Slurry Stabilization Treatment System Installation Plan Status

March 27, 2020

TEPCO

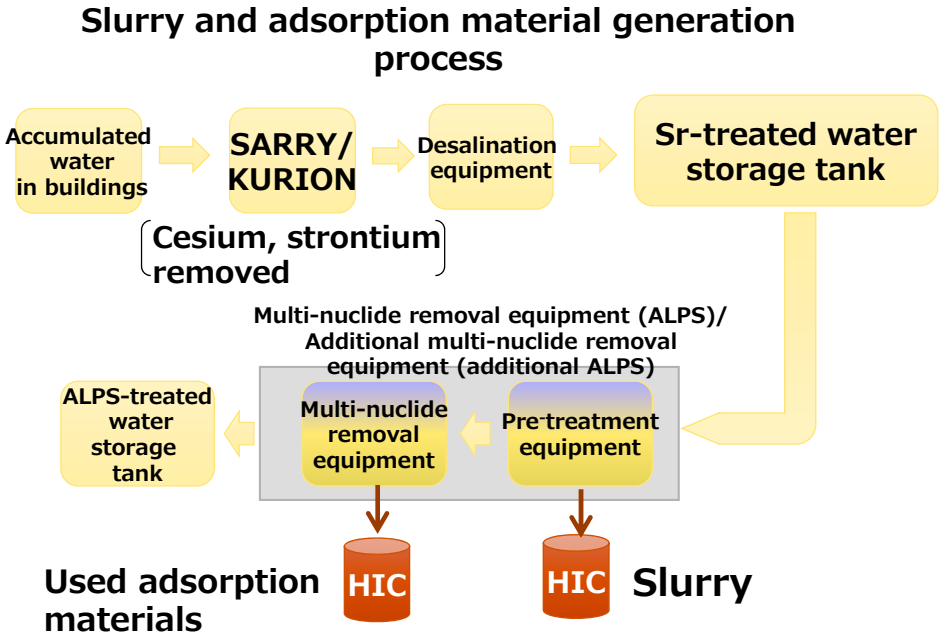
Tokyo Electric Power Company Holdings, Inc.

Multi-nuclide removal equipment (ALPS)

Equipment for removing 62 radioactive materials such as cesium (excluding tritium)

→As the waste is treated with ①pre-treatment equipment, and then ②multi-nuclide removal equipment, slurry (iron coprecipitate/carbonate precipitate) is produced by ① and used adsorption materials are produced by ②.

○Slurry and used adsorption materials are discharged into high integrity containers (HIC※), which are put in shielded temporary storage facilities



HIC (polyethylene part)

HIC (after additional reinforcement)

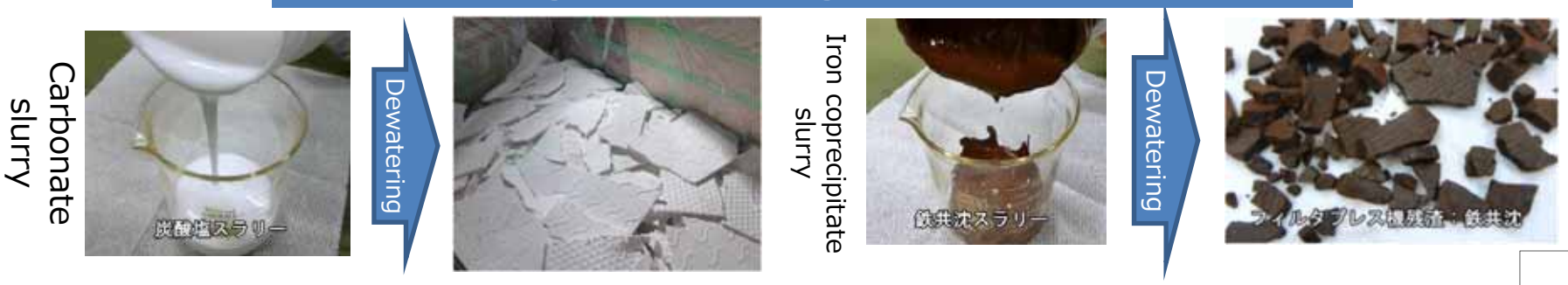
※HIC : High Integrity Container
Created by additionally reinforcing a USA-approved polyethylene container with stainless steel so that it can be used with ALPS

