Efforts to ensure ocean protection

Tokyo Electric Power Company

August 11, 2014

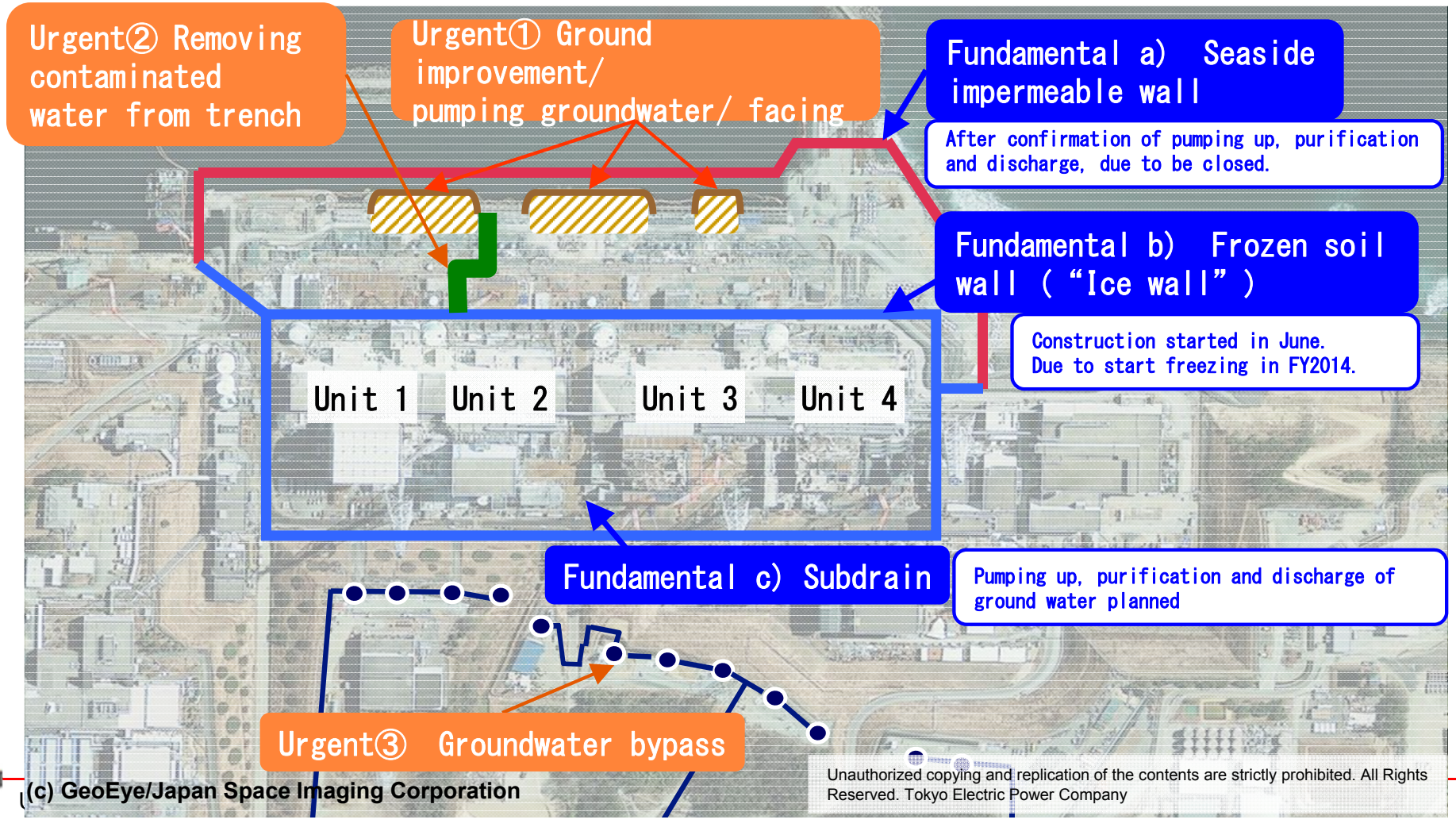
1. Outline of measures to protect the ocean

Urgent measures

-Stopping flow to the port ① Ground improvement/pumping groundwater/paving at contaminated area <Leakage prevention> <Contaminant isolation>
-Elimination of pollution source ② Removing contaminated water from trench <Contaminant removal>
-Suppression of contaminated water increase ③ Pumping up groundwater from hillside（groundwater bypass） <Contaminant isolation>

