Mid-and-Long-Term Decommissioning Action Plan 2025

March 27, 2025

Tokyo Electric Power Company Holdings, Inc.

Mid-and-Long-Term Decommissioning Action Plan 2025

The “Mid-and-Long-Term Decommissioning Action Plan” has been formulated to put forth the primary decommissioning work processes needed to achieve the milestones noted in the Mid-and-Long-Term Roadmap and the ideal state (FY2033) presented in the Nuclear Regulation Authority (NRA) Risk Map.

This is our “Mid-and-Long-Term Decommissioning Action Plan 2025,” a revised version based on the achievements made during FY2024.

Under the basic principle of “coexistence of reconstruction and decommissioning”, TEPCO aspires to carefully communicate about the future prospects of decommissioning in an easy-to-understand manner, so as to proceed with decommissioning while obtaining the understanding of the region and the people.

Furthermore, an outsourcing plan will be formulated based on the Mid-and-Long-Term Decommissioning Action Plan 2025 as we strive to expand outsourcing and get more local companies involved in decommissioning.

TEPCO and regional partner companies involved in decommissioning are collaborating in the field as one team going beyond their roles as contractor and contractee to improve the field capabilities of Fukushima Daiichi Nuclear Power Station.

Moreover, the initiatives undertaken during the work of decommissioning the Fukushima Daiichi Nuclear Power Station are unprecedented in the world, and hence, we will revise this plan regularly in accordance with the progress made and the challenges faced, as we systematically proceed with safe and stable decommissioning.

(Note) The “Mid-and-Long-Term Decommissioning Action Plan 2025” corresponds with the following plan indicated in the Mid-and-Long-Term Roadmap.
— Specific plan for achieving the main target processes, etc. specified in the Mid-and-Long-Term Roadmap and the goals laid out in the NRA Risk Map.
Mid-and-Long-Term Roadmap: Mid-and-Long-Term Roadmap towards the decommissioning of TEPCO’s Fukushima Daiichi Nuclear Power Station (Finalized by the Inter-Ministerial Council for Contaminated Water and Decommissioning Issues on December 27, 2019).
NRA Risk Map: Mid-term risk reduction goal map for TEPCO’s Fukushima Daiichi Nuclear Power Station (Finalized by the NRA on January 29, 2025)

Progress made in FY2024 and Revisions to the Plan

Progress made in FY2024

○ **Fuel removal from spent fuel pools**

- **Completed decontamination and shielding of the operating floor in Unit 2 (April 2024)**

○ **Fuel debris retrieval**

- **Completed the trial retrieval of fuel debris from Unit 2 (commenced in September 2024, completed in November 2024)**

○ **Waste management**

- **Started operation of the solid waste storage vault Building 10 (August 2024)**

○ **Other**

- **Formulated a plan for maintaining and removing decommissioning facilities (October 2024)**

Revisions to the Plan

○ **Fuel debris retrieval**

- **Reflected progress made in the fuel debris trial retrieval from Unit 2**
- **Fleshed out the details of PCV internal investigations**

Contaminated water management

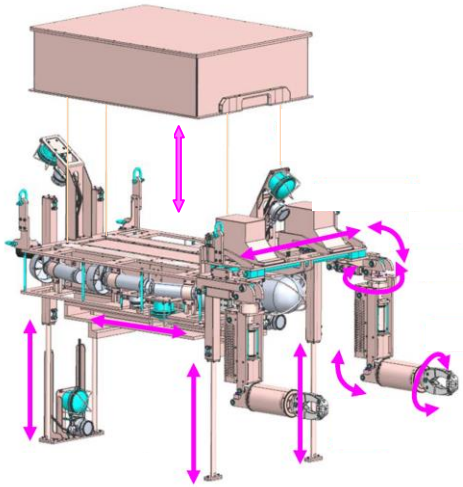
- Progress made in FY2024

○ Progress made in FY2024

- **Amount of contaminated water generated**
  - The amount of contaminated water generated is well controlled as a result of multi-layered contaminated water measures such as repairs to the damages in the building roofs and paving over the site. In FY2023, when rainfall per year was less then the average, the amount of contaminated water generated in approx. 80m^3/ day, or approx. 90 m^3/day when assuming average amount of rainfall. In April 2024, it was evaluated that the we had met the milestone in the Mid-and-Long-Term Roadmap of “suppressing the amount of contaminated water generated for an average amount of rainfall to 100 m^3/day or less in 2025.” in advance of the target schedule.
- **Accumulated water in buildings**
  - A full-scale mockup test for collecting the zeolite sandbags in the process main building was conducted. Actual work on the ground was started in March 2025.

Mockup equipment
(JAEA Naraha Center for Remote Control Technology Development)

ROV for collection work



Container sealing ROV

Contaminated water management

- Major work processes going forward（1/5）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Reduce contaminated water generation to about 100 m^3/day or less (within 2025)**
  - The maintenance, management and operation of the groundwater bypass, sub-drain and land-side impermeable wall will continue and the level of the groundwater around the buildings will be kept low in a stable manner.
  - As measures to prevent rainwater seepage, site pavement will be carried out on the inner side of the land-side impermeable wall and the damaged parts of building roofs will be repaired.
- **Reduce contaminated water generation to about 50-70 m^3/day (by the end of FY2028)**
  - Promote localized building water sealing as a measure to further suppress the amount of groundwater flowing into the buildings.
  - The countermeasures mentioned above are being implemented, and we are formulating countermeasures that minimize the need for operation/maintenance work, such as pumps for sub-drains and the land-side impermeable wall, etc., and consequently reduce the need for management resources.
  - Commencement of measures to reduce the amount of contaminated water pumped up at the 2.5m foundation

(Challenges)

- Studying measures based on the constraints for paving over the site (improve the radiation environment in the work area, remove existing equipment, etc.).
- Constraints in carrying out rainwater measures for buildings (removing existing equipment, etc.).

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Contaminated water management

- Major work processes going forward（2/5）

○ Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Reducing the amount of contaminated water being generated**
  - Complete localized water sealing of reactor buildings.
  - Commence measures to reduce the amount of contaminated water pumped up from the 2.5m foundation, including contaminated soil countermeasures.
  - Ascertain the relationship between the roles of the land-side impermeable wall/sub-drains and the generation of contaminated water, and formulate a plan to gradually phase these measures out.
- **Treating stagnant water in buildings**
  - Commence operation of α nuclide removal equipment, and dry out the process main building and HTI building.
    - In preparation for the treatment of stagnant water in buildings, install tanks that will be used as water storage tanks before the water is treated with cesium adsorption equipment (KURION/SARRY/SARRY-II)
    - The floor will be exposed after removing high radiation zeolite sandbags etc. on the lowermost subfloor.
    - Equipment for removing α nuclides present in the stagnant water will be designed/installed after ascertaining the characteristics of these nuclides.

    (Challenges)
    - Studying safety measures to be taken with regard to handling or implementing measures for high radiation zeolite sandbags etc.
    - Studying detailed operational methods for separating/removing α nuclides in the stagnant water.

Contaminated water management

- Major work processes going forward（3/5）

○ Other work related to contaminated water management

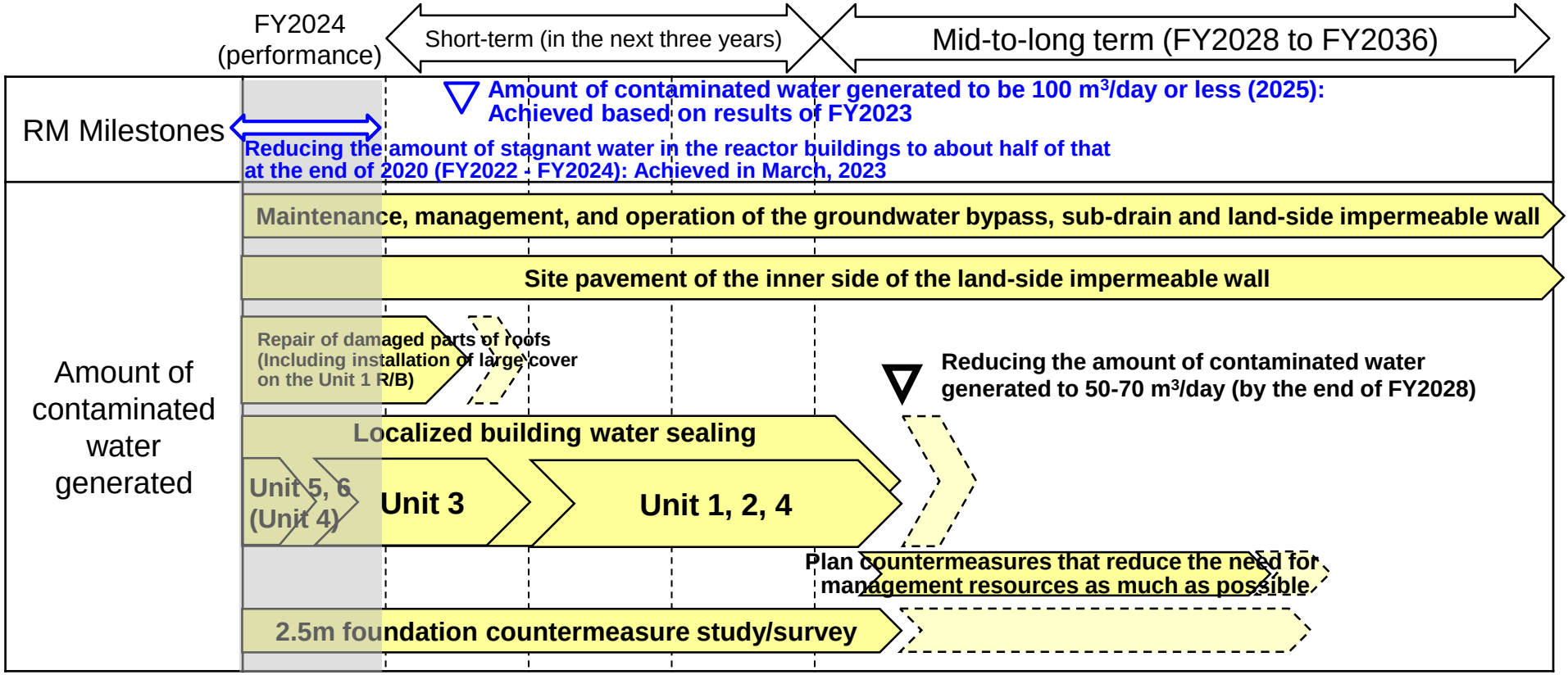
- **Countermeasures after removing stagnant water in the Units 1-4 T/B. etc.**
  - Study recovery methods and manufacture/install recovery equipment to handle sludge etc. that exists on the floor.
- **Countermeasures for puddle**
  - Remove the puddles on site (continue to monitor puddles with Cs137 levels that are below the Cs137 regulatory concentration limit as puddles from rainwater or groundwater)
  - Puddles in trenches that have yet to be investigated because the areas in which they are located cannot be accessed due to high radiation levels will be investigated and removed.
  - The underground water storage tanks will be removed after studying the method of dismantling them while ensuring that dust is not scattered.
  - Concentrated liquid waste (supernatant liquid) will be treated after pre-processing on a trial basis.

