& remote controlled



Cutting of the stack top (from Aug. to Sep.)

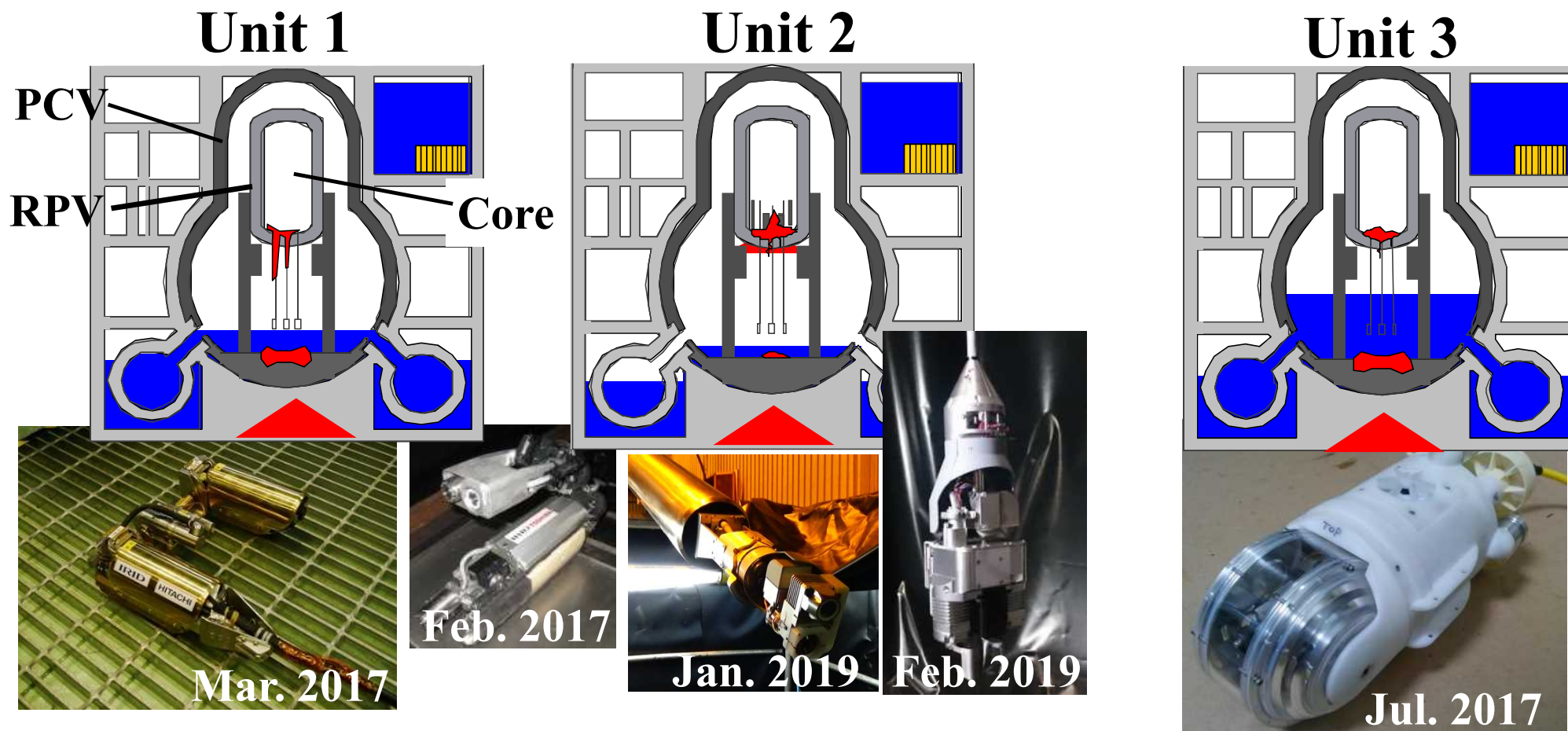


A blue-tinted photograph of three people working at computer monitors in a control room. The people are seen from behind, sitting at desks with multiple monitors. The room has a technical, professional feel. The text "4. Toward Fuel Debris Retrieval" is overlaid in white serif font in the center of the image.