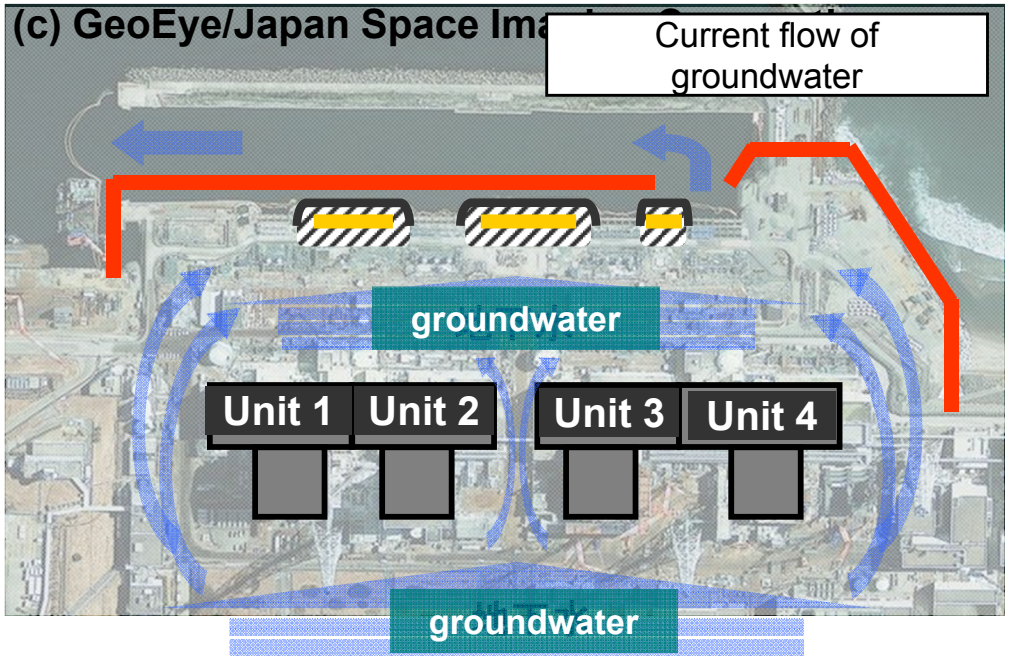
Fundamental measures

- **Stopping flow to the ocean a) installing seaside impermeable wall** <Leakage prevention>
- **Suppression of contaminated water increase/ stopping flow to the port b) installing landside frozen soil wall (“Ice wall”)** < Contaminant isolation>
- **Reducing groundwater flow into reactor facilities etc. c) pumping up groundwater through “Subdrain”** <Contaminant isolation>



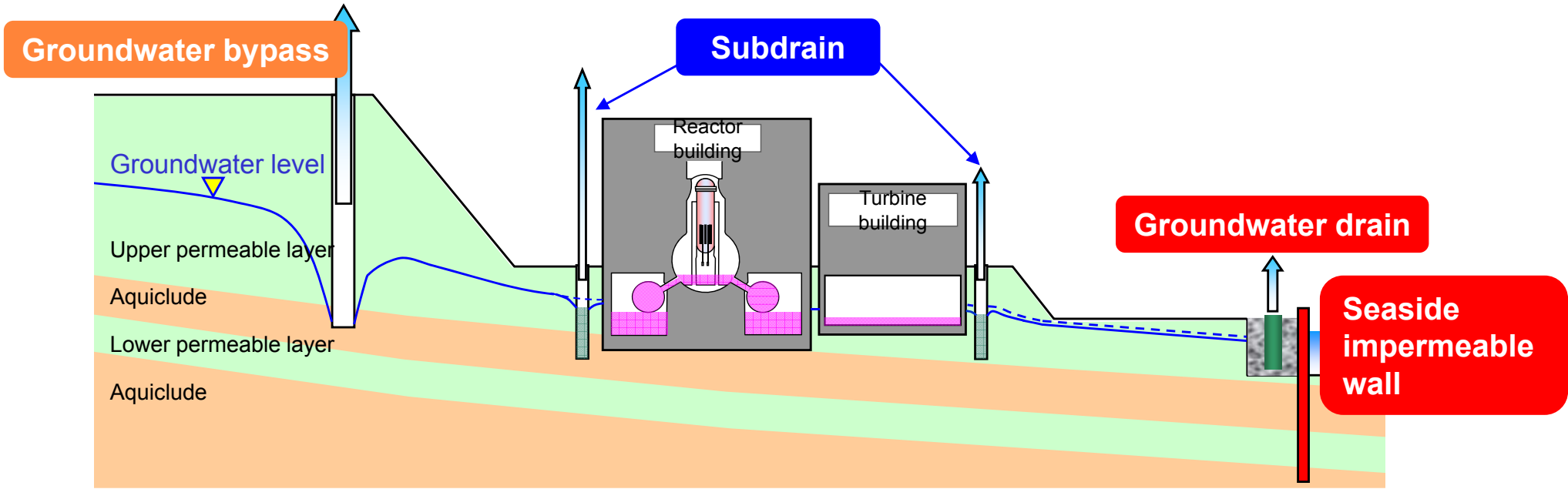
2. Current groundwater conditions

- Groundwater around reactor buildings (Unit 1 to 4) is confirmed to contain **radioactive materials** which have mixed with rainwater having been contacted with contaminated debris left on the ground surface due to the accident.
- Radioactive material concentration of the groundwater is **much lower than that of the contaminated water accumulating in the reactor facilities**. The water level of the contaminated water inside the buildings is kept lower than that of the outer groundwater, which prevents water inside from flowing out. Therefore, contaminated water in the buildings theoretically does **not mix with the groundwater flowing around the buildings.**