(Challenges)

- Measures for volume reduction and storage of contaminated waste generated when the underground water storage tanks that stored stagnant water are dismantled

Contaminated water management

- Major work processes going forward（4/5）



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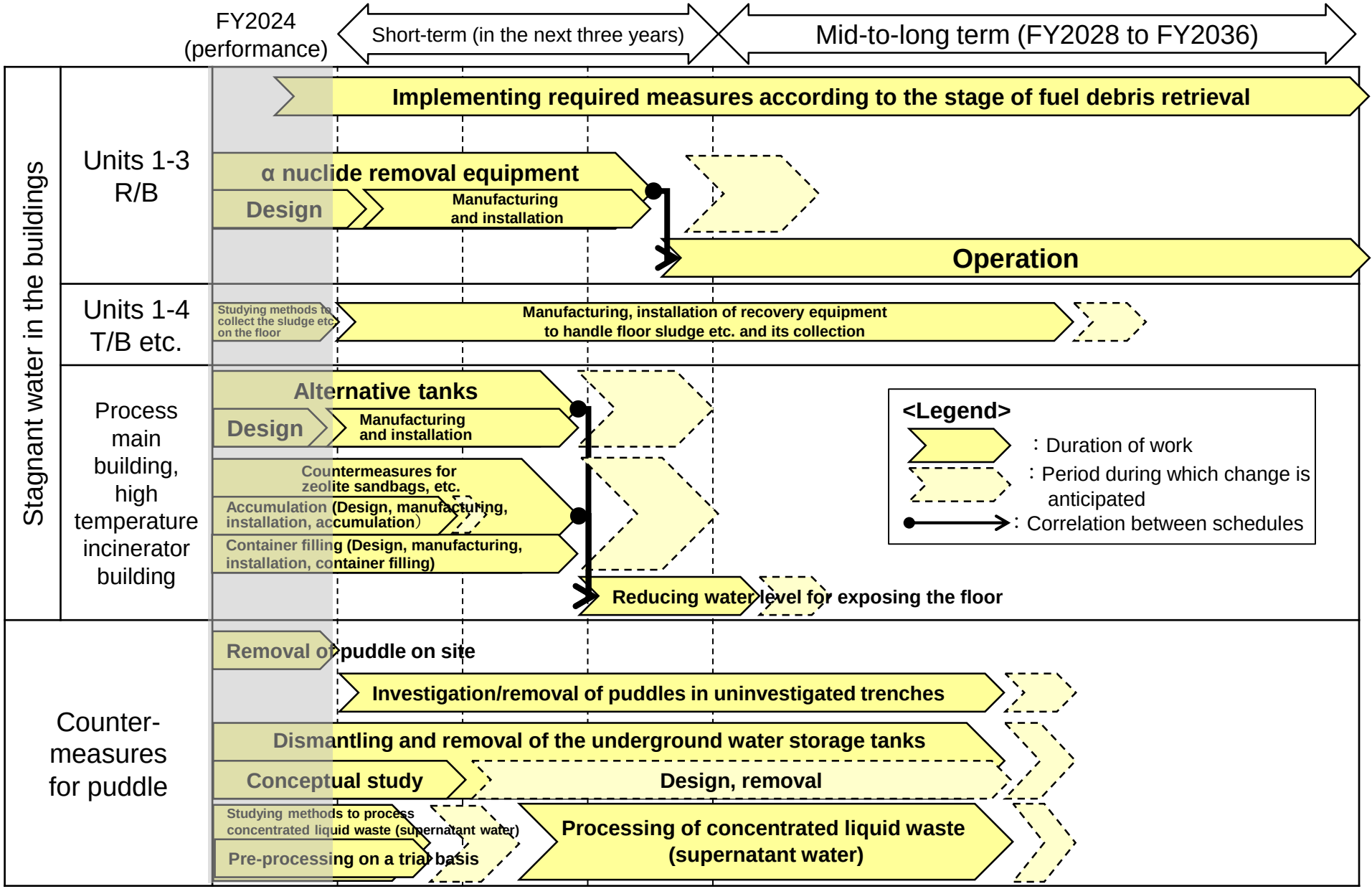
：Duration of work

：Period during which change is anticipated

：Correlation between schedules

Contaminated water management

- Major work processes going forward（5/5）



Treated water management

- Progress made in FY2024

○ **Major progress made in FY2024**

- **Treated water management**
  - The draft of the FY2024 ALPS treated water discharge plan was prepared in January 2024, and was finalized following input from various stakeholders.
    - FY2024 1st discharge (April to May 2024)
    - FY2024 2nd discharge (May to June 2024)
    - FY2024 3rd discharge (June to July 2024)
    - FY2024 4th discharge (August 2024)
    - FY2024 5th discharge (September to October 2024)
    - FY2024 6th discharge (October to November 2024)
    - FY2024 7th discharge (March 2025)
  - Sea area monitoring performed by the Government of Japan, Fukushima Prefecture, and TEPCO since the commencement of ALPS treated water discharge into the sea has confirmed that discharge is being carried out safely.
  - Facility inspections have been carried out during and after discharges, and it has been confirmed that there are no abnormalities.

Treated water management

- Major work processes going forward （1/3）

○ Work to achieve the goals of the Japanese Government's plan

- **Treated water management**
  - Create a discharge plan each fiscal year that keeps the total amount of tritium at the time of discharge below 22 trillion Bq per year※1
  - Measure and confirm the radioactive substances in the water discharged to confirm that it is ALPS treated water※2
  - Dilute ALPS treated water with a large volume of seawater so that it is discharged into the sea only after the concentration of tritium has been reduced to less than 1,500Bq/liter※3
  - Water being treated※4, if it is to be discharged, will be purified with ALPS until the concentration of radioactive substances clearly fall below the safety related regulatory requirements before it is discharged
  - Conduct sea area monitoring in order to check the dispersion of tritium in the sea area and the transfer of radioactive materials to the fish and seaweed

※1: The operational target value for the discharge of the total amount of tritium at the Fukushima Daiichi Nuclear Power Station before the accident.

※2: Water that is below the regulatory standard for the discharge of radioactive substances other than tritium into the environment (sum of the ratios of the concentration of each radionuclide to the regulatory concentration is less than 1).

※3: 1/40 of regulatory concentration limit (60,000Bq/L) for the discharge of tritium into the environment, and approximately 1/7 of the World Health Organization's (WHO) drinking water quality guidelines (10,000Bq/L).

※4: Water exceeding regulatory standards for the discharge of radioactive substances other than tritium into the environment (sum of the ratios of the concentration of each radionuclide to the regulatory concentration is 1 or higher).

○ Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Fuel debris retrieval, etc.**
  - Continue the discharge of ALPS treated water into the sea as planned

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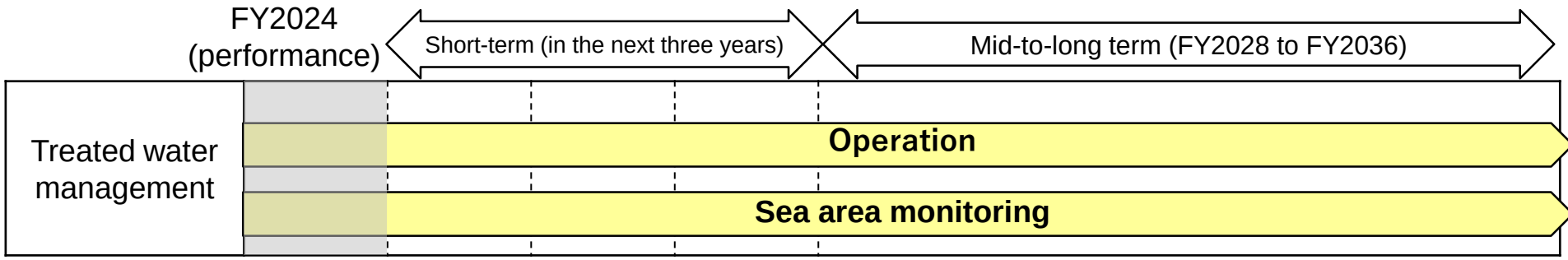
Treated water management

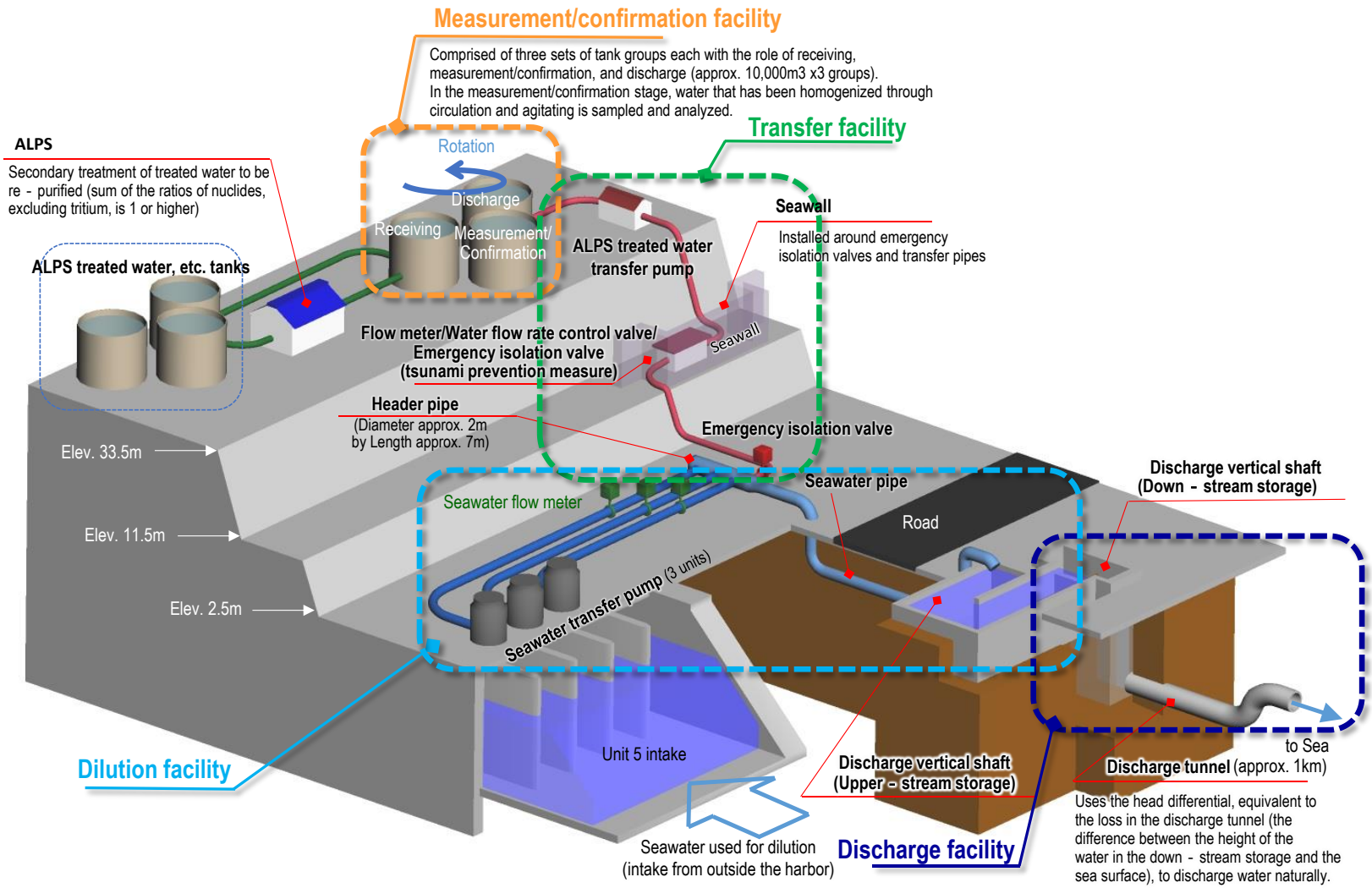
- Major work processes going forward（2/3）



<Legend>
: Duration of work
: Period during which change is anticipated
: Correlation between schedules

Treated water management

- Major work processes going forward（3/3）



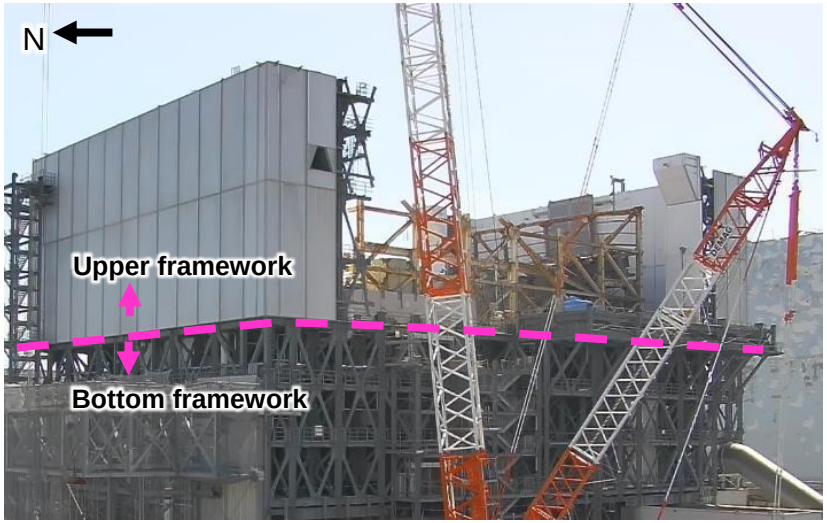
Overview of ALPS treated water dilution/discharge facility and related facilities

Fuel removal from spent fuel pools

- Progress made in FY2024

○ Progress made in FY2024

- **Unit 1**
  - Semi-assembly of the retractable roof is underway at the off-site yard in preparation for installing the large cover. The bottom framework of the large cover was installed in November 2024, and installation of the upper framework was commenced.
- **Unit 2**
  - Shielding to reduce the dose on the operating floor was installed in April 2024. The runway garter, which supports the rails on which the fuel handling equipment will run, was installed as part of fuel removal work platform installation work in March 2025.



Unit 1 large cover on-site conditions (Northwest side)
(Photographed on March 18, 2025)

Unit 2 fuel removal work platform conditions
(Photographed on December 3, 2024)

Fuel removal from spent fuel pools

- Major work processes going forward（1/7）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Complete installation of the large cover at Unit 1 (around FY2023)**
  - A large cover will be installed to control scattering of dust while removing rubble.
    Based on the results of a detailed investigation into how this construction will impact other work in the vicinity of the reactor building (Unit 1, 2 SGTS pipe removal, etc.), and the need to implement safety measures for high-dose locations on the walls of the reactor buildings, the construction of the Unit 1 large cover is scheduled to be completed around the summer of FY2025.