4. Toward Fuel Debris Retrieval

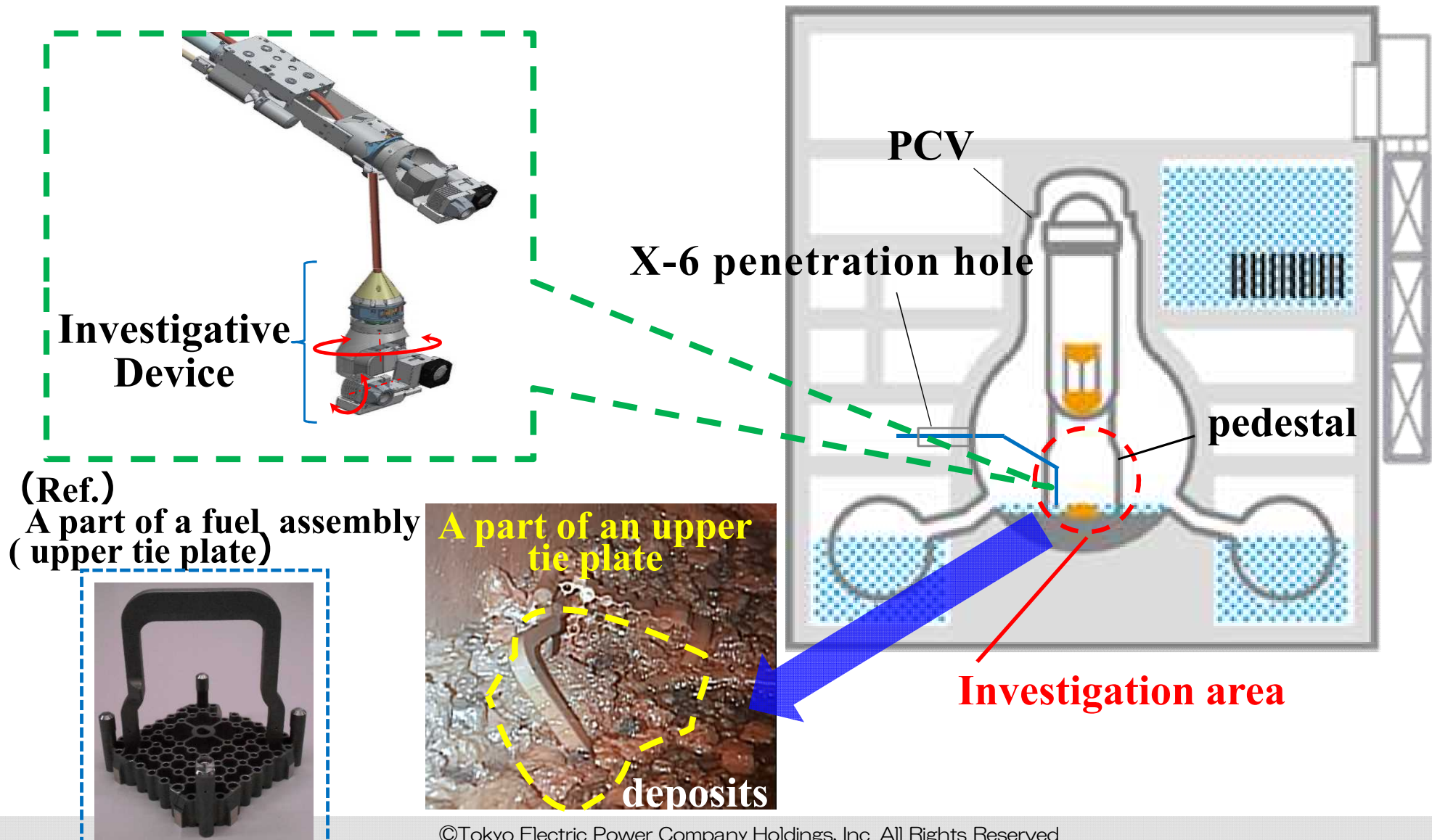
IRID has contributed to some work shown here

- Investigations suggest at Unit 1, almost all has dropped to the bottom of the PCV.
- It is assumed that at Unit 2, some has dropped to the bottom of the RPV or PCV, while some still remain within the core.
- As for Unit 3, its situation is assumed to lie between Unit 1 and 2.

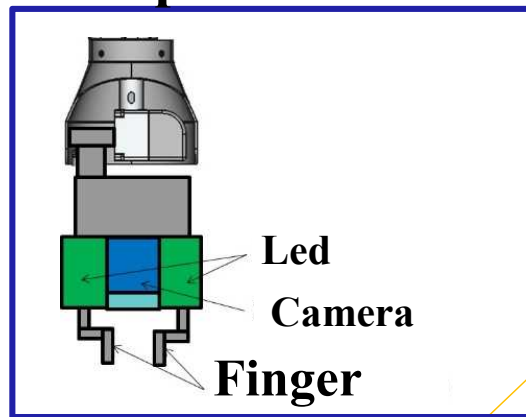


※The analysis of accident progression and the result of muon survey are also factored in.