Reducing risk by solidifying liquid slurry

Risk	Countermeasure
Leak of encapsulated water ・Carbonate slurry expands with hydrogen causing the supernatant to overflow	Dewatering
Accumulation of hydrogen ・Discharge of accumulated hydrogen during a strong earthquake	Solidification
Deterioration of polyethylene container caused by radiation ・As the HIC deteriorates over time it increases the chance of rupture if dropped by accident	Extract and dewater the slurry
Leak during the handling or transport of HIC as a result of an accident	dewatering

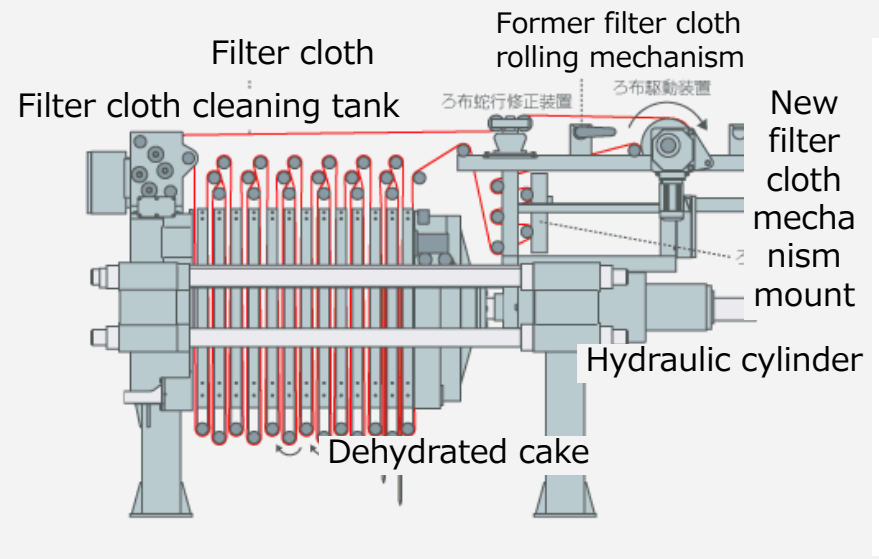
Research and development on dewatering slurry began as a subsidized decommissioning/contaminated water countermeasures project when ALPS was put into use (FY2013). Slurry stabilization treatment equipment centered around filter press dewatering equipment, for which performance was confirmed using actual-size equipment, installed.

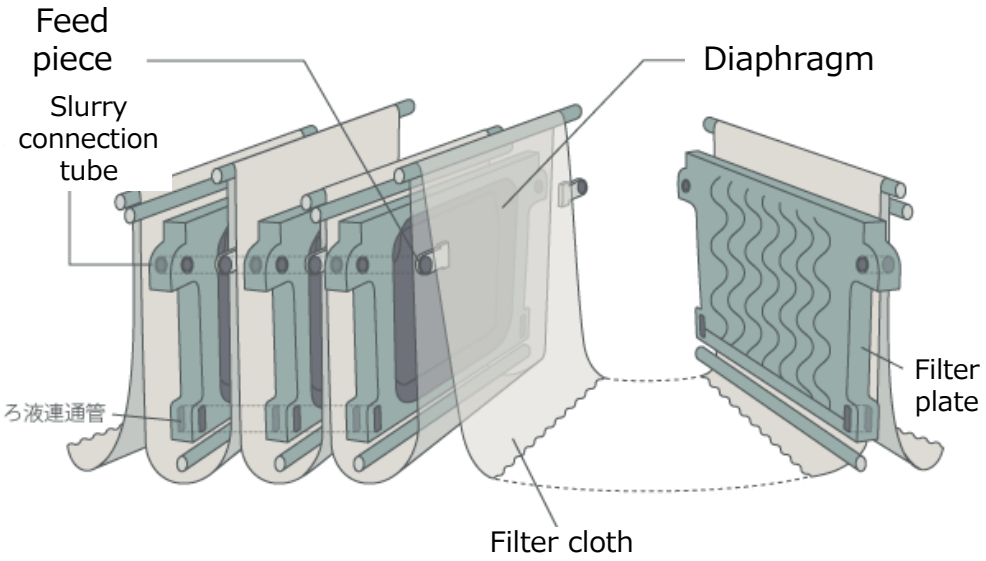
Stabilizing by turning liquids into solids



Reference Filter press method

- Overview
  - The filter press method is a commonly used technology for treating sludge.
  - The liquid to be treated is injected into a closed space comprised of filter cloth sandwiched between filter plates (filter chamber) to filter the water. The remaining cake is squeezed through a diaphragm to further dewater the cake, and the dehydrated cake gets discharged from the bottom.
  - A cleaner is incorporated into the pathway of the filter cloth to clean off slurry that has adhered to the filter cloth as the cloth is rolled up during replacement thereby reducing exposure during the task.

