<Reference>

Approach to the ocean-side trench investigation at the Fukushima Daiichi Nuclear Power Station

July 26, 2013
Tokyo Electric Power Company

1. Current status and investigation objectives (1/2)

[Current status]

- **Status around the site of contaminated water leakage at the Unit 2 screen room (power supply cable trenches)**
  - An extremely high level of radiation concentration was detected at the observation pit (No.1-2) near the site of contaminated water leakage, identified two years ago.
  - This is suspected to be attributable to the slow inflow of highly contaminated water, pooled at the leakage site in power supply cable trenches, i.e. the route of contaminated water leak, or the continuous permeation of highly contaminated water contained in the trenches.

- **Status of the ocean-side pipe trenches and intake power supply cable trenches**
  - There is no confirmed effect of contaminated water in the trenches on the increase of radioactive concentration in the ocean-side groundwater and ocean-side front open channels. However, there are concerns that the contaminated water in the trenches could seep out through deteriorated areas of the plant structures.
  - The seawater piping trenches and intake power supply cable trenches for Units 2 and 3 have been partially filled with grout and other materials, but they still contain a large volume of highly contaminated water, which has flown in from the turbine buildings.
  - In contrast to Units 2 and 3, the water resident in the seawater pipe trenches for Units 1 and 4 is found to have radioactive concentration about two digits lower than that of water at their respective turbine buildings. However, some of the power supply cable trenches for Unit 4 may contain pools of highly contaminated water, which has flown in from Unit 3.

1. Current status and investigation objectives (2/2)

[Investigation objectives]

- Investigate the fluctuations of water level in the trenches to quantitatively estimate the possibility and extent of highly contaminated water flowing into the trenches.

- Investigate the volume and properties of the contaminated water and the connectedness between the turbine buildings with adjacent trenches, and urgently implement effective measures that can be put in place at an early stage, in order to reduce the risk of the highly contaminated water in the trenches flowing into the sea.

The status of the ocean-side trenches is to be investigated for the abovementioned objectives.

2. Investigation content –Targets, investigation items-

- **Target units:** Unit 2 and Unit 3
  (Also taking into account possible water flow toward Unit 3 and Unit 4)

- **Target structures:** Ocean-side piping trenches and intake power supply cable trenches
  (Considering the categories of water stop areas based on the current status of water stop measures in place)

- **Investigation items**

(1) Water level measurement

・Examine the fluctuations of water level for a specific period of time to quantitatively determine the possibility of water flow from each of the trenches to surrounding soil.

・Identify the amount of water processed (drained) in the current measures.

(2) Radiation level measurement and water analysis

・Take into account the purification performance and progress of the current measures.

(3) Connectedness with turbine buildings and water stop performance of current measures

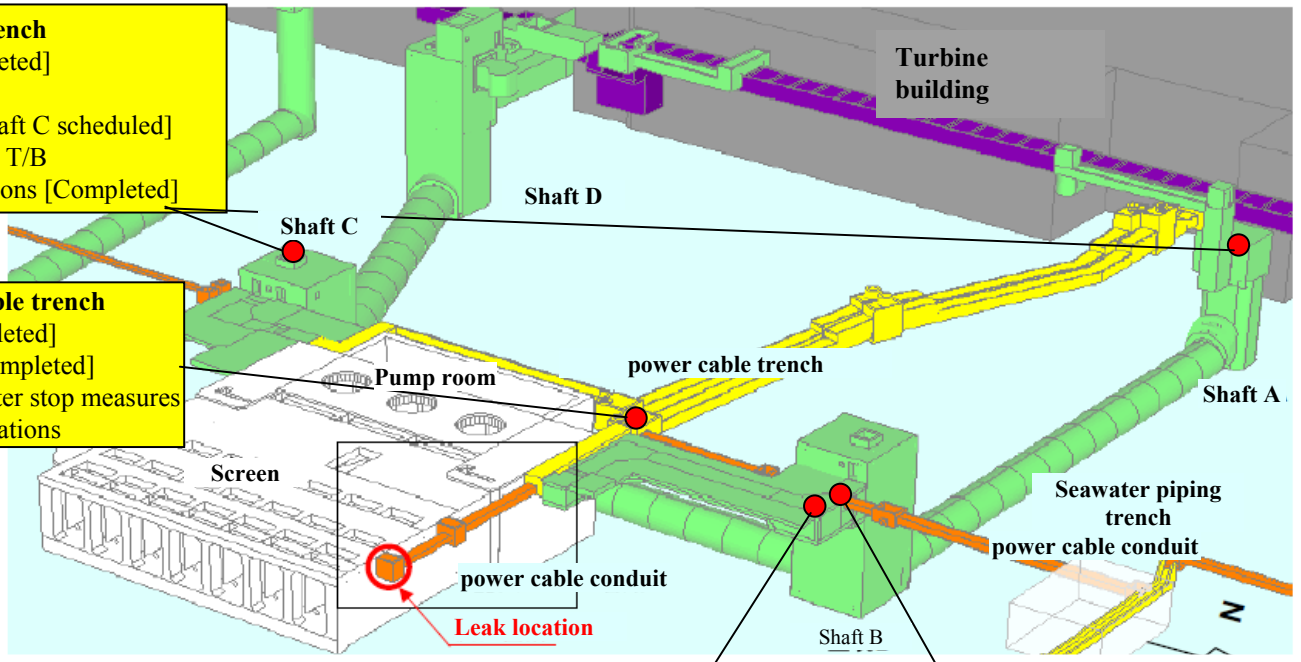
・Examine the results of (1) (water level measurement) to determine the connectedness with turbine buildings and water stop performance of current measures in place.