(Challenges)

- Studying and implementing plans that take into account other interfering work to be conducted in the work areas
- Studying and implementing plans that consider high-dose locations

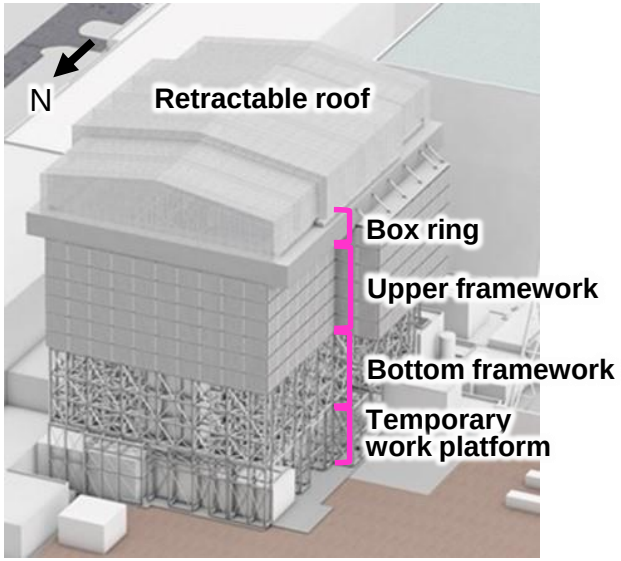


Diagram of the entire Unit 1 large cover

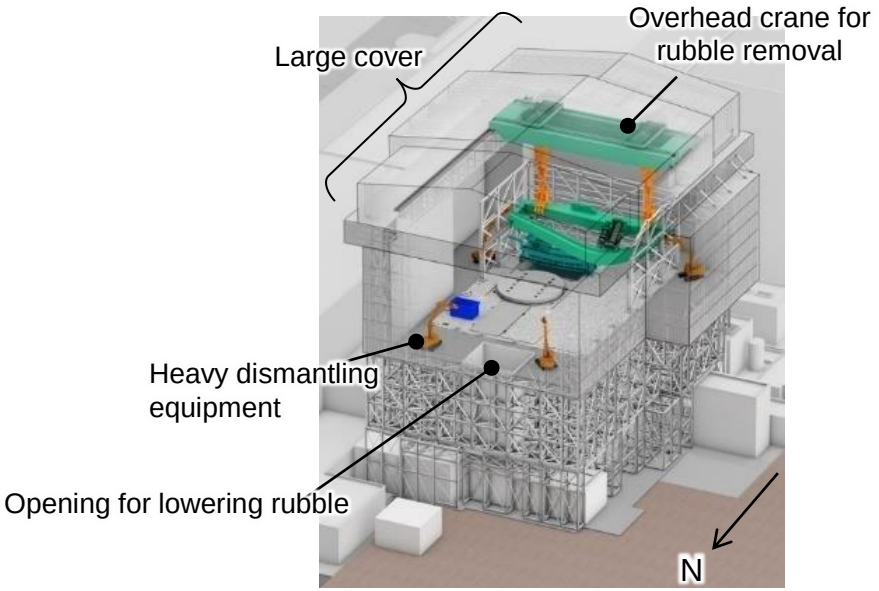


Diagram of the rubble removal work

Fuel removal from spent fuel pools

- Major work processes going forward（2/7）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Start fuel removal from Unit 1 (FY2027 - FY2028)**
  - Fuel handling equipment required for fuel removal will be fabricated.
  - The fuel handling equipment will be installed after removing rubble, collapsed overhead crane, etc., handling the well plug (shielding concrete installed on top of the reactor containment vessel) that has become misaligned due to the accident, and reducing the dose by means of decontamination and shielding, etc.
  - Fuel removal will be started after conducting training on fuel handling.

(Challenges)

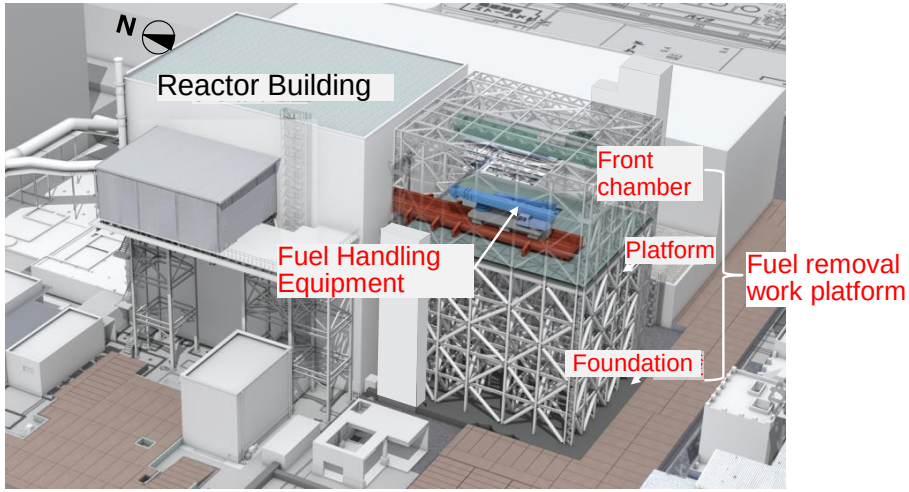
- Studying and implementing plans for removing rubble for which dust scattering can be reliably controlled
- Studying and implementing plans for effective decontamination and shielding in order to reduce the dose on the operating floor
- Studying and implementing plans for handling damaged fuel stored from before the disaster

Fuel removal from spent fuel pools

- Major work processes going forward（3/7）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Start fuel removal from Unit 2 (FY2024 - FY2026)**
  - Fuel handling equipment required for fuel removal will be fabricated.
  - A platform will be installed on the southern side of the reactor building for removing fuel from openings of R/B walls.
  - Fuel handling equipment will be installed after reducing the dose on the operating floor by means of decontamination and shielding.
  - Fuel removal will be started after conducting training on fuel handling.



Unit 2 gantry for fuel removal (Image)

Fuel removal from spent fuel pools

- Major work processes going forward（4/7）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Complete fuel removal from Units 1-6 (within 2031)**
  - Fuel will be removed from Units 5 and 6 in a way that does not interfere with work at Units 1 and 2.
  - Since the common pool receives spent fuel from each unit, the spent fuel in the common pool will be stowed in dry storage containers (casks) in advance and stored on high grounds.
  - Additional temporary storage facilities will be installed after securing sites within the premises.

(Challenges)

- Setting up additional temporary storage facilities for dry casks in accordance with the fuel removal plan including fuel removal from Units 5 and 6

○ Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Completing fuel removal**
  - Complete the removal of fuel from all spent fuel pools

Fuel removal from spent fuel pools

- Major work processes going forward（5/7）

○Other fuel removal related works

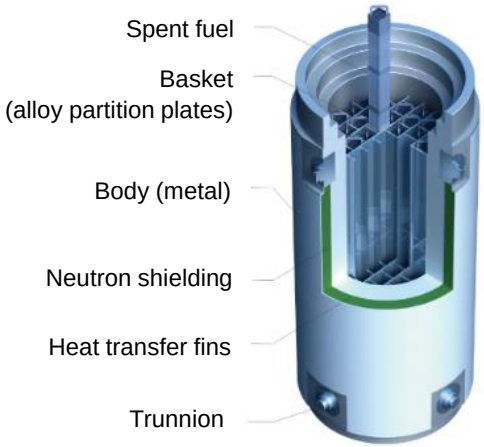
– After removing fuel from each unit, highly radioactive equipment such as spent control rods will be removed.

– Study, design, and installation of new facilities for storing high-dose radioactive equipment, etc. from Units 1 and 2. Preparations for removing large, high-dose radioactive equipment from the Unit 4 pool will be made.

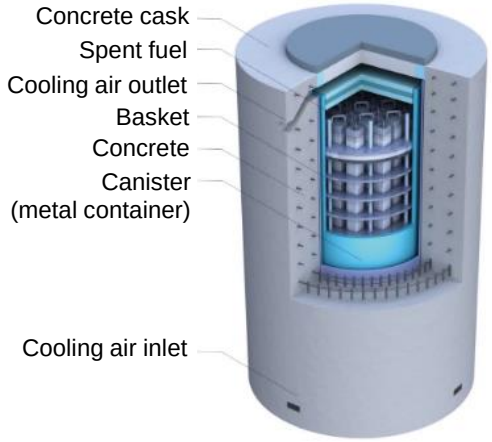
– In addition to existing metal casks, the use of dry storage facilities (concrete casks) that use canisters with a proven track record overseas will be studied as another dry storage option at the high ground for fuel being stored in the common pool.

(Challenges)

- Study of specific method for removing diverse equipment with varying sizes and shapes (remote operation, transfer and storage)
- Study of dry storage methods for damaged fuel that was in storage prior to the disaster



Metal casks (example)



Concrete casks (example)

Source: Federation of Electric Power Companies “Spent Fuel Storage Countermeasure Initiatives” (in Japanese only)
https://www.fepc.or.jp/library/pamphlet/pdf/18_chozo_taisaku_torikumi.pdf

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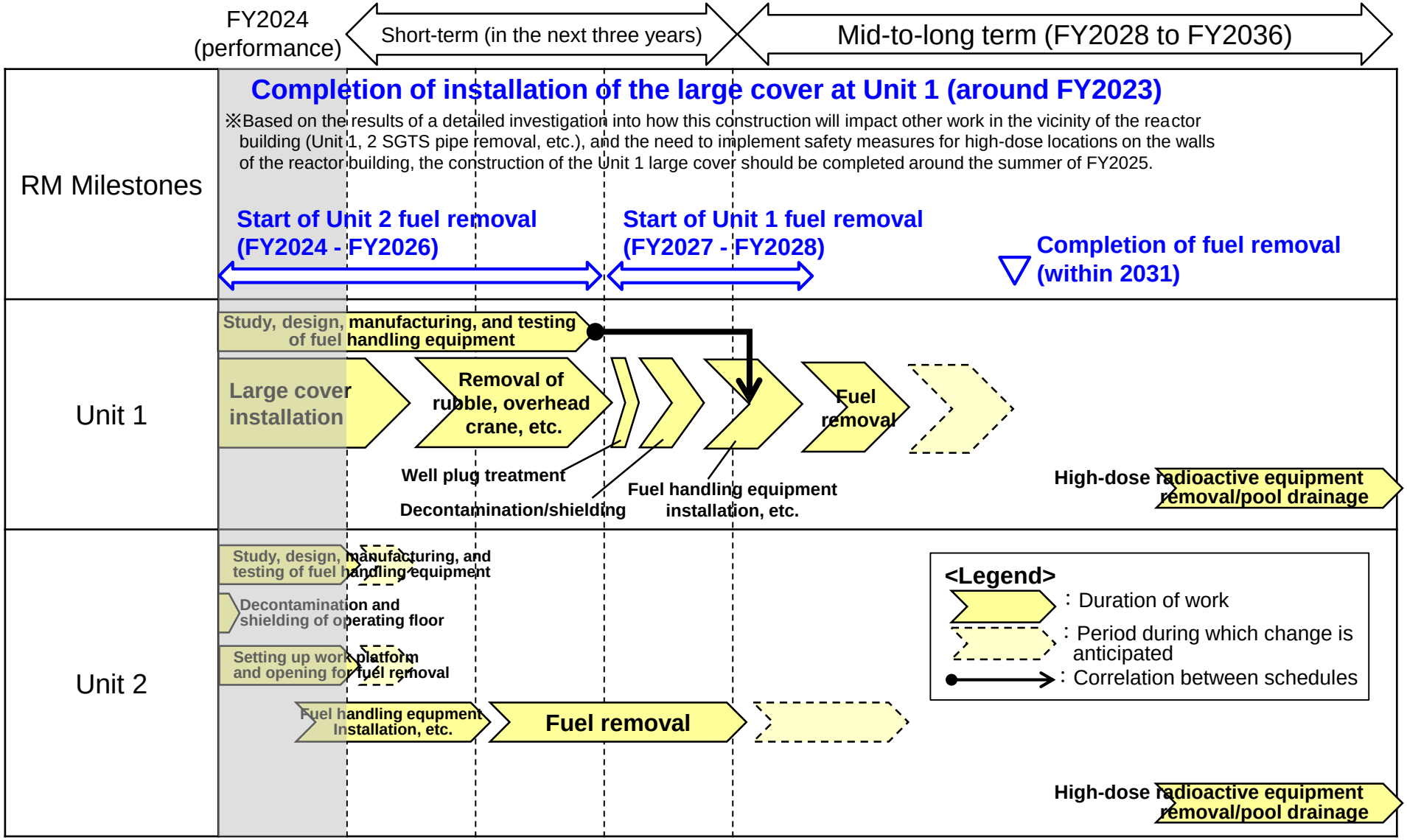
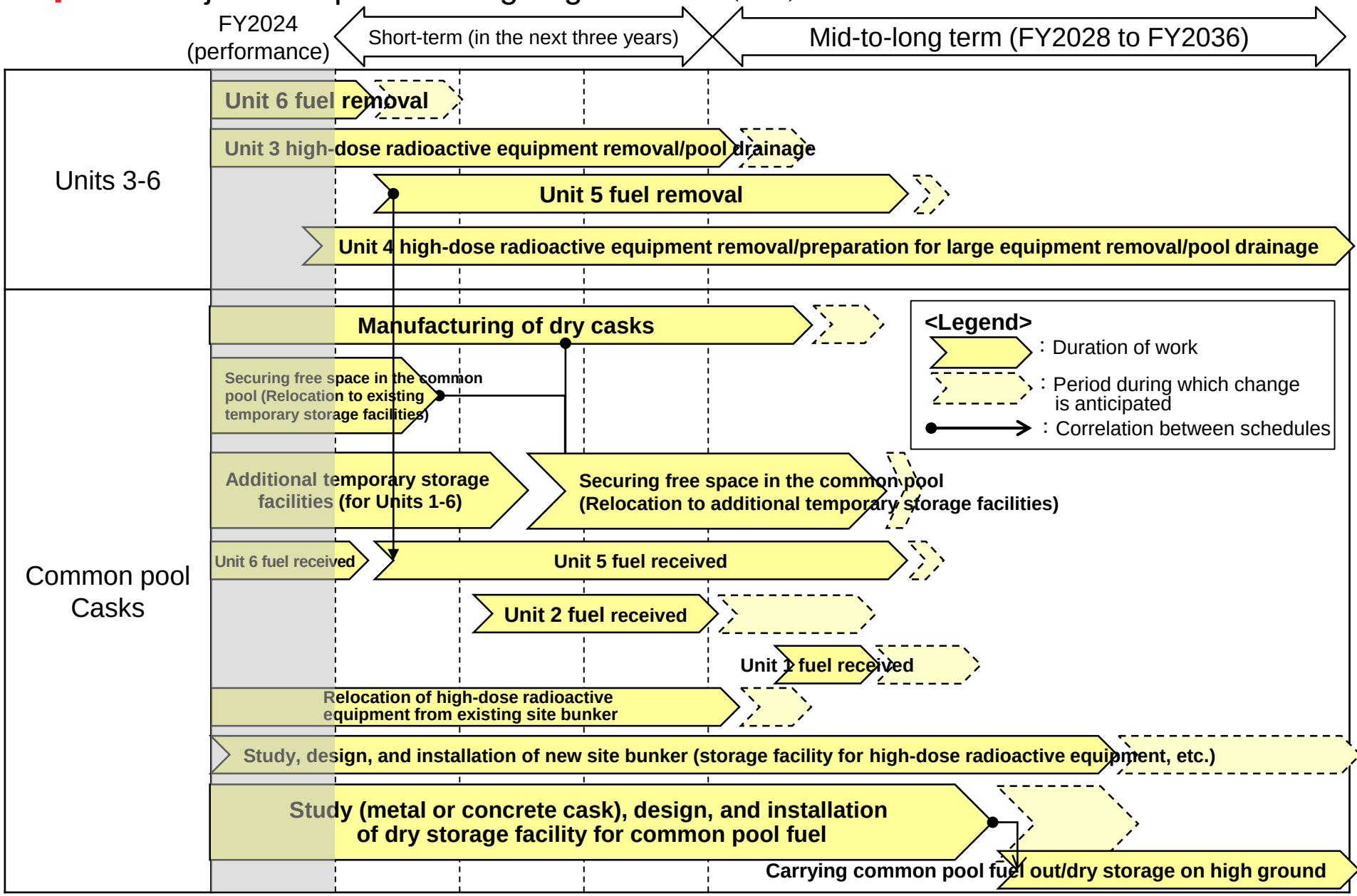
Fuel removal from spent fuel pools