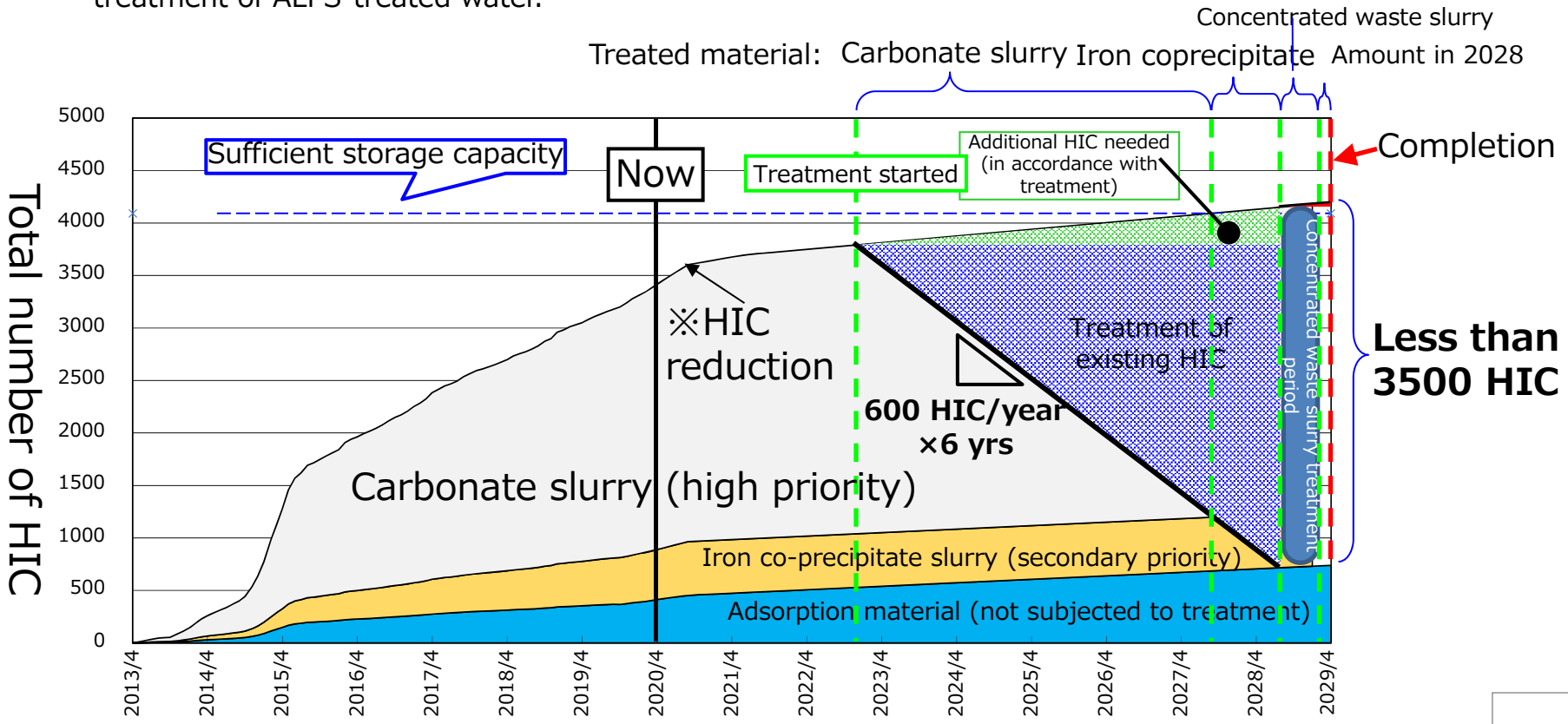




Stabilization (dewatering) treatment device

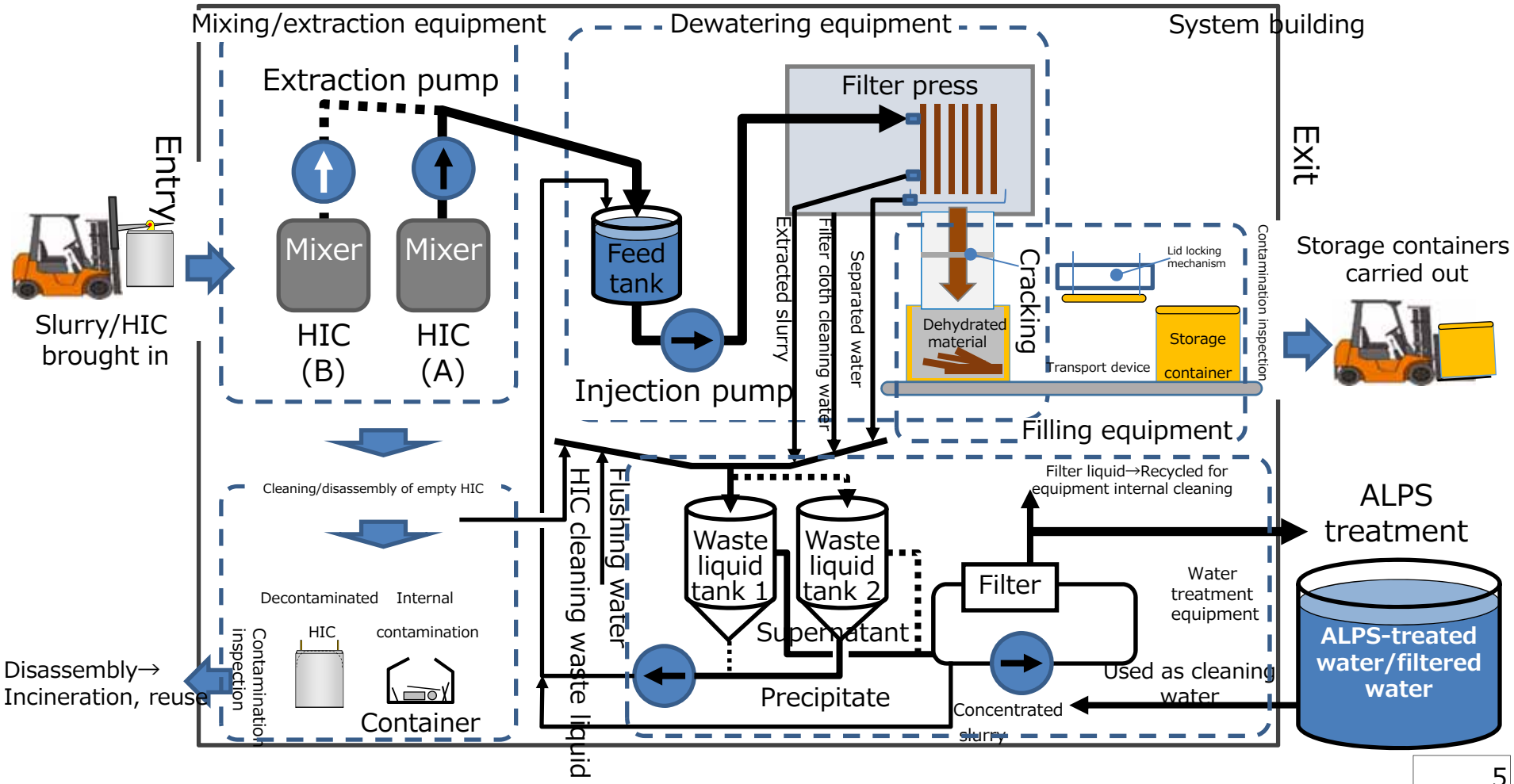
Stably ensure HIC storage capacity

- If current HIC storage is continued we predict enough storage capacity for approximately 6 to 7 years
- If slurry is to be extracted from the HIC and treated, the amount in storage would decrease
  - Currently, approximately 28 HIC are being used per month, but after ALPS treatment volume decreases in conjunction with the completion of treatment of Sr-treated water (forecasted for the summer of 2020: see the portion of the diagram marked with a ※) this should decrease to approximately 10 containers per month.
    In addition, we must also consider the number of HIC required in conjunction with the secondary treatment of ALPS-treated water.