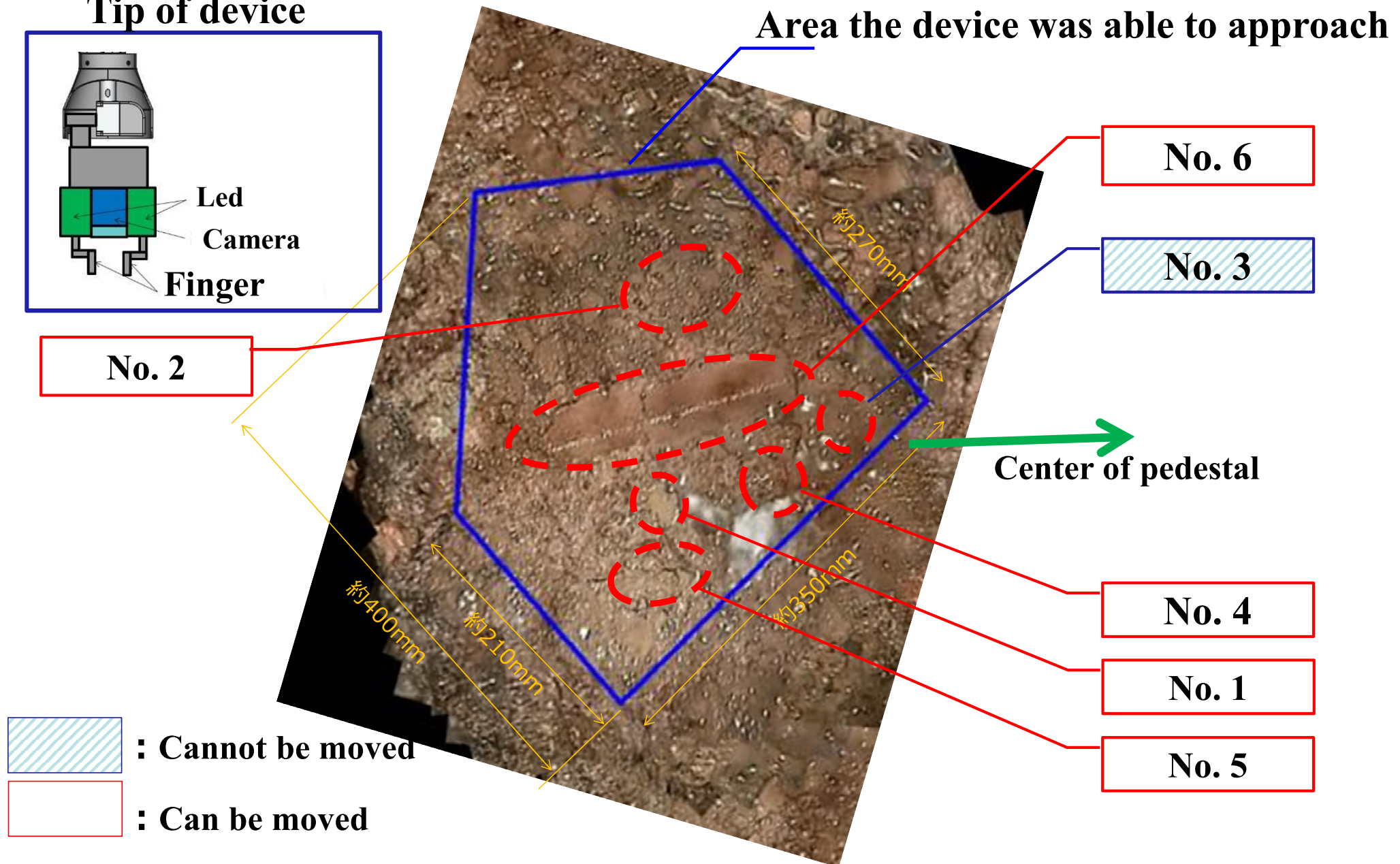
- An investigative device was lowered to the bottom of the PCV inside the pedestal.
- Deposits thought to include fuel debris were found.