・Use the findings as the premise for determining the feasibility of future measures including trench closure (need for grout injection, water draining) and localized water purification.

Main investigation items for Unit 2 trenches

A: Seawater piping trench
(1) Water level [Completed]
(2) Radiation level
[Shaft A completed, Shaft C scheduled]
(3) Connectedness with T/B
→ Water level fluctuations [Completed]

B2: Intake power cable trench
(1) Water level [Completed]
(2) Radiation level [Completed]
(3) Performance of water stop measures
→ Water level fluctuations



B1-1: Intake power cable trench (Seawater pipe foundation)
(1) Water level
(2) Radiation level
(3) Seawater piping trench's (Shaft B) water stop performance
→ Water level fluctuations

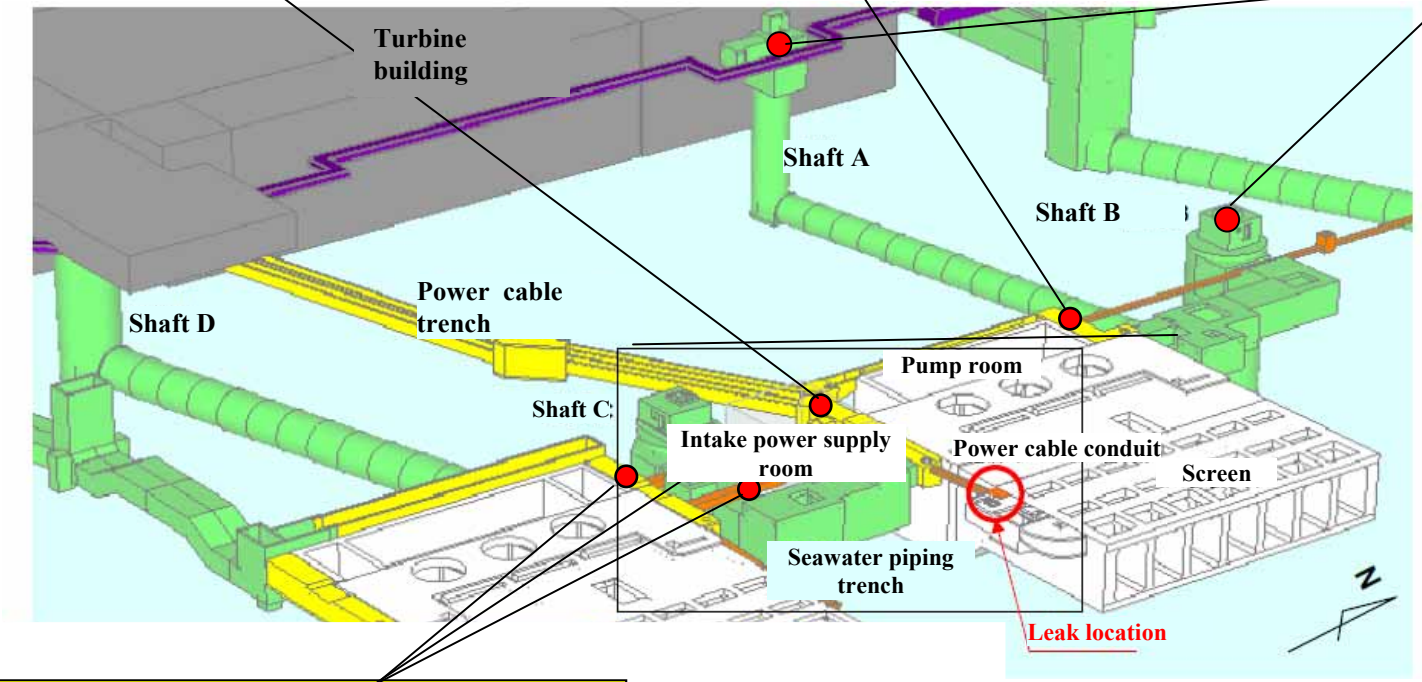
B1-2: Intake power cable trench (Seawater pipe foundation)
(1) Water level
→Water flow into cable conduits
(2) Radiation level