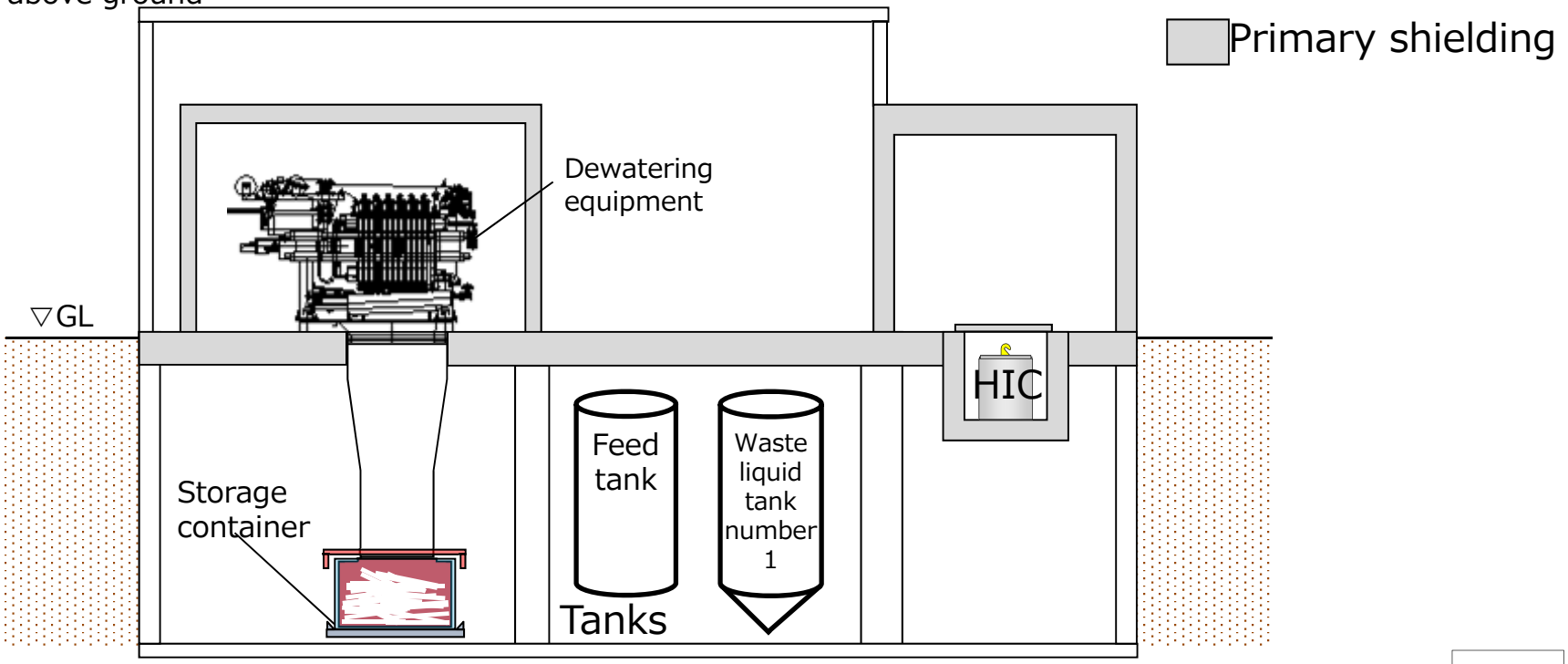
2 Slurry stabilization treatment system overview

- This system consists of mixing/extraction equipment for extracting and transporting the slurry, dewatering equipment, equipment for filling storage containers, water treatment equipment for recycling separated water, flushing waste liquid, and cleaning water, ventilation and discharge management equipment for suppressing discharges of dust outside the building, utility/control/operation equipment and the building it is all housed in.