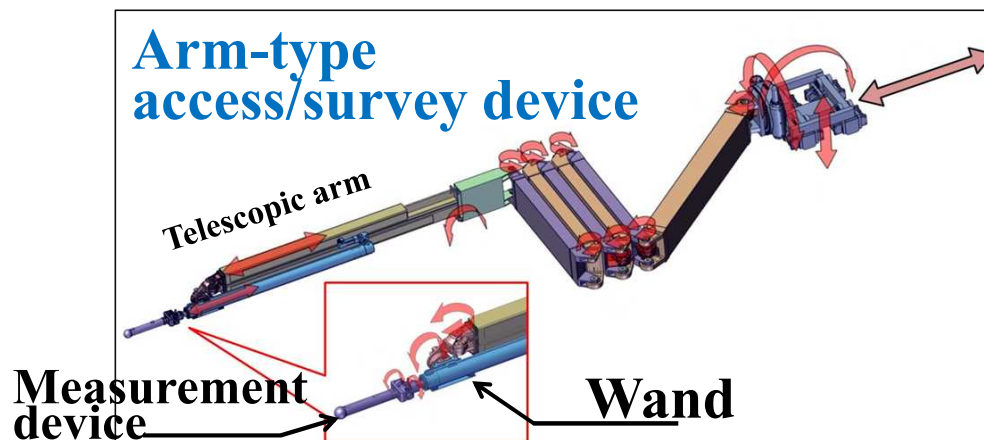
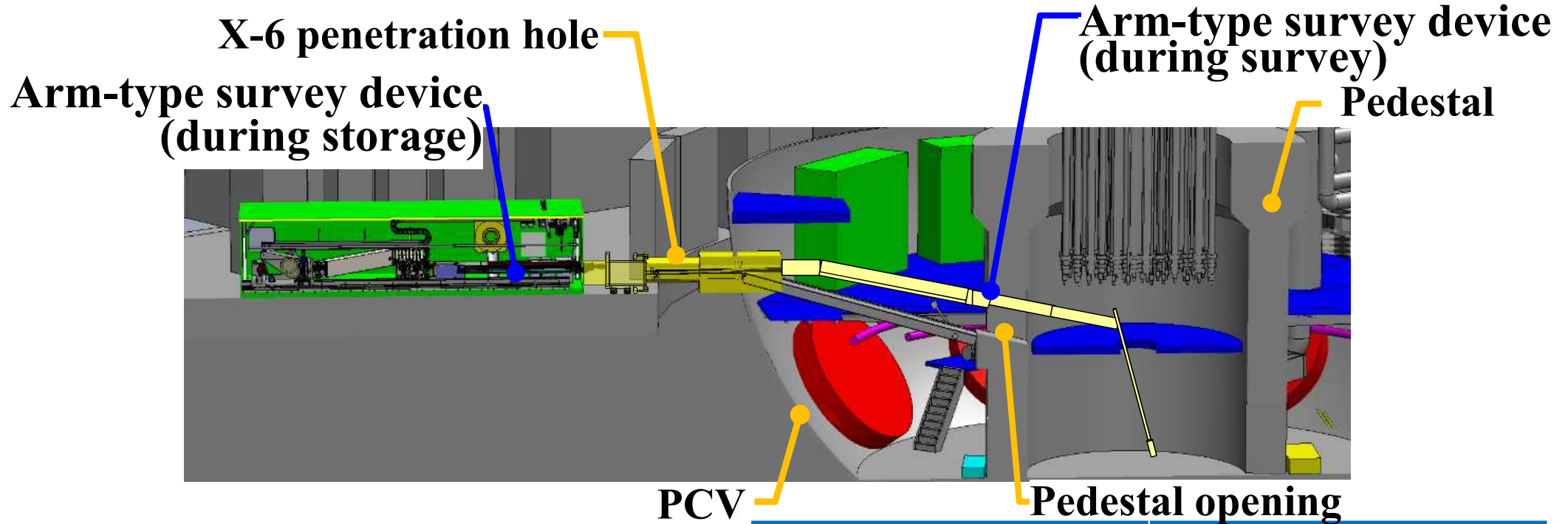
Tip of device