- Major work processes going forward（6/7）



Fuel removal from spent fuel pools

- Major work processes going forward（7/7）

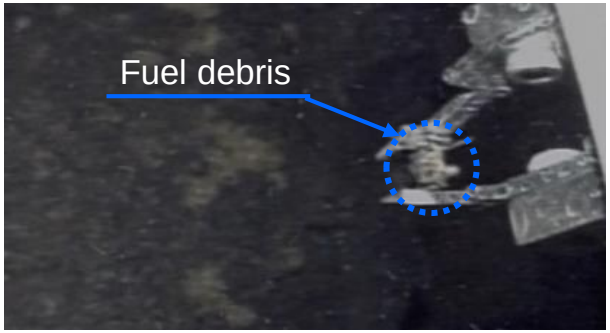


Fuel debris retrieval

- Progress made in FY2024

○Progress in FY2024

- **Trial retrieval of fuel debris from Unit 2**
  - Commenced trial retrieval of fuel debris in September 2024.
  - Succeeded in retrieving fuel debris using a telescopic device on a trial basis in November 2024. The retrieved debris was sent to the JAEA Oarai Nuclear Engineering Institute.
- **Unit 1 PCV internal investigation (non-submerged area)**
  - Because there was a possibility that the environment within the PCV may have changed as a result of work to lower the Unit 1 PCV water level, PCV investigations (non-submerged area) were conducted in September 2024 (summer) and in February 2025 (winter) to aid in future investigations. The data obtained will be used to plan efficient tests and training.



Fuel debris being grasped (Photographed on October 30, 2024)

External appearance of fuel debris sample (Approx. 9mm x 7mm)

Off-site transportation container loaded onto an off-site transfer vehicle (Photographed on November 12, 2024)

Fuel debris retrieval

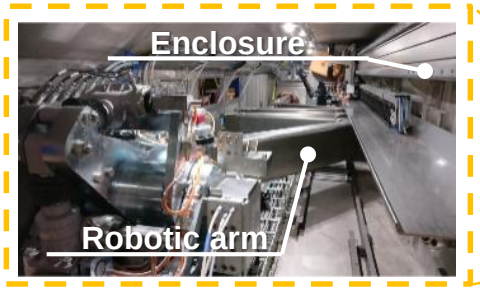
- Major work processes going forward（1/5）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

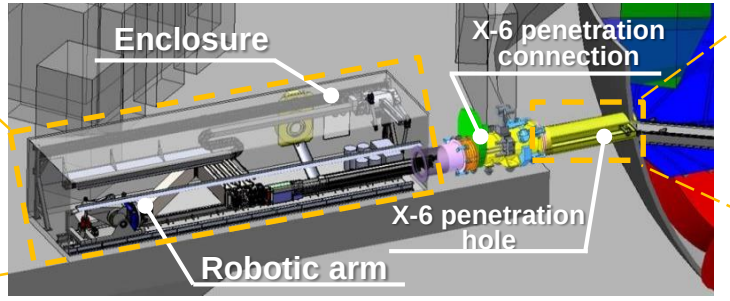
- **Start fuel debris retrieval from the first implementing unit**
  - In preparation for trial retrieval of fuel debris from Unit 2, engineering to develop technologies and apply that research to the field was conducted. Fuel debris retrieval equipment (e.g., access device, retrieval device) was manufactured and installed, and fuel debris was sampled using a telescopic device that has been previously used in internal investigations.
  - Going forward, fuel will be sampled for the second time using the telescopic device, and an internal investigation and fuel debris sampling will be conducted using a robotic arm.

(Challenge)

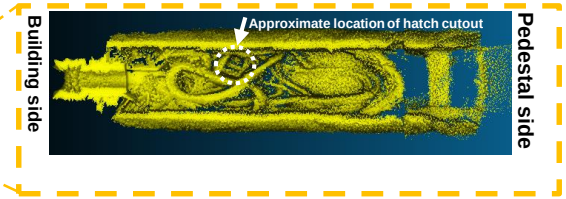
- Development of devices



Enclosure and robotic arm



Overview of equipment for trial retrieval



3D scan from above the X-6 penetration

*This document leverages the results of the International Research Institute for Nuclear Decommissioning (IRID).

Fuel debris retrieval

- Major work processes going forward（2/5）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Optimal management of the internal reactor environment**
  - The reactor will be managed using optimal cooling methods (air cooling/water spraying, etc.) after comprehensively considering the state of fuel debris and the generation of contaminated water, etc.
  - An inert atmosphere will be maintained in consideration of hydrogen and facility degradation risks while optimal methods (equalization/negative pressure, etc.) are used to manage the atmosphere inside the reactor in consideration of radioactive substance dispersion risks.
  - Safety measures required in conjunction with the implementation of the aforementioned internal reactor environment management methods will be identified.
    - Optimal methods for maintaining the environment inside the reactor until fuel debris is completely retrieved will be studied by ascertaining internal reactor behavior through Unit 1/3 cooling water injection shutdown tests and feed/exhaust gas flow rate change tests, etc.

- **Fuel debris retrieval, etc.**
  - The retrieved fuel debris will be stored in a stable condition.

Fuel debris retrieval

- Major work processes going forward（3/5）

○ Other fuel debris retrieval related work

- **Expansion of the scale of retrieval gradually (Unit 2)**
  - In preparation to expand the scale of retrieval in stages, research and development will be undertaken, and engineering work will be carried out to apply the achievements of such R&D to the field. Taking also into account the knowledge, etc. obtained through trial retrieval, design, manufacturing and installation of fuel debris retrieval equipment, safety systems (containment, maintaining cooling, criticality control, etc.), fuel debris storage facilities and equipment for the maintenance of the retrieval equipment will be carried out as well.
  - For improving the environment inside the building, the radiation dose in the west-side area on the first floor of the reactor building will be further reduced.
  - Internal investigation of the Unit 2 reactor pressure vessel (RPV) will be studied.

  (Challenges)
  - Study on measures to control scattering of dust while crushing fuel debris or removing structures from inside the PCV
- **Efforts for determining methods for processing and disposal of fuel debris**
  - After fuel debris retrieval, analysis, etc. of fuel debris properties will be performed.
- **Further expansion of the scale of retrieval (Units 1/3)**
  - In preparation to enlarge the scope of fuel retrieval, we are pushing forward with engineering that can be applied to the field based on the assessment results and suggestions offered by the Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods, and research and development successes. The knowledge we gain from the trial retrieval of fuel debris from Unit 2 will be leveraged to determine the retrieval method to be used going forward as we design/manufacture/install fuel debris retrieval equipment and make preparations, such as preparing the environment in the vicinity of Unit 2. We will also continue to construct training facilities to enable the required skills to be obtained by the personnel implementing these tasks.

Trial retrieval (Unit 2)		Gradual expansion of the scale of retrieval (Unit 2)	
Access equipment	Fuel debris retrieval equipment	Access equipment	Fuel debris retrieval equipment
	 Proposed metal brush  Proposed vacuum container		 Proposed gripper tool  Proposed digging recovery tool

*This document leverages the results of the International Research Institute for Nuclear Decommissioning (IRID).

Fuel debris retrieval

- Major work processes going forward（4/5）

– In addition to the Unit 1 PCV internal investigations (submerged/non-submerged areas), we are also studying the implementation of other investigations such as the sampling of deposits from within Unit 1, etc., as well as PCV/RPV internal investigations of the Unit 3. The information we obtain through these investigations will be used for assessments and to study countermeasures.

– In order to improve the environment inside the buildings, radioactive sources will be investigated and eliminated for reducing the radiation dose at the work site (in particular, highly contaminated pipes). In addition, equipment, etc. that could hinder future work will be removed. And the PCV water level will be reduced such as by decreasing the amount of water injected into the reactor.

– For improving the environment outside the building, facilities that pose an impediment (Unit 1/2 exhaust stack, Unit 3/4 exhaust stack, etc.) will be removed, thereby securing space for fuel debris retrieval equipment, etc.

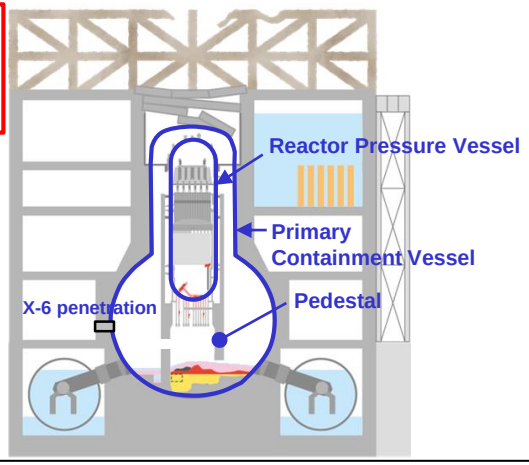
(Challenges)

- Study on the method of reducing the dose of highly contaminated pipes by means of remote operations (removal or decontamination) and the method of installing equipment for retrieval and water intake, etc., since the dose at the work site in Units 1/3 is higher compared to that in Unit 2
- Accumulated hydrogen gas that may be found during fuel debris retrieval preparations, etc.