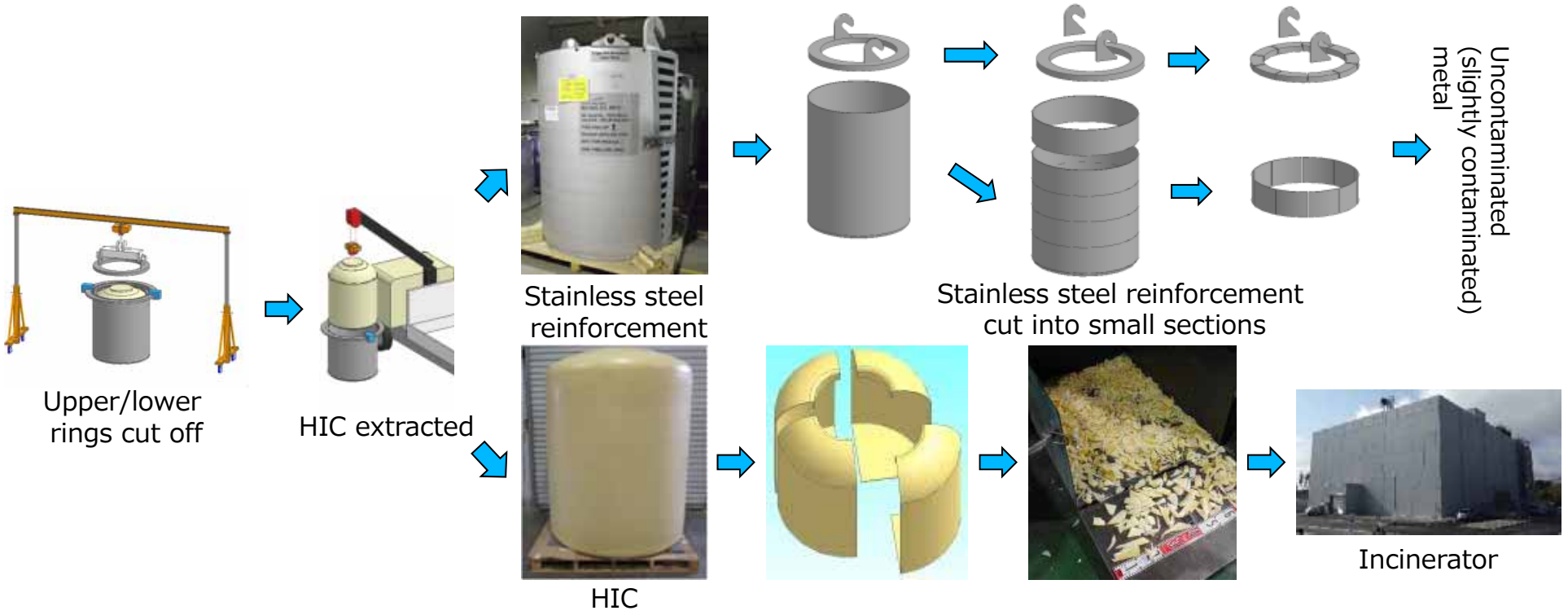
3 Suppressing the impact on dose levels at site boundaries

- Radiation sources shall be shielded, such as by the building, to suppress the impact on dose levels at site boundaries
- Assessment targets: HIC, dewatering equipment, storage containers, tanks (including water treatment equipment)
- Primary nuclides: Sr-90, Y-90 (the percentage of other nuclides that may exist depends upon multi-nuclide removal equipment)
- Primary shielding: Reinforced concrete building
  - With the exception of the dewatering equipment, all equipment will be placed underground and shielded by the floor slab of the ground floor
  - Additional reinforced concrete shielding will be installed to shield the dewatering equipment installed above ground