Area the device was able to approach

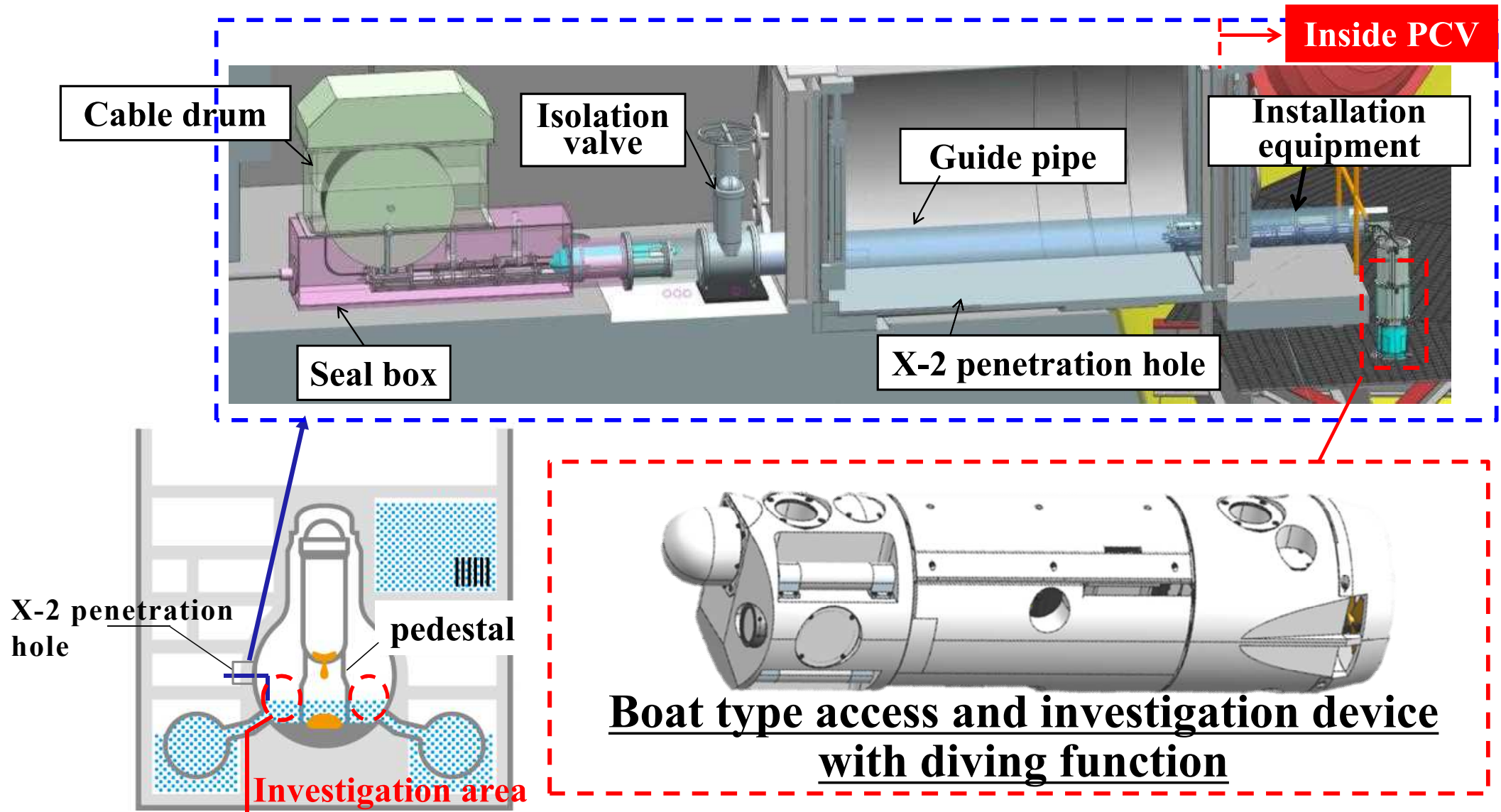


- An arm-type access and survey device is being developed to understand the structures and distribution of deposits inside the pedestal.
- Measuring equipment and a sampling tool will be attached to its wand.

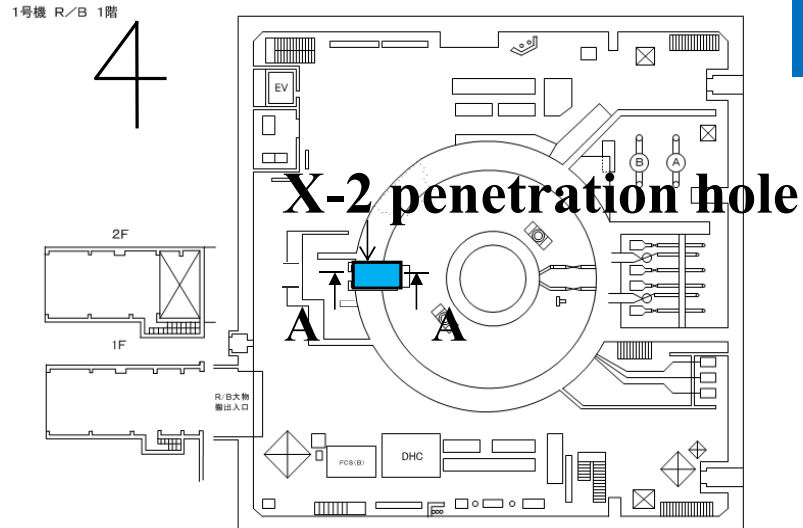


Investigation Item	Measuring equipment to be mounted
Detailed visual investigation	Pan-tilt camera
3D rendering	Airborne laser scanning equipment
Dose rate	Gamma camera