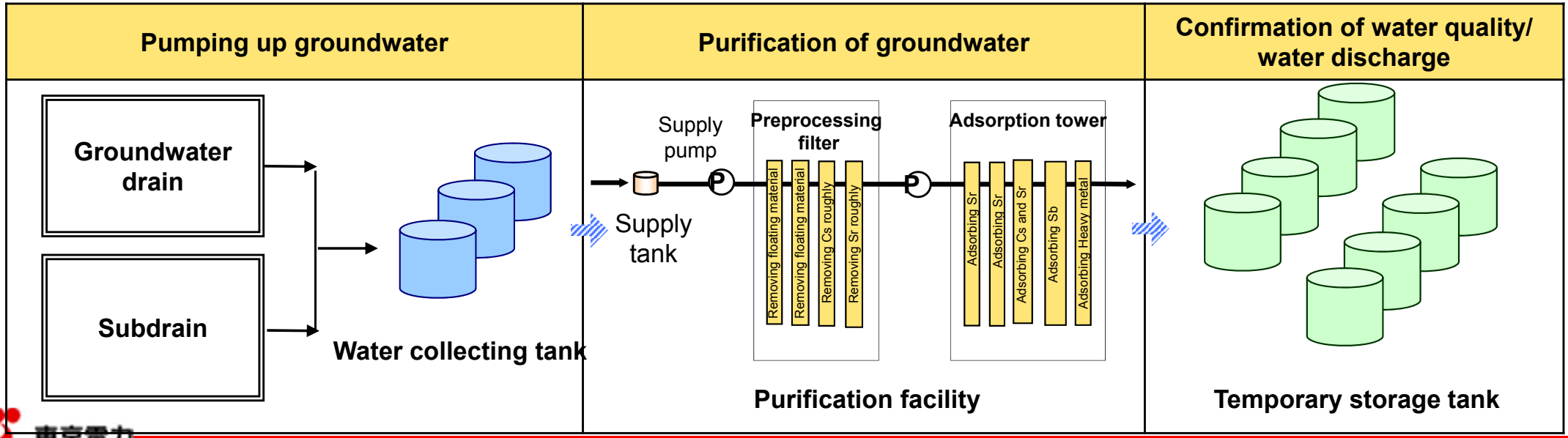
3. Pumping up groundwater from groundwater drain and subdrain systems

- The well placed on the seaside (**groundwater drain**) pumps up groundwater flowing to the sea.
- Flow of groundwater will also be reduced by the upper-stream well around the buildings（**subdrain**）.
- Since **pumping up through subdrain** greatly reduces the amount of groundwater flowing into the reactor facilities, consequently **the volume of highly contaminated water being stored at the site every day will be reduced,** reducing risks of ocean contamination.



