Attachment

Plan to prevent water leakage containing highly concentrated radioactive materials to outside environment in Fukushima Daiichi nuclear power plant (summary)

1. Past incidents

On April 2, 2011, the water leakage containing highly concentrated radioactive materials (“contaminated water”) occurred at the Unit 2 water intake. As a countermeasure to prevent leakage, pits located around the water intake were filled with concrete, etc in order to shut the water flow. However, on May 11, another leakage occurred at the power cable pit through the crack penetrating the concrete wall of screen room (reference 1: Location map of trenches and pipe lines on seaside). On May 20, TEPCO reported the countermeasures in order to prevent the leakage of contaminated water located at the height of O.P. + 4.0 m in these vertical shafts based on the survey. In addition, following the instruction dated May 23, TEPCO conducted the situation survey of other vertical shafts and shore protection and reports the plan to prevent water leakage today.

2. Survey conducted for leakage prevention

(1) content of the survey

Survey was conducted for the following 3 items in order to specify the leakage route and to shut the route in effective way.

- Leakage route from turbine building to the yard on seaside at the height of O.P. + 4.0 m
- Leakage route in the yard on seaside at the height of O.P. + 4.0 m and the status of pit near the shore protection
- Status of shore protection (cracks on the wall etc)

In addition to the survey on the drawings and specifications including drawings of vertical shafts and of underground facilities, site survey was conducted in order to specify the leakage route which may not be specified in the drawings. Part of the drawings stored in the library located at main office building of the power plant could not be carried out due to the possible collapse of the building by aftershocks and the entry restriction because of the high radiation dose. Therefore, the information that was not confirmed by the drawings was supplemented by conducting interview with our employee with sufficient site knowledge.

a. Survey for Leakage route from turbine building to the yard on seaside at the height of O.P. + 4.0 m

Survey of the shafts and pipes connected to the underground floor of turbine building below the height of O.P. + 4.0 m was conducted using building design drawings in order to specify the leakage route from turbine building, where the contaminated water accumulates, to the yard on seaside at the height of O.P. + 4.0 m

b. Survey for leakage route in the yard on seaside at the height of O.P. + 4.0 m and the status of pit near the shore protection

Regarding the leakage route specified in a., the height above the sea level of vertical shafts, shafts, pipes and pits were confirmed in order to specify the potential leakage route reaching to the vicinity of screen pump room. In addition, leakage route and status of pits near the shore protection were surveyed. As a result, several pits were selected to close and shut the leakage route in effective manner.

The following site survey was conducted at the same time.

- Site survey period: from May 13 to May 15, from May 23 to May 25, 2011
- Site survey location: the yard on seaside at the height of O.P. + 4.0 m
- Site survey conductors: TEPCO employee, employee of other companies
- Site survey content: kinds of pits, depth, existence of debris and water

From May 13 to 15, reacting to the leakage found on May 11, survey was mainly conducted for the pits located near the leakage route, the vicinity of screen pump room, and pits near the shore protection. Survey was also conducted for the pits which were not on the drawings but were confirmed during the site survey.

From May 23 to 25, survey for the implementation of construction work to close the leakage route was conducted. The existence of debris in the area from seawater pipe trench, through which contaminated water was estimated to flow in, to power cable trench was surveyed as well.

c. Survey for status of shore protection (cracks on the wall etc)

Survey was conducted as follows:

- Site survey period: from May 24 to May 26
- Site survey location: open channel for water intake of Unit 1 to 4 in shore protection
- Site survey conductors: TEPCO employee
- Site survey content: visual survey from the shore protection was conducted for the top of the steel sheet pile

Survey was conducted in order to find water leakage through the cracks caused by the earthquake above the seawater.

(2) result of the survey

a. Result of survey for leakage route from turbine building to the yard on seaside at the height of O.P. + 4.0 m

It was confirmed by the drawings that shafts and pipes connected to the underground floor of turbine building below the height of O.P. + 4.0 m were seawater pipe trench, power cable trench, and multi pipe conduits (reference 1: Location map of trenches and pipe lines on seaside),

As a result of survey in Unit 1, it was confirmed that water will not flow from turbine building to the yard on seaside at the height of O.P. + 4.0 m because both the seawater pipe trench and power cable trench connects to the turbine building at O.P. +10.2m and +7.9m respectively.

Accordingly it was confirmed that the potential leakage route was seawater pipe trench in Unit 2 to 4.

As a result of survey for the trenches on mountain side (west side) of Unit 1 to 4, it was confirmed that the waste system common pipe trench connecting Unit 1 to 4 and each radiation waste treatment facilities was the only trench whose connection was located below O.P. + 4.0 m. As such trench becomes vertical shaft and goes up to O.P. + 10.0 m right after the radiation waste treatment facilities, it can not be the leakage route of contaminated water from the turbine building.

b. Result of survey for leakage route in the yard on seaside at the height of O.P. + 4.0 m and the status of pit near the shore protection

As leakage routes in the yard on seaside at the height of O.P. + 4.0 m, the route from seawater pipe trench to power line conduit through power cable trench was specified. The feasibility of closing such route was also confirmed by site survey (reference 2: leakage route survey result map).

Regarding the pits located near the leakage route and shore protection, in 81 pits in total (74 pits during the survey conducted from May 13 to 15 and 7 pits from May 24 to 26), kinds of pits, depth, existence of debris and water were surveyed.