4 Proposed treatment of used HIC

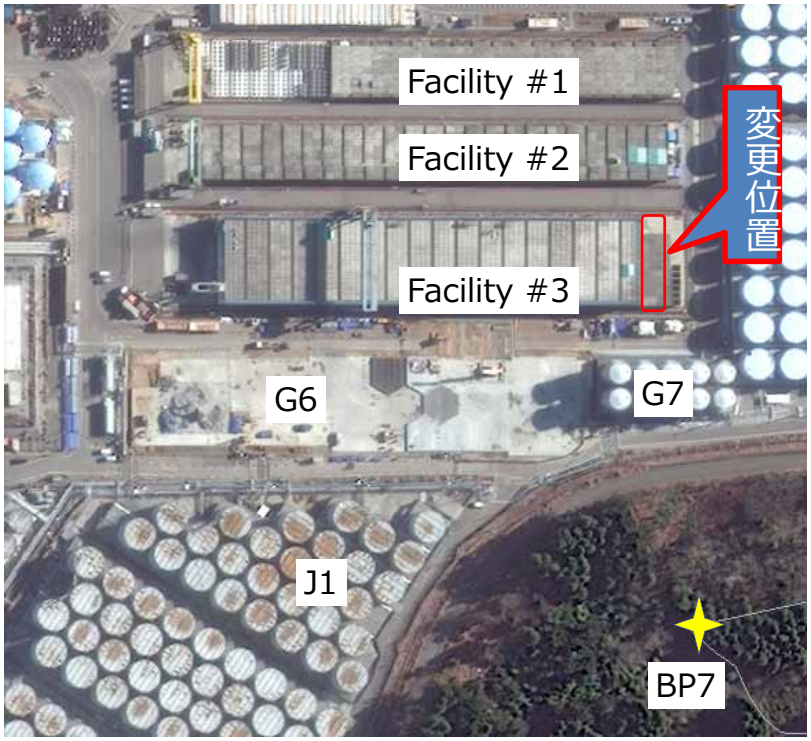
- HIC that have been emptied in the course of stabilization treatment shall be incinerated (some HIC may be reused)
  - The HIC (polyethylene portion) is to be removed from the stainless steel reinforcement, pulverized and incinerated

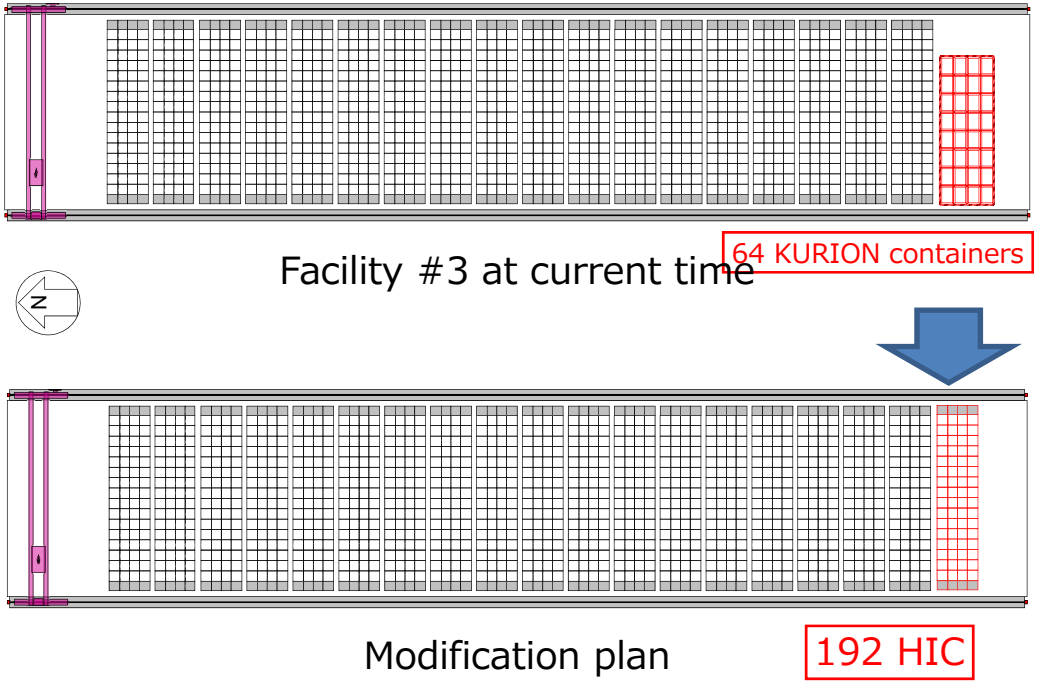


  - Reusing HIC that have only deteriorated slightly from radiation shall be deliberated in order to reduce waste
    - HIC that have been stored for short periods and have low dose levels, for example
  - However, when deliberating reuse, rules for ensuring the integrity of HIC shall be determined in advance and discussed with the Nuclear Regulatory Agency

5 Increasing HIC storage capacity

- In order to secure greater HIC storage capacity margins, we are deliberating converting the cesium adsorption tower temporary storage facility (facility #3)
  - In particular, the box culverts for holding the 64 KURION containers that have not been used will be converted to hold 192 HIC.
  - In regards to the impact on dose levels at site boundaries, it is expected that the impact from reducing 64 KURION containers (5.8×10^{-3}mSv/year at BP7) will be greater than that of HIC storage (under assessment)





6 Future schedule