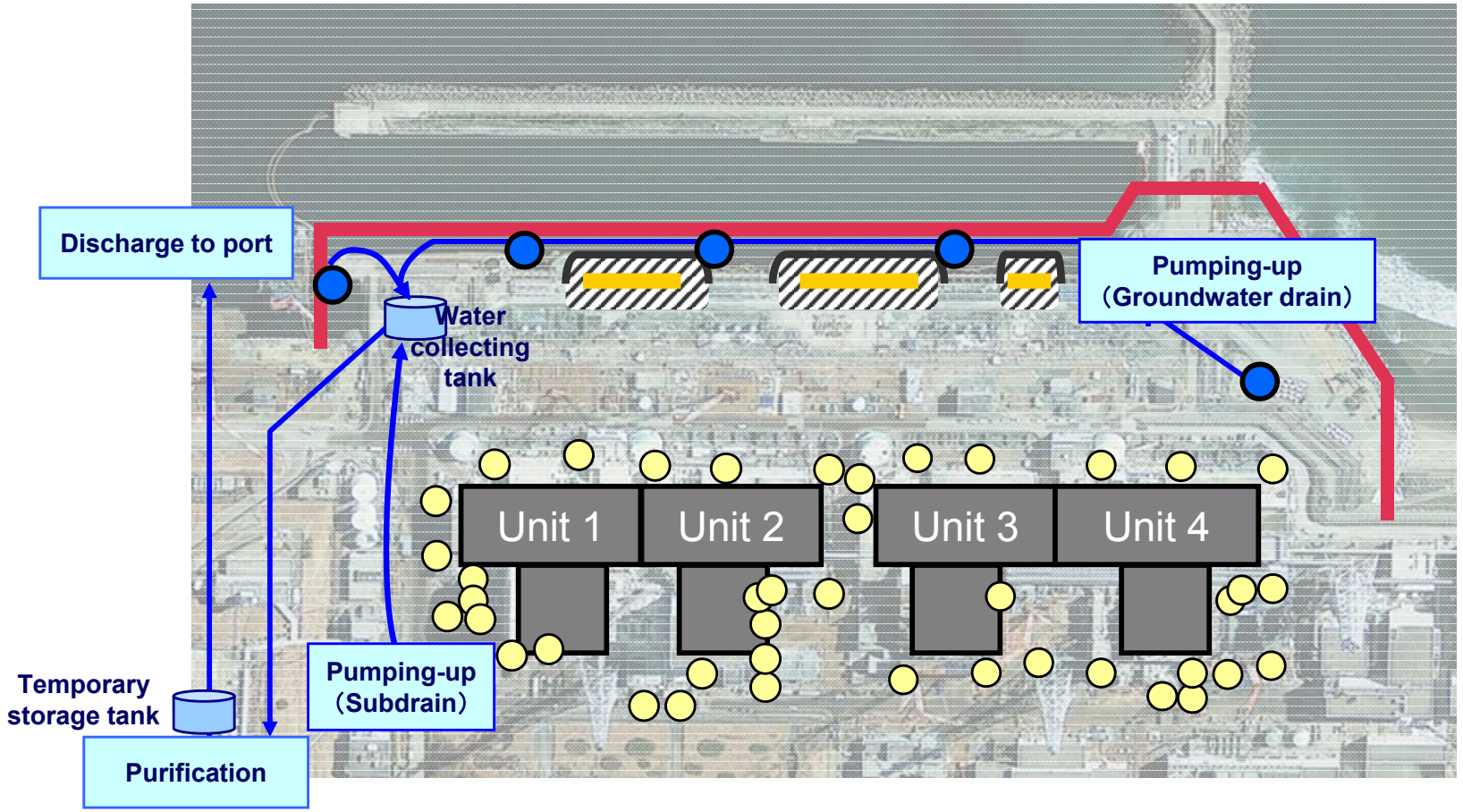
4. Purification of groundwater and testing the purification system

- The collected groundwater will be purified by a specified facility capable to reduce radioactive material concentration to as low as between one-thousandth and ten-thousandth.
- As the groundwater contains fairly lower radioactive material than the accumulating water inside the buildings, the purification facilities for groundwater are more simplified and less subject to being out of order than the existing treatment facilities. However, in cases when the facility does not work, putting the priority on preventing groundwater flow to the ocean, the amount of water pumped up from the subdrain system will be adjusted, while continuing pumping up from the groundwater drain. If the suspension of the facilities seems to be prolonged, pumping up through subdrain will be stopped.
- Purification and transfer tests are planned. (The subdrain water is planned to be pumped up and tested this week).