Unit 1

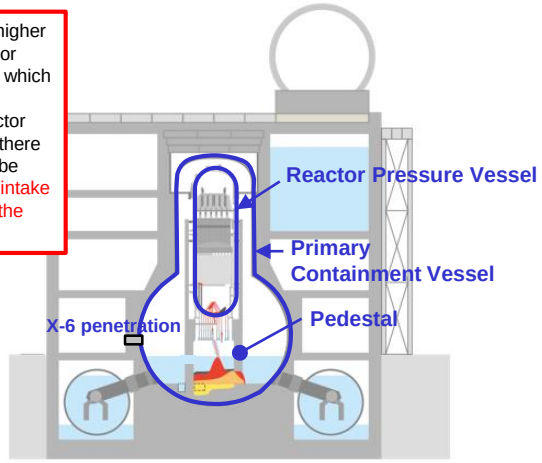
The radiation dose on the first floor of the Reactor Building, where the fuel debris retrieval equipment, etc. is to be installed, is high. Hence, the dose of the highly contaminated pipes needs to be reduced.

AC piping (South-eastern area on the first floor)
Surface 50cm radiation dose: Approx. 1000mSv/h
(Estimated based on the intensity of the γ rays)



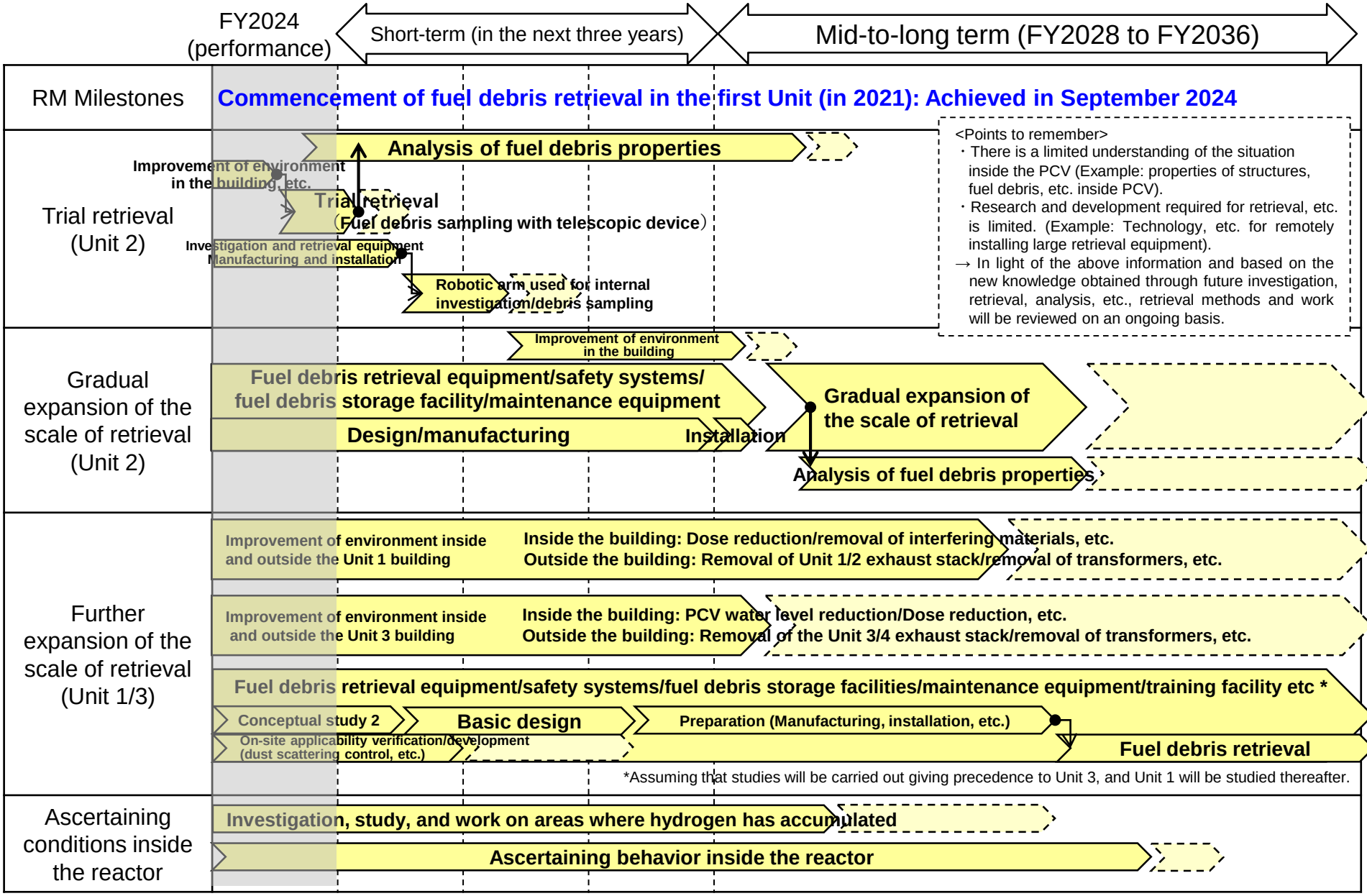
Unit 3

The PCV water level is higher than the opening (Reactor Building first floor), from which the space (inner side of pedestal) below the reactor pressure vessel, where there is lot of fuel debris, can be accessed. Hence water intake is required for reducing the water level.



Fuel debris retrieval

- Major work processes going forward（5/5）



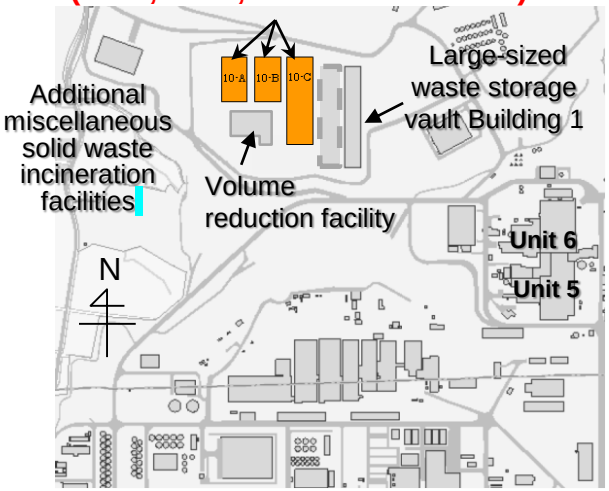
Waste management

- Progress made in FY2024

○Progress in FY2024

- **Rubble, etc.**
  - Construction on the solid waste storage vault Building 10, which is being built for the plant to be able to house containers of contaminated soil generated in decommissioning and volume-reduced rubble indoors, is being conducted. Building A was brought online in August 2024, Building B in October 2024, while construction on Building C is ongoing.

Solid waste vault building 10
(10-A, 10-B, 10-C from the left)



Map

Solid waste storage vault Building 10
(Left: map; middle: Buildings A and B; right: Building C)

Waste management

- Major work processes going forward（1/8）

○ Schedule for achieving the milestones of the Mid-and-Long-Term RM

- **Eliminate temporary storage areas outside for rubble and other waste (in FY2028)**

  – Waste is processed with the additional miscellaneous solid waste incineration facility and miscellaneous solid waste incineration facility, which reduce the volume of combustible materials, as well as the volume reduction equipment, etc., which reduces the volume of incombustible materials (metals and concrete).

  – Incineration and volume reduction of waste that is temporarily stored outdoors, will be carried out and it will be stored in the solid waste storage vaults.

  – If the projection of the amount of solid waste that will be generated in the future fluctuates and the capacity of storage facilities is short, additional storage facilities will be built after securing space within the premises.

  (Challenges)

  • Reflection of fluctuation in the projection of the amount of waste that will be generated in the future into the storage management plan.

Waste management

- Major work processes going forward（2/8）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Radioactivity density assessment and management**
  - Establish a method for assessing the radioactivity density of existing rubble (including ash, slag) and store/manage appropriately in accordance with density.
    - Based on the status of progress of future decommissioning work, characterization required for studying treatment and disposal of solid waste will be carried out utilizing the radioactive substance analysis and research facility.
    - We will continue to analyze existing rubble and construct means for managing radioactivity density.

    (Challenges)

    - Analysis for transitioning to radioactive density management
- **Full-scale leveraging of on-site reusing**
  - We will organize logical methods for the storage and on-site reusing of waste, including outdoor storage depending on the radioactivity density of the waste, and put these methods into use.
  - We will start operation of melting facilities and carry out volume reduction of metal rubble, etc.
    - Melting facilities will be built in order to decontaminate/reduce the volume of objects to be melted. The types of waste to be melted will be revised as necessary going forward in accordance with design progress.

Waste management

- Major work processes going forward （3/8）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Formulating methods for dismantling buildings**
  - We will formulate a common model (building dismantling model) that includes methods for investigating/assessing contamination conditions, and decontaminating/dismantling contaminated facilities, etc.
    - Through the study of a dismantling model we will formulate methods for dismantling/decontaminating buildings, storing/managing waste, and managing radioactivity density that will be applied to buildings dismantled in the future.

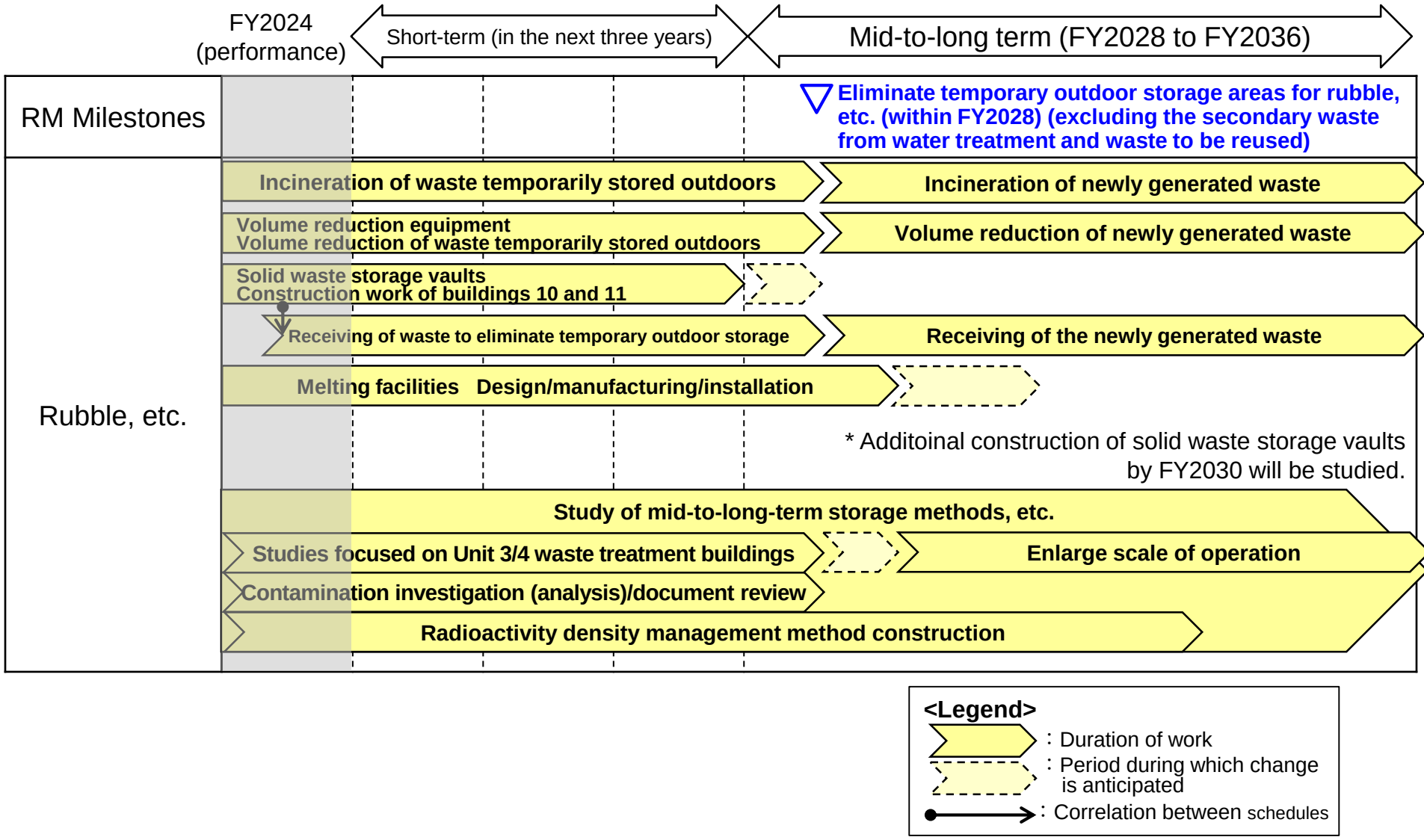
- **Managing dismantling waste in accordance with radioactivity density**
  - The amount of waste generated from the dismantling of buildings will be calculated and reflected in storage management plans.
  - Dismantling waste will be managed properly in accordance with radioactivity density.

○ Other waste management-related tasks

– We will study the additional construction of a solid waste storage vault by FY2030.