Main investigation items for Units 3 / 4 trenches

B2: Intake power cable trench
(1) Water level
(2) Radiation level
(3) Performance of water stop measures
→ Water level fluctuations

B1: Intake power cable trench
(1) Water level
(2) Radiation level
(3) Performance of water stop measures
→ Water level fluctuations

A: Seawater piping trench
(1) Water level [Completed]
(2) Radiation level
[Shaft A completed, Shaft B scheduled]
(3) Connectedness with T/B
→ Water level fluctuations [Completed]



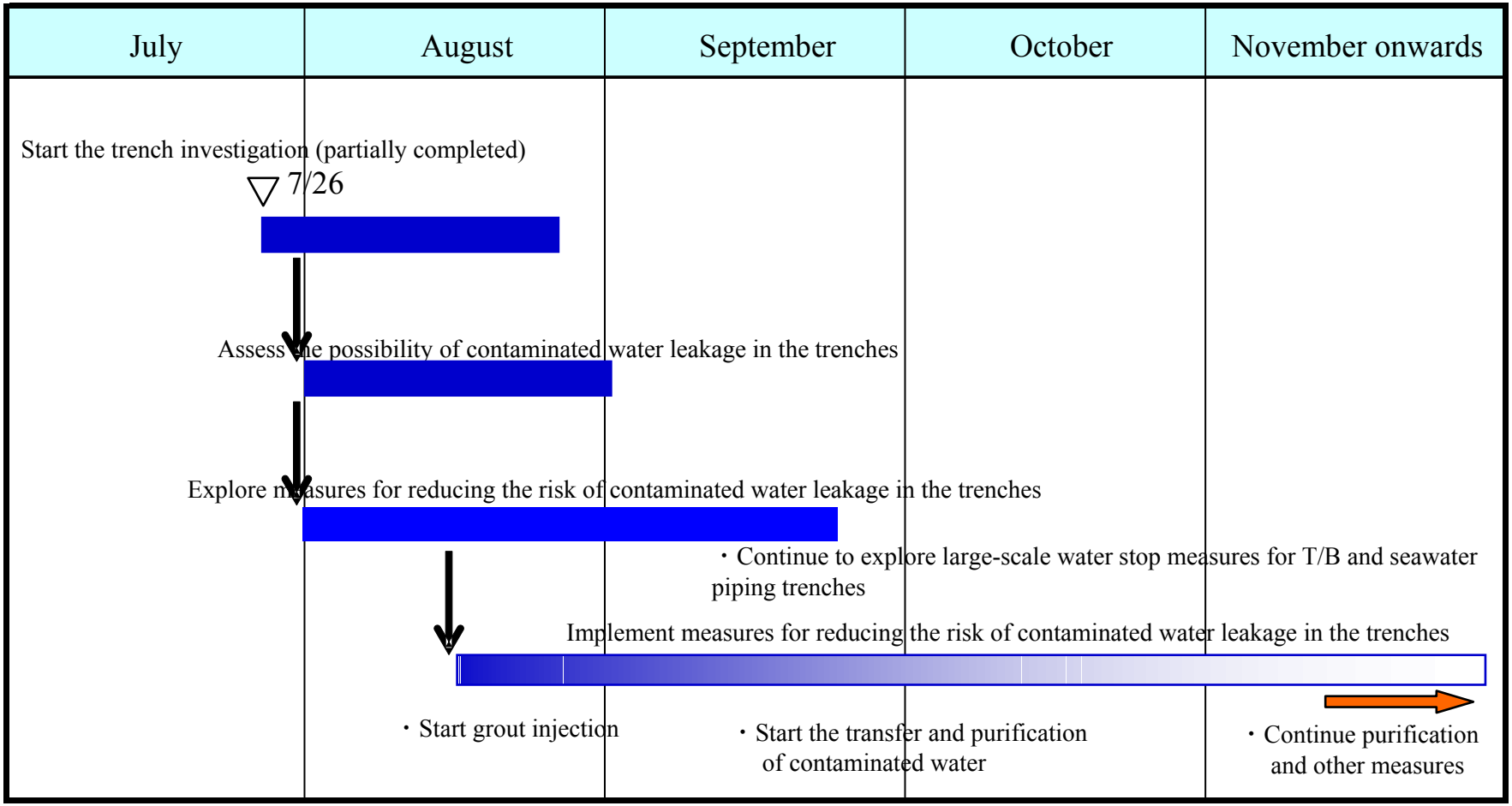
B3: Intake power cable trench (Unit 4)
(1) Water level
(2) Radiation level
(3) Water flow via the basement of the intake power supply room