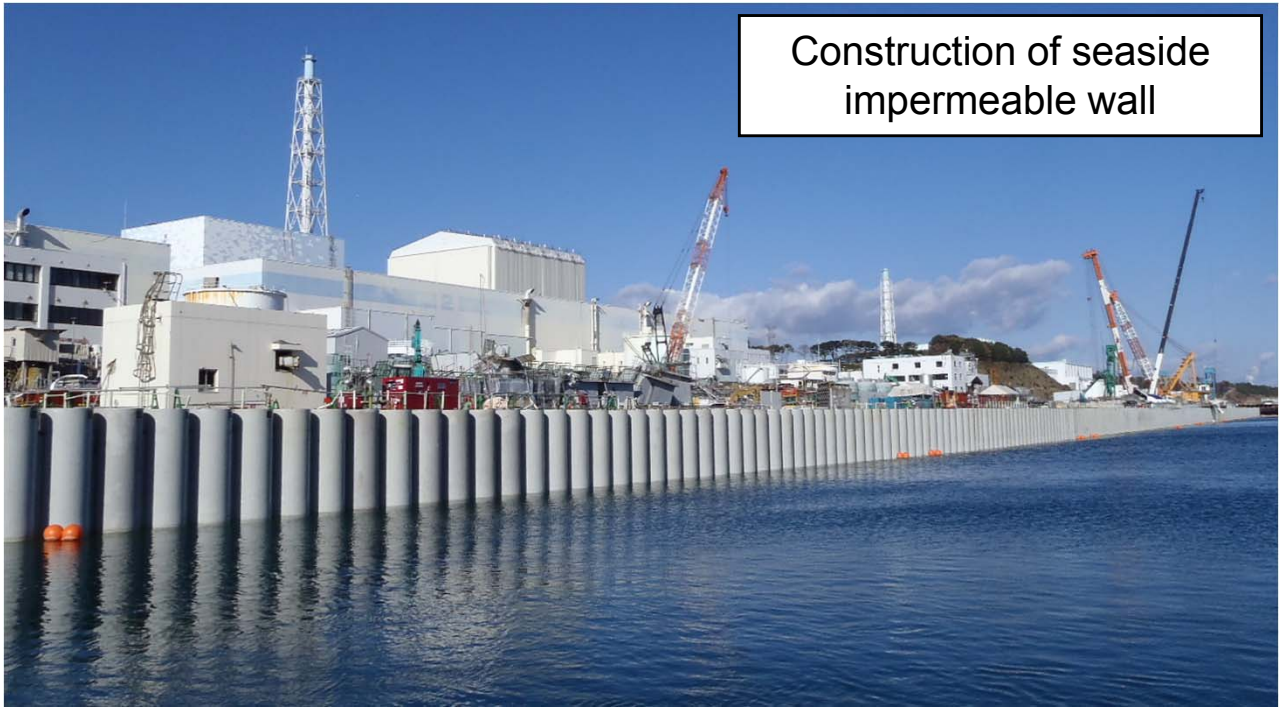
5. Discharge of the purified groundwater

- The purified groundwater will be discharged to inside of port after confirming **it meets the water quality standards** (management objective) set by **groundwater bypass.**
- **Discharge will not be carried out without the understanding** of such stakeholders as the relevant ministries and the fishermen.



6. Closing of the seaside impermeable wall

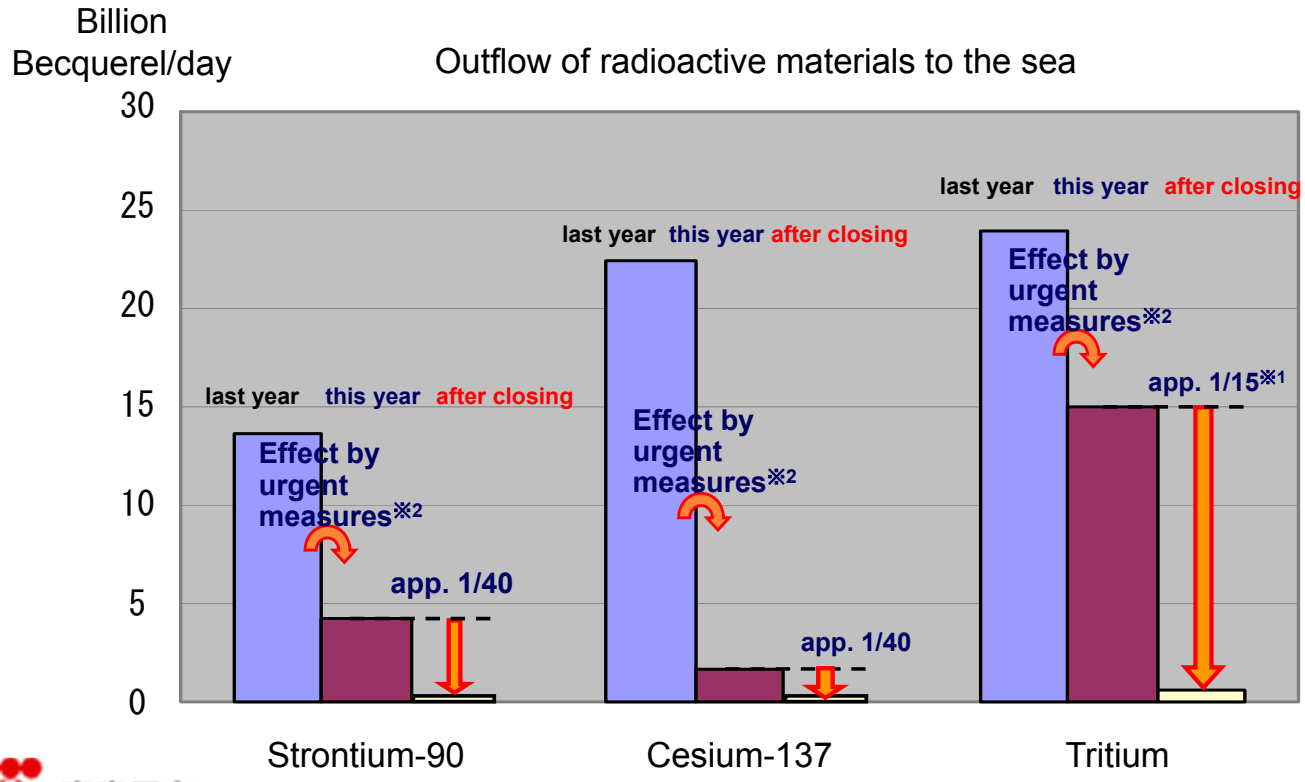
- The seaside impermeable wall will be closed **after water purification and transfer is confirmed to work stably.**
- The seaside impermeable wall is installed deeper than the lower permeable layer (30m deep inside the seabed).
- **The seaside impermeable wall** surrounding Units 1 to 4 port area reduces groundwater flow from the site to the port. Consequently, the ocean will be further protected from contamination. The impermeable wall is now prepared to be able to **close as early as the end of September, 2014**.