Waste management

- Major work processes going forward（4/8）



Waste management

- Major work processes going forward （5/8）

◯Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Eliminating outdoor storage and properly storing waste**
  - Zeolite and decontamination system sludge will be collected. Secondary waste from water treatment including them will be stored in a seismic-resistant large waste storage vault.
    - Secondary waste from water treatment(adsorption vessels) will be relocated to the large-sized waste storage vault.
  - ALPS slurry is being steadily dewatered and the dewatered products will be stored appropriately in solid waste storage vaults. The dewatering of accumulated ALPS slurry will be completed.
    - Slurry, which is the secondary waste generated from treatment of water by ALPS, contains a lot of water and must be dewatered/stabilized.
- **Commencement of solidification**
  - We will install/commence using the solidification facility to solidify dewatered slurry.
  - Based on analysis results we will determine methods for solidifying other secondary waste from water treatment while keeping in mind that we may have to transition to disposal forms in accordance to classification (waste body, etc.).
    - We will formulate plans for the solidification of secondary waste from water treatment and develop technologies based on those plans.

Waste management

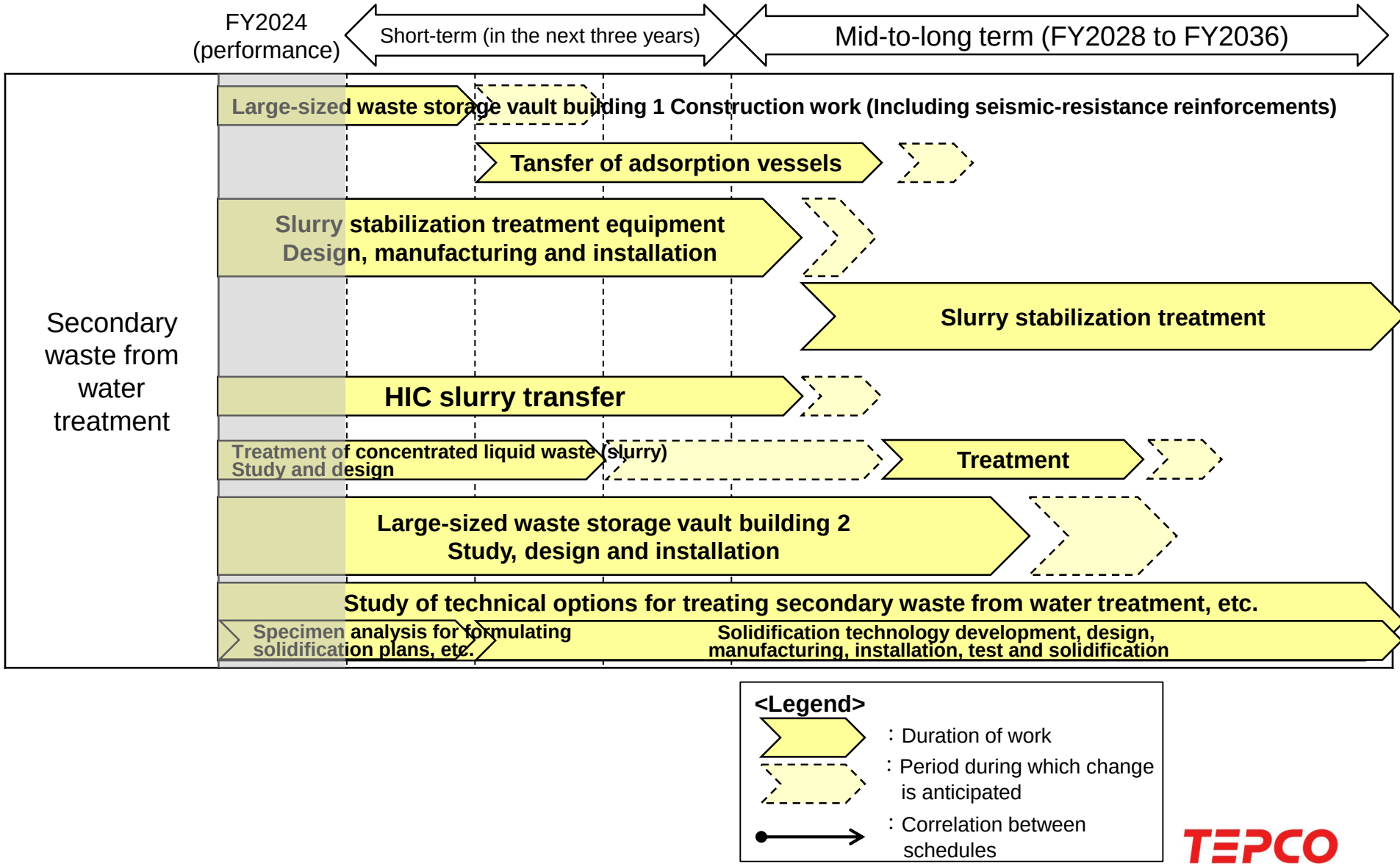
- Major work processes going forward（6/8）

○Other work related to waste countermeasures

- **Secondary waste from water treatment**
  - The slurry is stored in high integrity containers (HIC). While it will not leak if the HICs are stationary, the slurry will be transferred from HICs whose integrity cannot be confirmed if it were to fall in consideration of the effects of slurry radiation, by the start of operation of the slurry stabilization treatment equipment.
  - Concentrated liquid waste (slurry) will be treated with slurry stabilization treatment equipment. Treatment will commence after testing, etc.

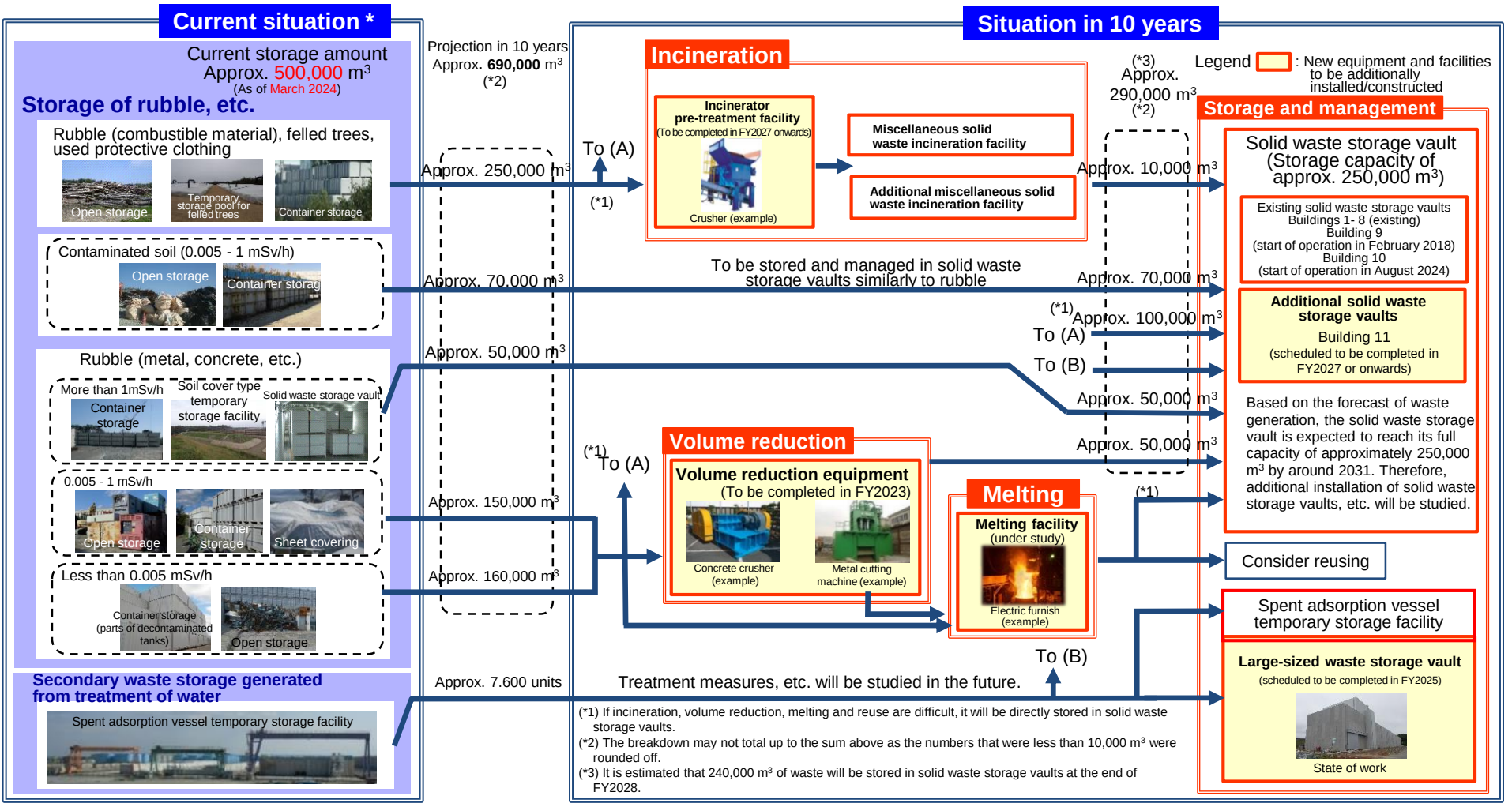
Waste management

- Major work processes going forward（7/8）



Waste management

- Major work processes going forward（8/8）



(*1) If incineration, volume reduction, melting and reuse are difficult, it will be directly stored in solid waste storage vaults.
(*2) The breakdown may not total up to the sum above as the numbers that were less than 10,000 m³ were rounded off.
(*3) It is estimated that 240,000 m³ of waste will be stored in solid waste storage vaults at the end of FY2028.

* Used protective gear that is not yet incinerated and is determined at this point in time to be processed/reused and concrete waste at the BG level are not included.

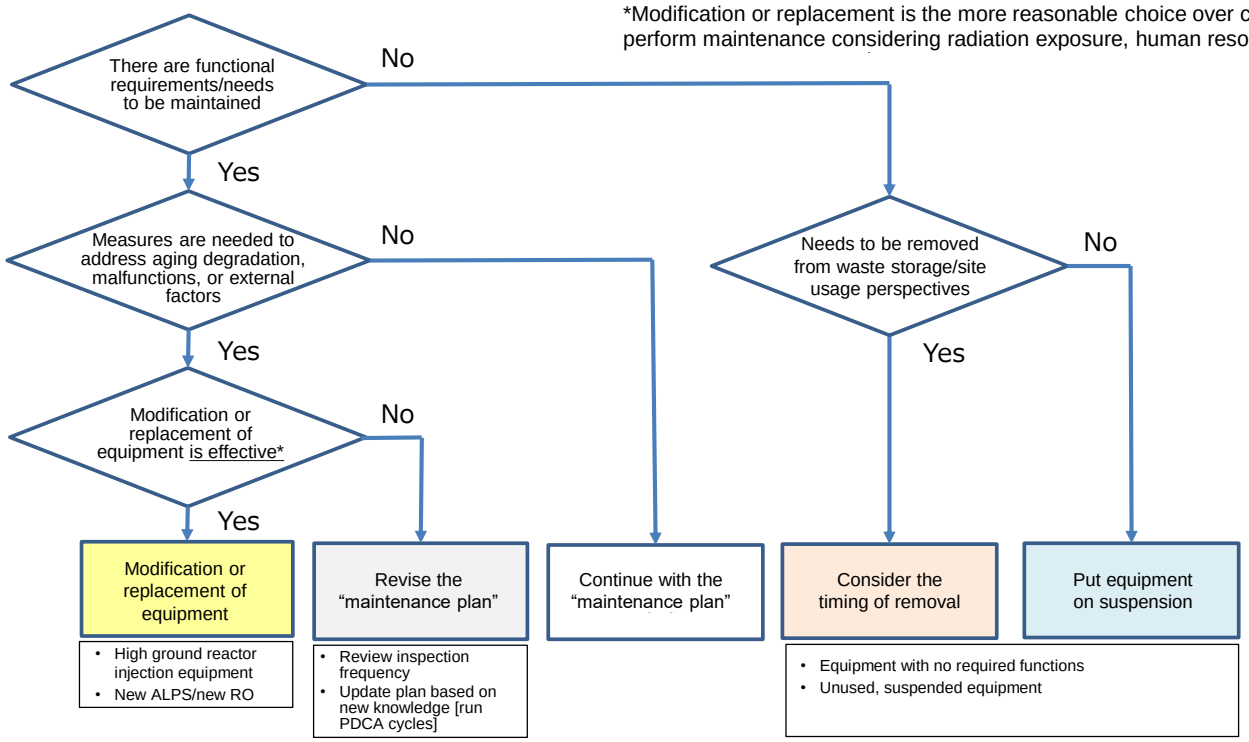
- The dose on the site boundary is expected to decrease due to incorporation into indoor storage and elimination of outdoor storage.
- The dose of the exhaust gas from the incineration facility and the dose on the site boundary are measured and published on the website, etc.

Other measures

- Progress made in FY2024

○Progress made in FY2024

- **Maintaining and removing equipment and facilities**
  - To increase reliability, taking into consideration the risks of aging degradation of equipment, a plan for maintaining and removing decommissioning facilities to be used over a long-period of time was prepared in October 2024.
    Going forward, equipment will be updated to increase reliability according to the plan.