- A boat type device is being developed to understand the distribution of deposits mainly outside the pedestal.
- X-2 penetration hole will be used as a access route.



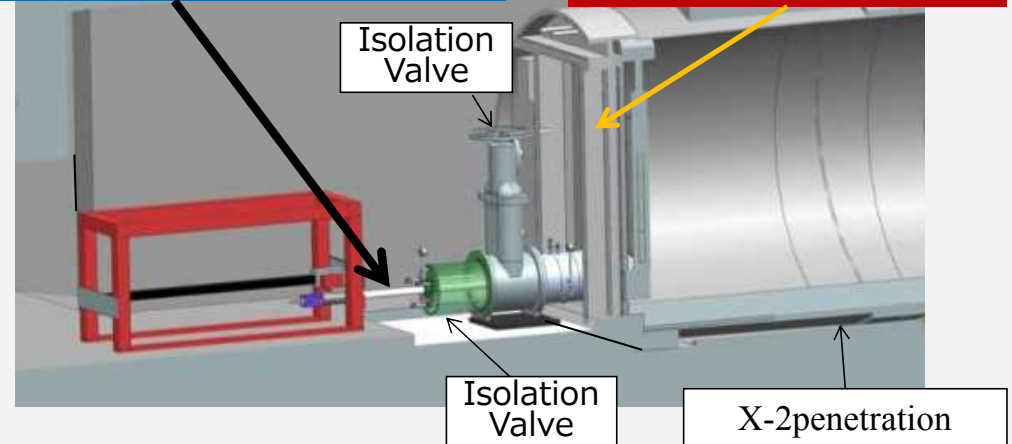
- The formation of an access route is underway using drilling and cutting technologies.
- The work was suspended due to the rise in the value on a temporary dust monitor.



Position of X-2 penetration at Unit1 first floor

Drilling Machine (core bit)

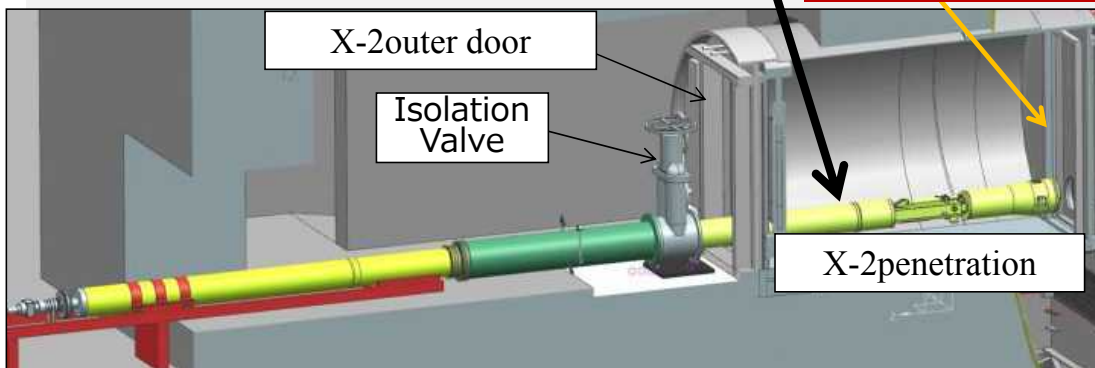
X-2 outer door



Drilling X-2outer door (A-A)
(completed in May 2019)

Drilling Machine (AWJ)

X-2 inner door



Drilling X-2 inner door (A-A)
(conducted in June 4, 2019)

The rise in the value
on temporary dust
monitor

Suspension of Work



**Accelerating the decommissioning work
with safety and steadiness**

**Establishment of a project-based
approach**

**:Transition to the system which allows us
to work in a planned manner, looking to
the future**

**Engaged in an emergency crisis mode to
reduce the short-term high risk**

- **Contaminated Water Management**
- **Radioactivity Reduction**



Thank you for your kind attention

TEPCO