Construction of seaside impermeable wall

7. Purification of pumped groundwater and effects of discharge

- Measures to reduce flow of radioactive materials to the sea are progressing, such as by ground improvements etc.
- **By the operation of the systems to pump up, purify and discharge groundwater and the closing of the seaside impermeable wall,** the outflow of radioactive materials to the sea is estimated to be further reduced.
- This is due to the pumping up of groundwater from the upstream via the subdrain system, which prevents groundwater from catching the radioactive materials on the fairly highly concentrated seaside area.
- On each process in the mid-and-long term project for decommissioning, in case of any accident which may cause leakage of contaminated water, the impermeable wall will **ensure ocean protection.**



-Outflow of radioactive material of "last year" and "this year" are estimated based on radioactive material concentration of inside and outside port (#They are under reevaluation by TEPCO and JAEA)

- The figure of "last year" and "this year" contain the difference due to survey point which was moved from intake north side (2013) to intake north side east seawall bank (2014) for landfill.

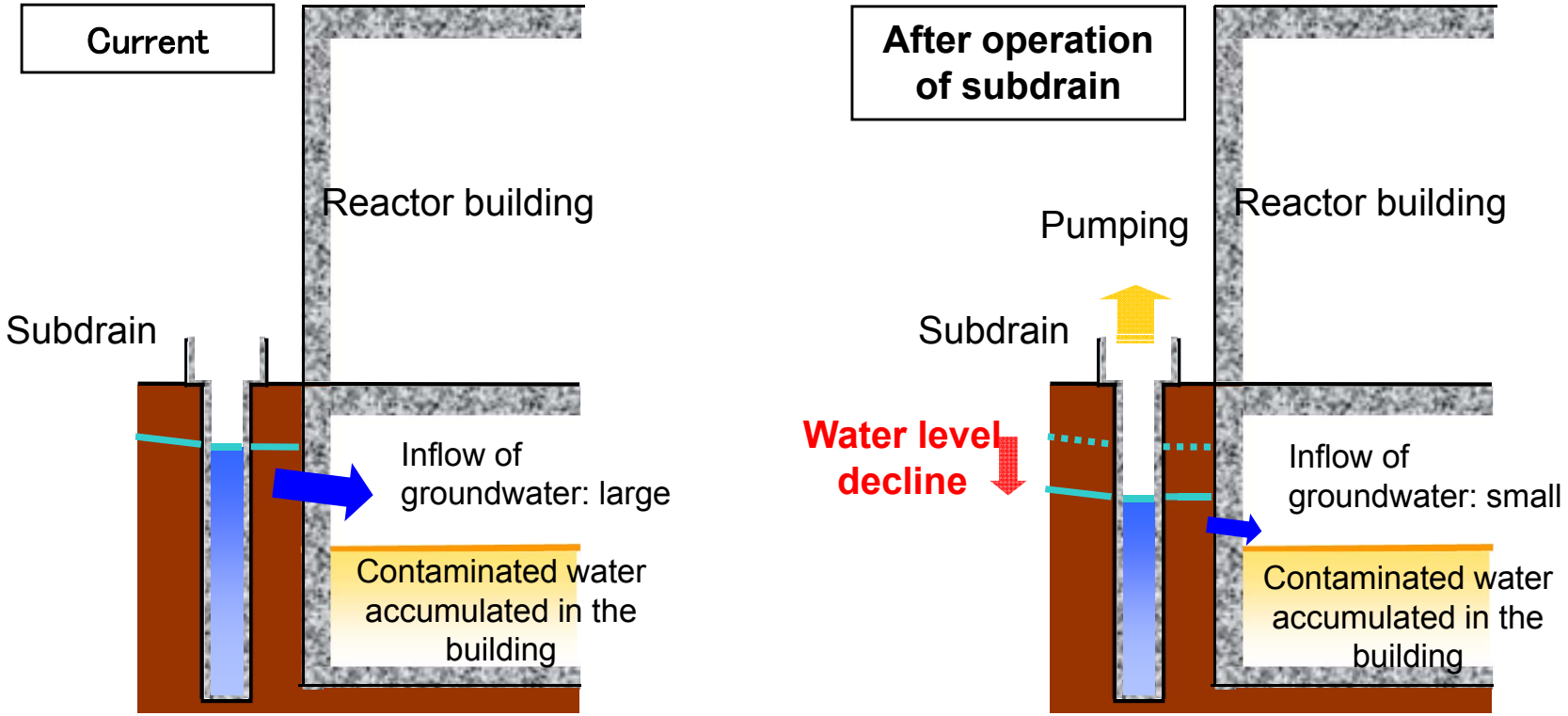
-Outflow of radioactive material after closing is sum of volume of radioactive material of the groundwater filtered through impermeable wall [theoretically; a trace] and that of groundwater discharged after purification.