Approach to maintaining and removing decommissioning equipment

Other measures

- Major work processes going forward（1/5）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Degradation status inspection/assessment and improving reliability**
  - Status of degradation of reactor buildings will be inspected/assessed using integrity assessment methods.
    - The integrity of the Units 1-3 reactor buildings that needs to be confirmed in the long-term before debris retrieval completion will be assessed through investigations of the building inside, trend analysis using seismometers, etc.

      In addition, a seismometer will be installed on the fifth floor of the Unit 1 reactor building after rubble is removed.

    (Challenges)

      – Study of methods to investigate integrity inside high dose buildings.
  - We will continually update decommissioning equipment that will be used over the long-term to improve reliability in consideration of risks such as equipment aging/degradation.
    - We will formulate plans pertaining to the maintenance/removal of decommissioning facilities and update equipment in order to improve reliability in accordance with these plans.
    - Facility improvements that take into account operation/maintenance will be made as part of recurrence prevention measures in light of the body contamination incident that occurred during the cleaning of additionally installed ALPS piping in October 2023, and the leak of water containing radioactive substances from the high temperature incinerator building that occurred in February 2024.
    - In light of the fact that the discharge of ALPS treated water into the sea will take place over a long-period of time, we will study/design/manufacture/install new ALPS so that ALPS treatment, including secondary treatment, can be steadily maintained over the long-term.
    - In order to improve the reliability of desalination equipment (RO) we will study/design/manufacture/install new RO equipment.

Other measures

- Major work processes going forward （2/5）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Degradation status inspections/assessment and improving reliability**
  - We will move forward with countermeasures to improve the resilience of equipment/facilities to external events, such as by completing slope modifications to prevent landslides.
    - In consideration of the risk of a slope collapse caused by standard seismic motion used for studies, we will implement slope countermeasures in the vicinity of common operation assistance facilities (common pool building) that are shared for Fuel removal from spent fuel pools, etc.

- **Facility removal**
  - Planned removal of unneeded facilities, such as ALPS treated water storage tanks, will be implemented.

Other measures

- Major work processes going forward （3/5）

○Initiatives for achieving the "ideal state (FY2033)" mentioned in the risk map

- **Completing analysis required to achieve the "ideal state"**
  - We will complete the following analyses
  - ✓ Analyses needed to commence the solidification of dewatered slurry
  - ✓ Analyses needed to determine methods for solidifying other secondary waste from water treatment
  - ✓ Analyses needed to develop methods for assessing/managing the radioactivity density of existing rubble.
  - ✓ Analyses needed to formulate a building dismantling model
- **Securing analysis capabilities**
  - We will maintain/secure analysis facilities/capabilities required to conduct analyses pertaining to building dismantling and the transition to waste body (after FY2033).
    - Construct facilities that have analysis functions required to proceed with decommissioning in the future.
    - Establish an analysis framework that can flexibly handle changes to analysis demands.

Other measures

- Major work processes going forward（4/5）

○ Other related work

- **Natural disaster prevention measures**
  - Countermeasures for possible tsunami such as removal of decontamination system sludge, etc. will be implemented.
  - Drainage channels will be upgraded in preparation for large-scale rainfall.

(Challenges)

- Measures other than seawall as tsunami countermeasures (protecting the freezing brine transfer pipes, etc.)
- Study of safety measures to be taken with regard to remote recovery, dewaterability evaluation, and handling of decontamination system high radiation sludge

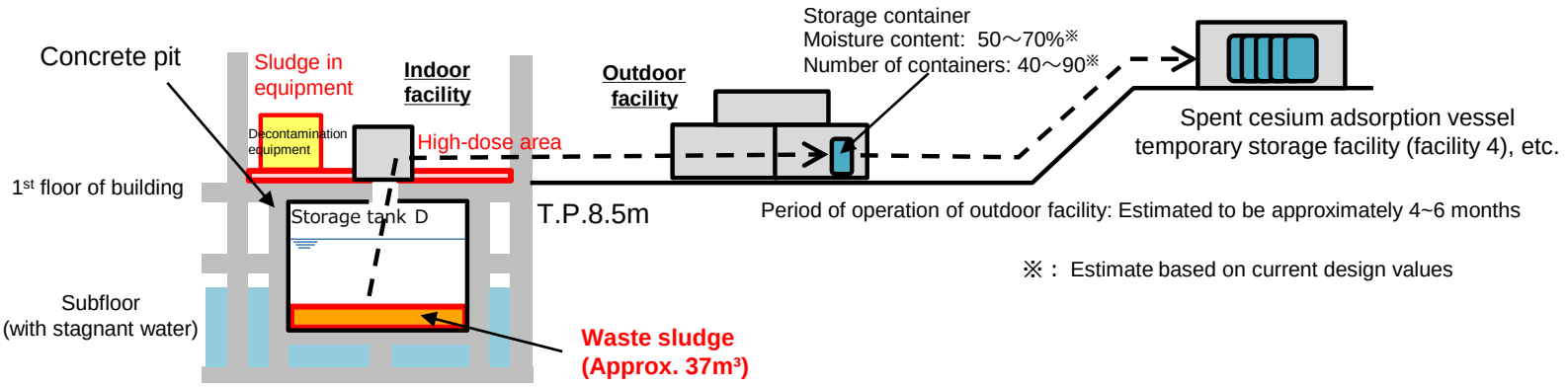
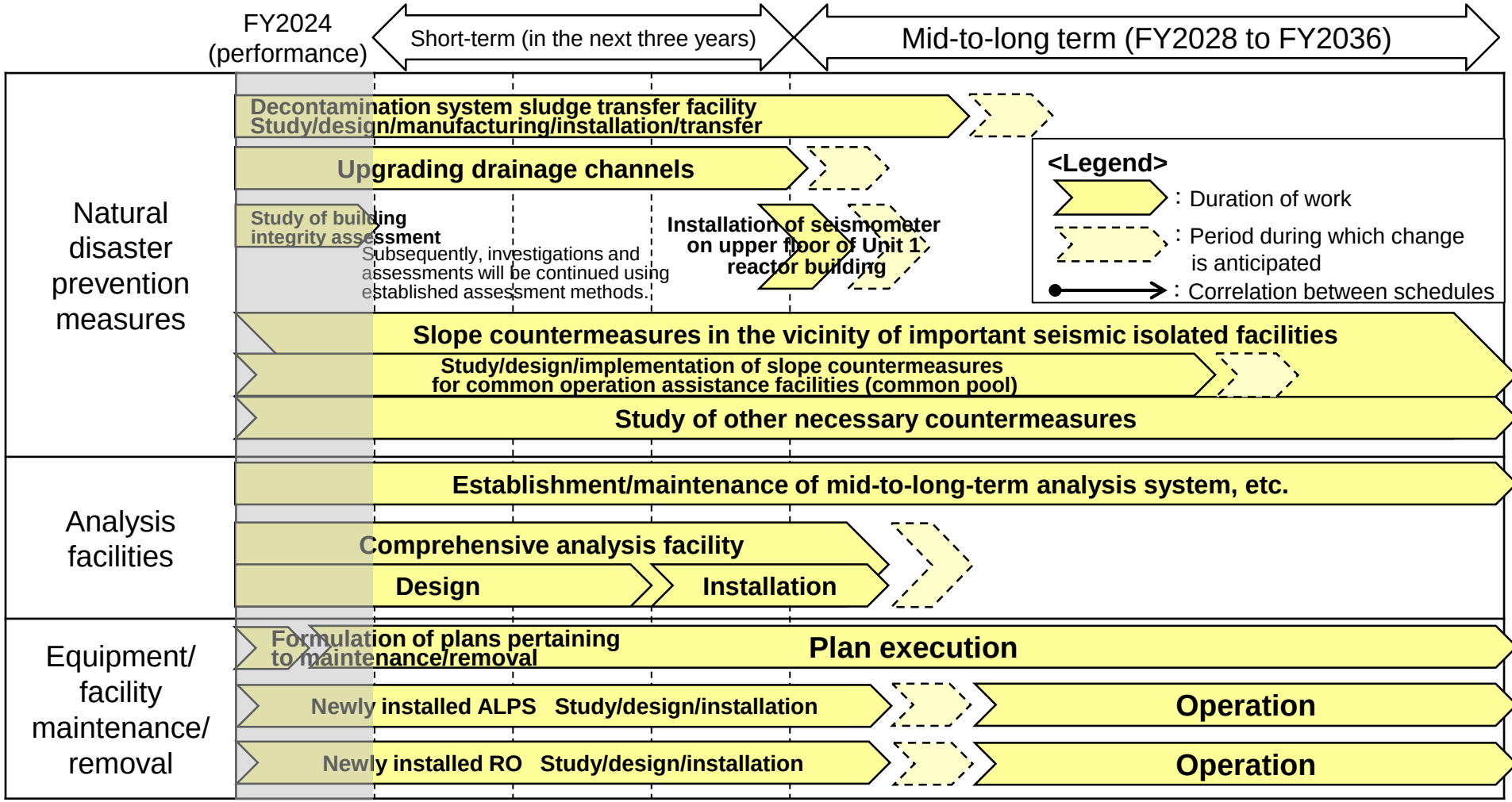


Diagram showing the building structure in the vicinity of storage tank D in the process main building (cross-section)

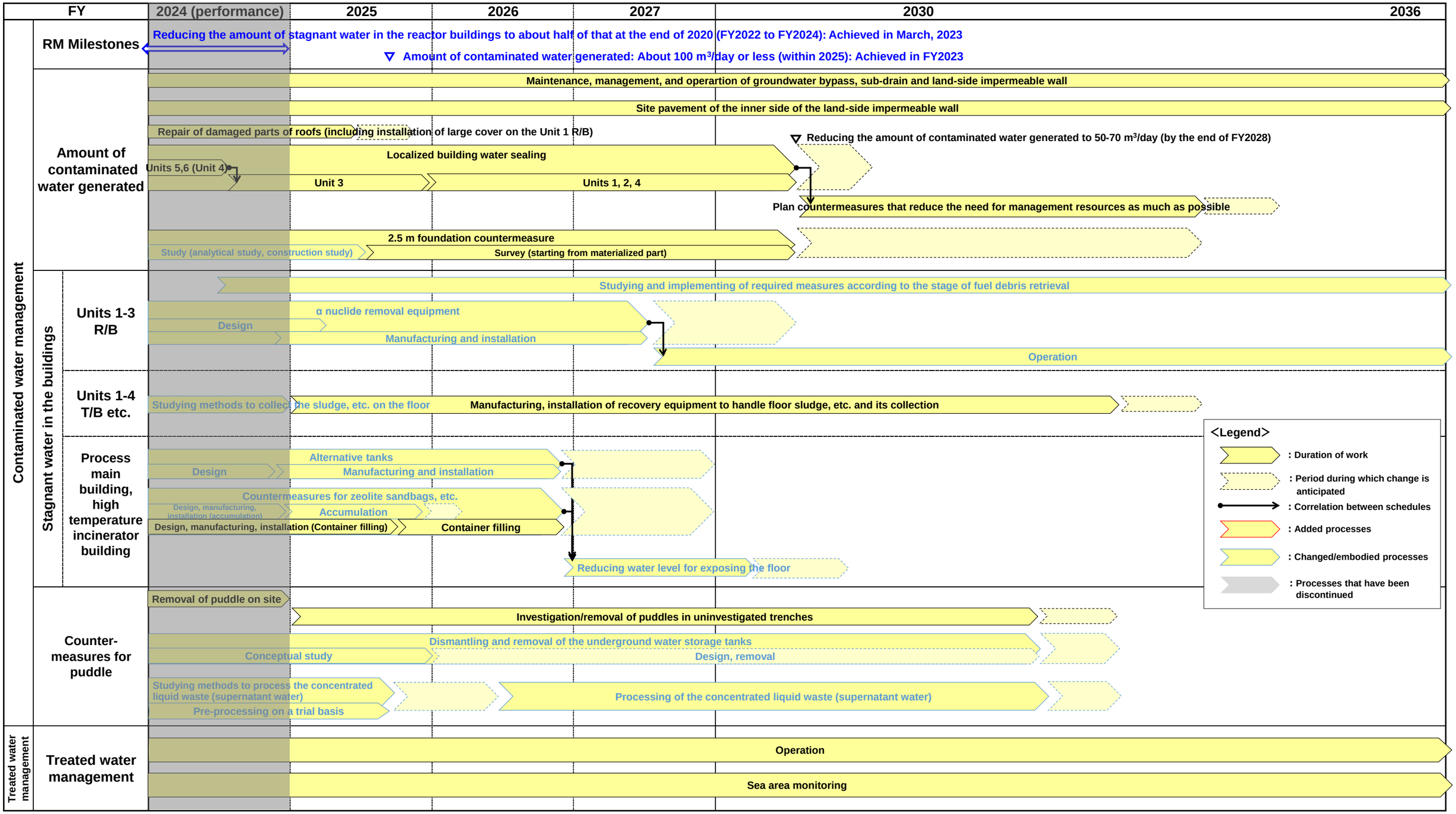
Decontamination system sludge extraction process