6 pits out of 81 pits were not located in the drawings and were not confirmed by the interview with TEPCO employee. Therefore, it could not be confirmed whether those pits located on the leakage route.

c. Result of survey for status of shore protection (cracks on the wall etc)

A connecting part of steel sheet pile at the south side of Unit 1 screen room was found to be

damaged (reference 3: Protected shore survey result). This damage is considered to be caused by the transformation of connecting part due to the earthquake. While the damaged part locates above the seawater level, water leakage from that part is not found at the moment. It locates near the corner of Unit 1 screen room. No trace of contaminated water was found as no trenches nearby had inflow of contaminated water and radiation dose in the closest pit was low.

3. Plan to prevent water leakage, progress made and measures to be taken

As a result of above survey, the leakage route of contaminated water and the status of pits located near the shore protection were confirmed. Based on such result, the plan to prevent contaminated water leakage was established while considering status of debris in the site, distribution of radiation dose, safety of workers, procurement of construction materials, and feasibility of construction work.

The following were the main measures of the plan.

Measure 1: Closing of seawater pipe trench located on the upstream of leakage route.

Measure 2: Closing of upstream of power cable trenches which connects to seawater pipe trenches.

Measure 3: Closing of the damaged part in the shore protection

Measure 4: Implementation of dispersion prevention measures in case of another leakage

Other measures: in addition to the above, measure will be taken for the contaminated water remaining in the closing trenches.

Regarding the above measures, specific prevention measures described below were planned and implemented.

(1) Measure 1: Closing of seawater pipe trench located on the upstream of leakage route.

As vertical shaft of seawater pipe trenches in Unit 2 to 4, which are the only potential leakage route from turbine building to the yard on seaside at the height of O.P. + 4.0 m, locates in the upstream of leakage route, closing of such shaft is expected to be quite effective for shutting the leakage route. Therefore, vertical shafts (5 in total) located at the height of O.P. + 4.0 m will be closed using concrete, etc.

For the part where such work is difficult, closing will be conducted at the joint part (4 in total) with power cable trench at the height of O.P. + 4.0 m.

As of May 31, in Unit 2 to 4, 2 vertical shafts out of 5 were closed, another 2 were closed at the opening part, and remaining 1 will be closed on June 2.

The joint part (4 in total) between seawater pipe trench and power cable trench were all closed by May 30.

(2) Measure 2: Closing of upstream of power cable trenches which connects to seawater pipe trenches.
The leakage route is shut by closing multiple pits located on the leakage route at the height of O.P. + 4.0 m. The followings were taken into consideration when selecting the pits to be closed.

- All the pits located on the leakage route are shut in order to shut the leakage route with certainty.
- Pits near the screen pump room are closed immediately as the leakage from such pits is considered highly likely from the case of Unit 2 and 3.
- Pits whose connection parts were not confirmed in the design drawings are closed to make sure.

Among 81 pits confirmed during the survey, 35 pits were selected from the above perspective and will be closed. When establishing the work plan, they are classified into following groups in accordance with the priority.

Measure 2-1: Closing of pits near the screen pump room. This is necessary considering the case of Unit 2 and 3. There are 10 parts in total.
Measure 2-2: Closing of the pits near the pits treated in measure 1. This is to make sure the shutting of leakage route. There are 8 parts in total.
Measure 2-3: Closing of the pits located on the extended path of leakage route and the pits whose route is unknown and possibility of leakage can not be denied. This is to make sure there will be no leakage. There are 17 parts in total.

Based on above, 35 parts in total will be closed by concrete, etc, once the debris is removed and other preparation is completed (reference 4: Outline of closing of pits)

As of May 31, measure 2-1 is completed in all 10 parts. Measure 2-2 is conducted in 3 parts out of 8. Measure 2-3 in 5 parts out of 17.

In summary, measure 1 is completed in all 4 parts. Measure 2 is conducted in 18 parts out of 35. In total, 22 parts out of 35 were closed and remaining 17 are planned to be closed using

concrete, etc, by the end of June (reference 5: Map of closing plan of vertical shaft and pits, reference 6: Roadmap of closing of vertical shafts and pits).

(3) Measure 3: Closing of the damaged part in the shore protection

The survey described above found that a connecting part of steel sheet pile at the south side of Unit 1 screen room was damaged. However, it is unlikely that contaminated water flows into the sea through this damaged part as there is no trench nearby and other trenches with potential contaminated water inflow will be closed at the upstream. To make sure, damaged part will be closed using grout materials by the middle of June (reference 7: image of repair of damaged shore protection).

(4) Measure 4: Implementation of dispersion prevention measures by installing sliding timber weir

In Unit 2, the steel plate was installed in front of the screen room as a countermeasure to prevent dispersion (implemented on April 15). In addition, in response to the sharp increase of water level in the vertical shaft occurred along with the water transfer in the condenser, sliding timber weir was installed in front of the emergency equipment cooling seawater pump room (implemented on May 26). Such weir will be installed in front of the screen room of Unit 1 to 4. Manufacturing of weir was initiated from the end of May and weirs are planned to be installed by the end of June (reference 8: dispersion prevention measure “Installation of the sliding timber weir in front of screen pump room: example of Unit 2”).

(5) Other measures:

Collection and treatment for the contaminated water remaining in the closing trenches such as seawater pipe trenches will be considered along with the treatment of contaminated water accumulated in the turbine building, etc. Such water will be collected as much as possible and be treated by the treatment facilities located inside the plant site.

End

Terms:

In this document, vertical shaft and pit are defined as follows:

Vertical shaft: vertical shaft in the underground with depth of approx. 10 m

Pit: underground facilities with the depth of approx. 1 to 2 m having the manhole alike structure.