※1 Estimated by "this year's outflow". If "this year's outflow" is revised, the reduction ratio will be modified..

※2 "Urgent" (measure) means ground improvement/ pumping up through well-point, etc.

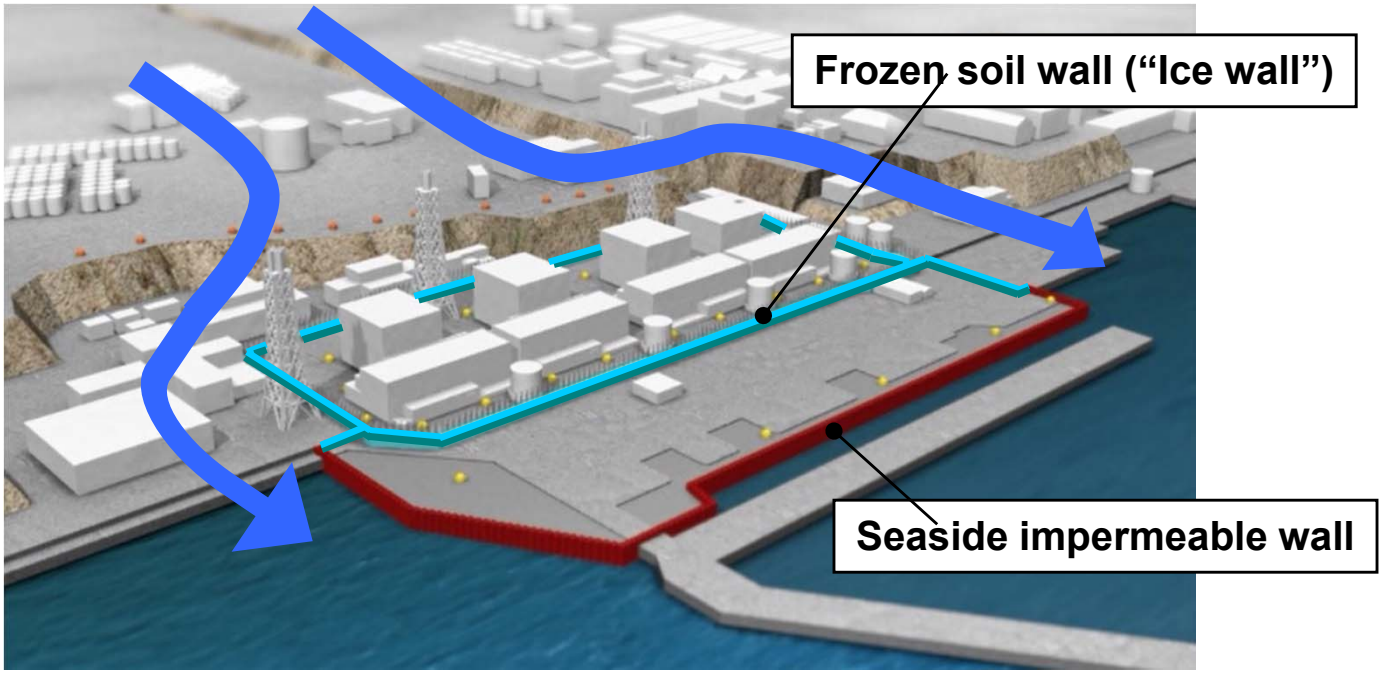
8. Effect of pumping up from subdrain

- Subdrain pumping will lower groundwater level around the reactor facilities. Especially, as the difference of water levels inside and outside the buildings is currently up to around 4 meters, it is estimated to be able to reduce water amount of 200m3/day (from 400m3/day, current) by the operation of the subdrain system. Therefore, reducing groundwater inflow will consequently **lead to reducing the volume of contaminated water** stored at the site.