3. Direction of countermeasures based on the investigation

■Investigation according to the areas of water stop measures (by trench type) (partly completed)

	Contaminated water volume	Contaminated water's radioactive concentration	Connectedness with T/B or adjacent trenches
Seawater piping trenches	Unit 2: Approx. 5000 m^3 Unit 3: Approx. 6000 m^3	Unit 2: Approx. 10E+4 Bq/cm^3 Unit 3: Approx. 10E+5 Bq/cm^3	Unit 2: Major connectedness with T/B Unit 3: Minor connectedness with T/B
Intake power cable trenches	To be investigated	To be investigated	To be investigated
Others (intake power cable conduits, etc.)	To be investigated	To be investigated	To be investigated

4. Schedule


July
August
September
October
November onwards
Start the trench investigation (partially completed)
▽ 7/26
Assess the possibility of contaminated water leakage in the trenches
Explore measures for reducing the risk of contaminated water leakage in the trenches
・Continue to explore large-scale water stop measures for T/B and seawater piping trenches
Implement measures for reducing the risk of contaminated water leakage in the trenches
・Start grout injection
・Start the transfer and purification of contaminated water
・Continue purification and other measures

<Reference 1> Status of seawater piping trenches for Units 1-4

- **Contaminated water is flowing into trenches at Units 2 and 3.**
- **At Unit 2, the water level at T/B and shaft trench changes in synch, and so does the concentration of contaminated water.**
- **At Unit 3, there is a time lag in water level changes at T/B and shafts (suggesting that the nature of connectedness is different between Unit 2 and Unit 3).**
- **The status of contaminated water in the intake power cable trenches, linked to the seawater piping trenches, has been investigated with action being considered.**

	Concentration of contaminated water (Cs137)		Ambient dose (Note 5)	Trench base location	Water retained in the trench
	T/B	Trench			
Unit 1 (Note 1)	~10^3Bq/cc	~10^1 Bq/cc	—	O.P.-12m	—
Unit 2 (Note 2)	~10^4Bq/cc	~10^4 Bq/cc	Approx. 10mSv/h	O.P.-12m	Approx. 5,000m^3
Unit 3 (Note 3)	~10^4Bq/cc	~ 10^5 Bq/cc	Approx. 100mSv/h	O.P.-17m	Approx. 6,000m^3
Unit 4 (Note 4)	~10^4Bq/cc	~10^2 Bq/cc	Approx. 1mSv/h	O.P.- 1m	—

Note 1: At Unit 1, the trenches are connected on the ground level of T/B with no flow of contaminated water into seawater trenches.
Note 2: At Unit 2, the radioactive concentration of contaminated water at T/B and in the trenches is the same (sampled from the T/B-side shaft).
Note 3: At Unit 3, the radioactive concentration of contaminated water in the trenches (T/B-side shaft) is higher than that of the contaminated water at T/B.
Note 4: At Unit 4, the trenches are raised to the ground level on the T/B side with no flow of contaminated water into seawater trenches.
Note 5: The trenches' ambient dose was measured from the top area of shafts on the T/B side.

<Reference 2> Sampling results for investigated locations

※Published on 7/11, 7/19 and 7/22

■**Unit 2 intake power cable trench: Analysis results on main gamma nuclides, all beta radiation and tritium (H-3) (Sampling on July 17, 2013)** **<See B2 on page 4>**

Location	Salinity (ppm)	Cs134 (Bq/cm3)	Cs137 (Bq/cm3)	All β (Bq/cm)	H-3 (Bq/cm3)
Unit 2 intake power cable trench	70	1.2×10^{4}	2.4×10^{4}	2.3×10^{4}	1.2×10^{2}

■**Unit 3 seawater piping trench's shaft A: Analysis results on main gamma nuclides, all beta radiation and tritium (H-3) (Sampling on July 10, 2013)** **<See A on page 5>**

Location (water depth)	Salinity (ppm)	Cs134 (Bq/cm3)	Cs137 (Bq/cm3)	All β (Bq/cm3)	H-3 (Bq/cm3)
Unit 3 Shaft (1m)	11,000	5.0×10^{4}	1.0×10^{5}	6.7×10^{5}	1.2×10^{4}
〃 (7m)	7,500	3.4×10^{4}	6.9×10^{4}	5.7×10^{5}	9.7×10^{3}
〃 (13m)	7,000	3.1×10^{4}	6.2×10^{4}	5.3×10^{5}	6.0×10^{3}