Other measures

- Major work processes going forward（5/5）

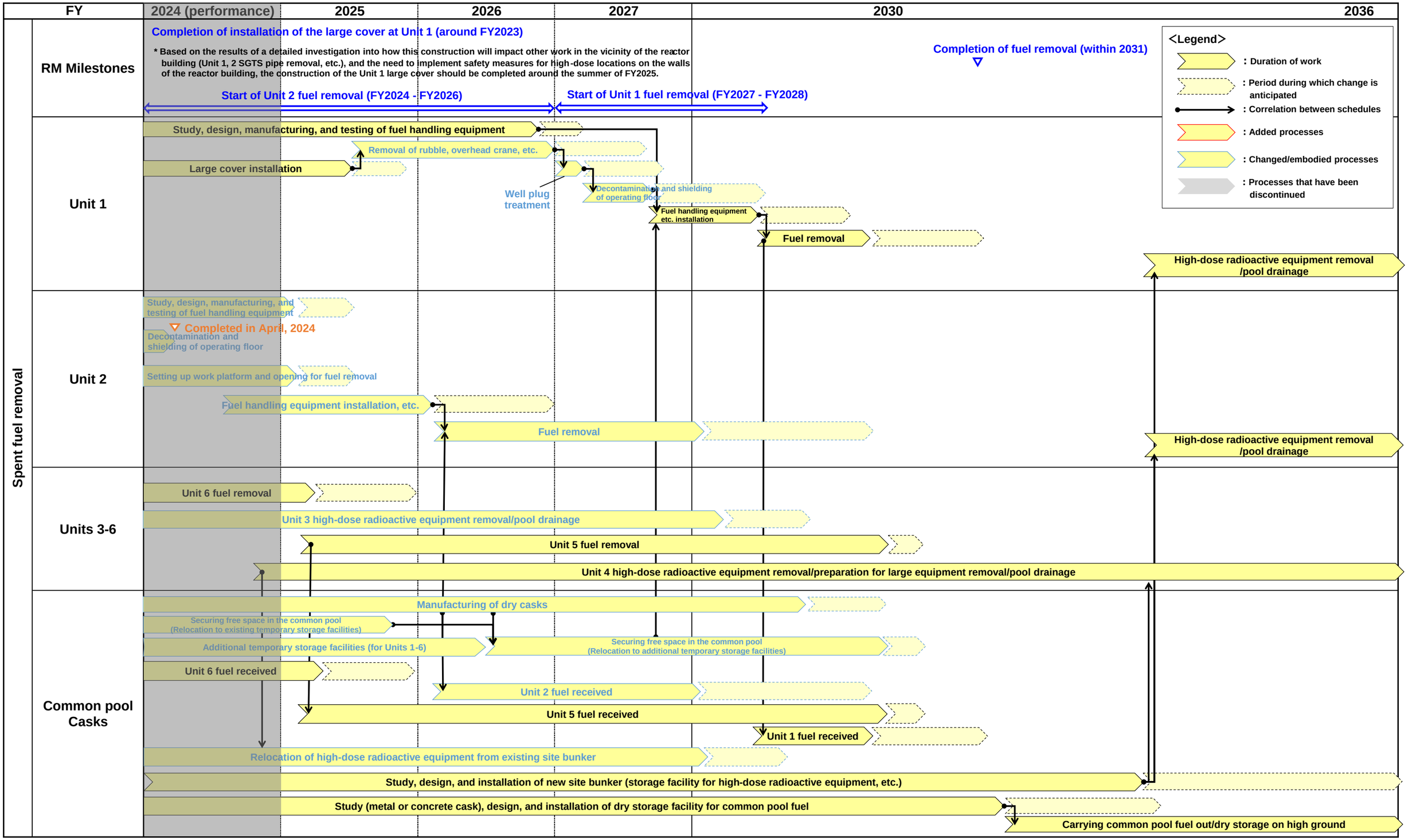


Mid-and-Long-Term Decommissioning Action Plan 2025



Note: The description may change depending on future studies.

Mid-and-Long-Term Decommissioning Action Plan 2025



Note: The description may change depending on future studies.

Mid-and-Long-Term Decommissioning Action Plan 2025

Fuel debris retrieval

FY	2024 (performance)	2025	2026	2027	2030	2036

RM Milestones

Commencement of fuel debris retrieval from the first implementing unit (within 2021): Achieved in September, 2024

Trial retrieval (Unit 2)

- Improvement of environment in the building
- Analysis of fuel debris properties
- Removal of obstacles around opening
- Manufacturing and installation preparation, etc. of telescopic device
- Trial retrieval (Fuel debris sampling with telescopic device)
- Manufacturing/installation of investigation/retrieval equipment
- Safety system operation change
- Robotic arm used for internal investigation/debris sampling

Gradual expansion of the scale of retrieval (Unit 2)

- Improvement of environment in the building
- Fuel debris retrieval equipment
- Design/manufacturing
- Installation
- Design/manufacturing/installation of safty systems
- Design/manufacturing/installation of fuel debris storage facilities/maintenance equipment
- RPV internal investigation
- Fuel debris retrieval (Gradual expansion of the scale of retrieval)
- Analysis of fuel debris properties

* Gradual expansion of the scale of Unit 2 retrieval will be reviewed based on the trial retrieval (internal investigation, sampling of debris) results, etc.
Further expansion of the scale of Unit 2 retrieval will be studied in the future, based on the trial retrieval, gradual expansion of the scale of retrieval, etc.

Further expansion of the scale of retrieval (Units 1/3)

- Improvement of environment inside and outside the Unit 1 building
- PCV water level reduction
- Unit 1,2 SGTS pipe removal
- Removal of the lower portion of the Unit 1/2 exhaust stack
- Inside the building: Dose reduction/removal of interfering materials, etc.
- Outside the building: Removal of transformers, etc
- Unit 1 PCV internal investigation
- Non-submerged area investigation
- Equipment improvdement/manufacturing
- Non-submerged area investigation
- Eqipment improvement/manufacturing
- Deposit sampling investigation, investigation inside vent pipe and S/C
- Assessment of investigation results/study of countermeasures
- Improvement of environment inside and outside the Unit 3 building
- Inside the building: Dose reduction/removal of interfering materials, etc.
- PCV water level reduction
- Removal of the Unit 3/4 exhaust stack
- Removal of transformers
- Unit 3 PCV internal investigation
- Improvement of work environment/formation of access route
- Equipment study/manufacturing
- Internal investigation
- Equipment improvement/manufacturing
- Non-submerged area investigation
- Fuel debris retrieval equipment/safety systems/fuel debris storage facilities/maintenance equipment/training facility etc. *
- Conceptual study 2
- Basic design
- On-site applicability verification/development (dust scattering control, etc.)
- Preparation (Manufacturing, environmental preparation around installation locations, installation, etc.)
- Fuel debris retrieval

* Assuming that studies will be carried out giving precedence to Unit 3, and Unit 1 will be studied thereafter

Ascertaining conditions inside the reactor

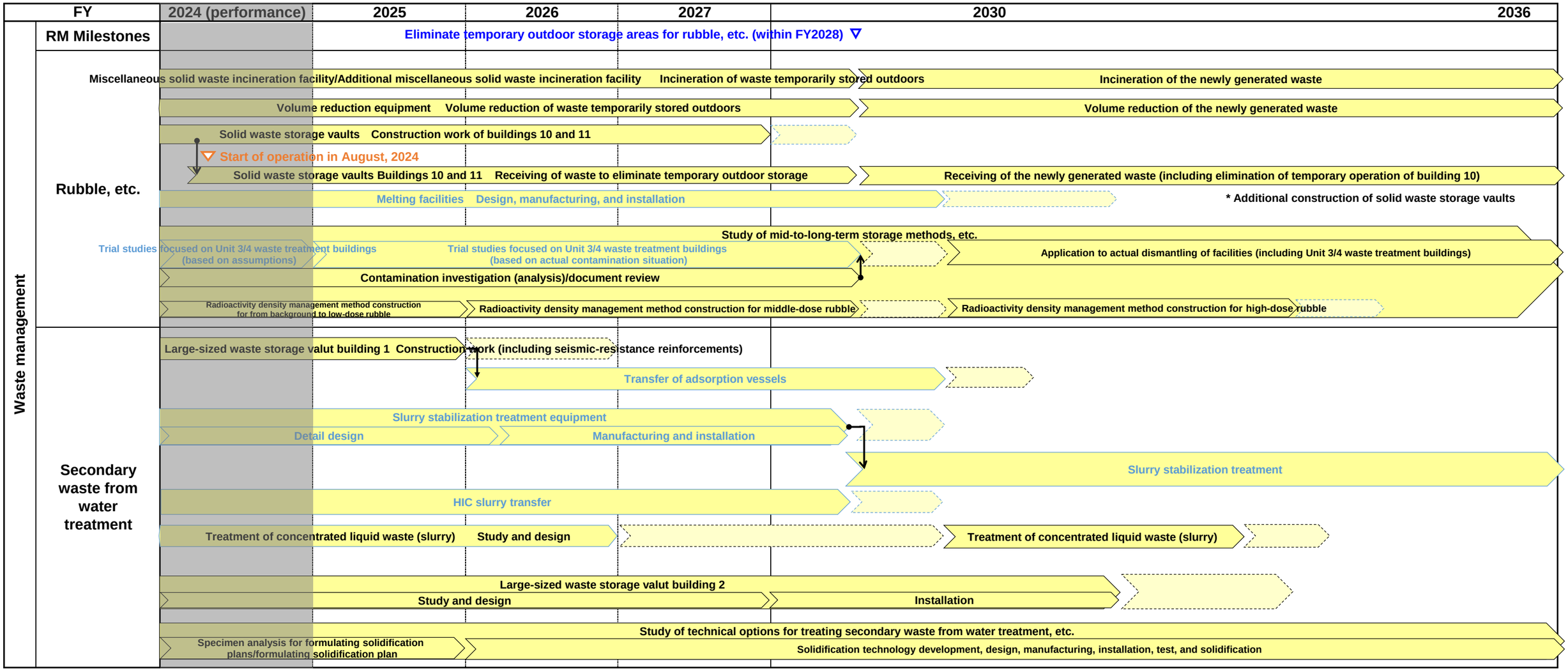
- Investigation, study, and work on areas where hydrogen has accumulated
- Ascertaining behavior inside the reactor

<Legend>

- : Duration of work
- : Period during which change is anticipated
- : Correlation between schedules
- : Added processes
- : Changed/embodied processes
- : Processes that have been discontinued

Note: The description may change depending on future studies.

Mid-and-Long-Term Decommissioning Action Plan 2025



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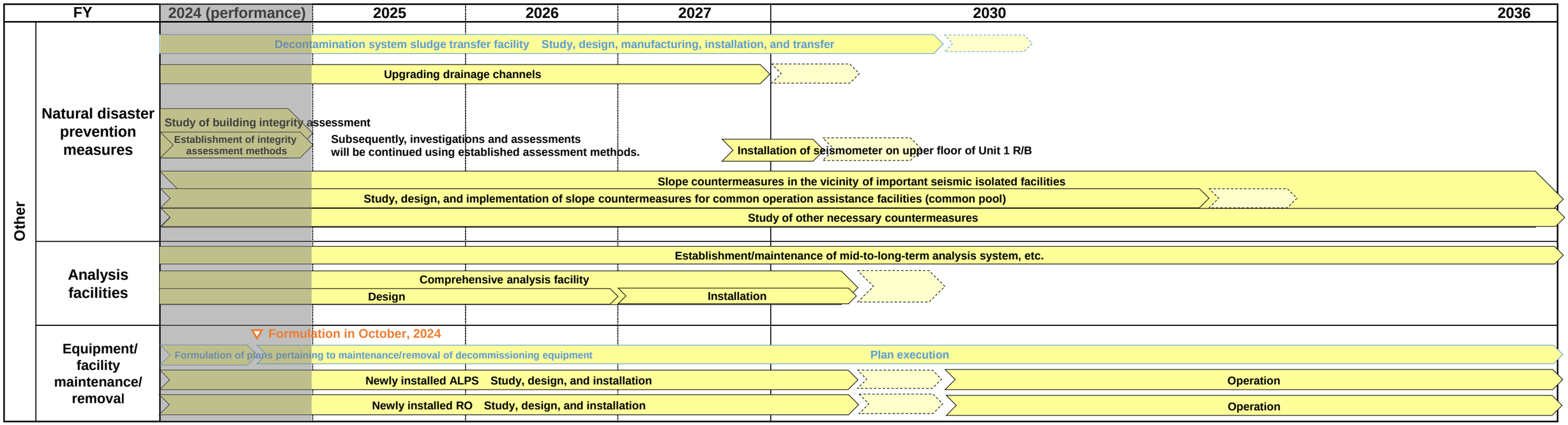
Mid-and-Long-Term Decommissioning Action Plan 2025



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