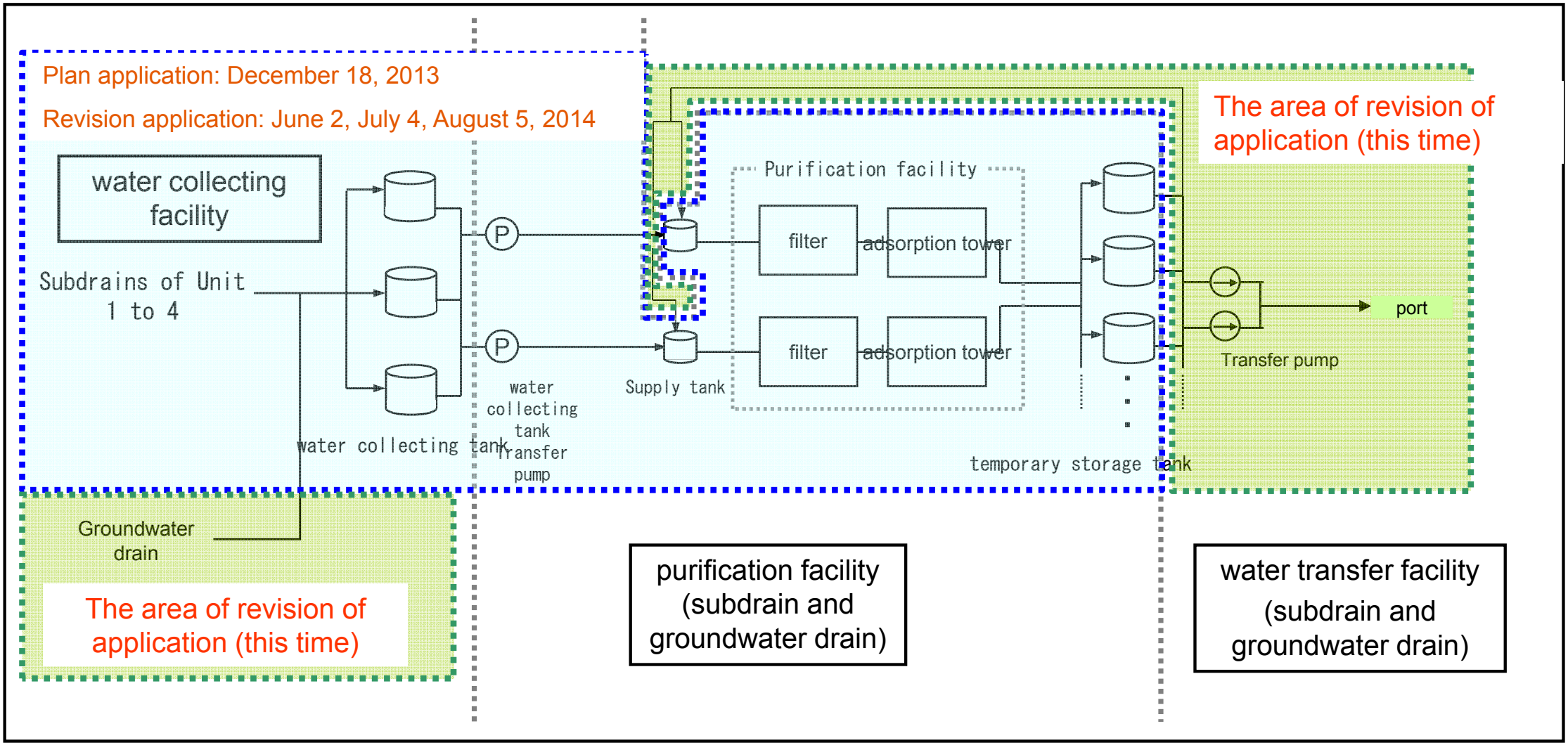
9. Condition of groundwater after installation of frozen soil wall (“Ice wall”)

- As a fundamental measure, we are constructing the **frozen soil wall (“Ice wall”) around Units 1 to 4,** as well as pumping groundwater through subdrain and closing the impermeable wall. The construction started in June, 2014, and freezing is scheduled to start within FY2014.
- The “Ice wall” will prevent groundwater from flowing into the buildings, instead making it flow around the Units 1 to 4 buildings and lead to the sea.
- Since **flow of underground water around Units 1 to 4 will be greatly reduced** if the “Ice wall” operates, the amount of water pumped up by subdrain will also be greatly reduced.
- Amount of water pumped up through groundwater drain will also be reduced since flow of groundwater to the **seaside impermeable wall will be greatly reduced** after the start of “Ice wall” operation.



10. Area of revision of application to the NRA

Water treatment facilities (subdrain and groundwater drain)



11. Layout of water treatment facilities (subdrain, groundwater drain)