<Reference Materials>
July 22, 2013
Tokyo Electric Power Company

Increases in the Concentration of Radioactive Materials in Seawater and Groundwater on the Ocean Side of the Site: Current Situation and Countermeasures

1. Analysis of Current Situation

(1) Measurement History

- The concentrations of radioactive material in the seawater in the port have clearly been decreasing since immediately after the accident. However, recently, although levels are still lower when compared to levels immediately after the accident, the concentrations have been fluctuating up and down. **(Reference A)**
- In order to ascertain the cause of these fluctuations, groundwater was sampled at the groundwater observation hole on the ocean side of the site, which was subsequently analyzed.

(2) Results of Groundwater Analysis from between Unit 1 and Unit 2 Water Intakes

- 400,000 to 500,000Bq/L of tritium and 1,600Bq/L of all beta radiation were detected from the No.1 groundwater observation hole between Unit 1 and 2. (**Reference B**)
- Thereafter, additional observation holes No. 1-1 to 1-4 were added in the vicinity of No. 1 and the groundwater was analyzed. At observation hole No. 1-2, which is the closest to the leak discovered two years ago, 380,000Bq/L of tritium (as of July 11), 890,000Bq/L of all beta radiation (as of July 15), 12,000Bq/L of cesium 137 and 5,900Bq/L of cesium 134 (as of July 15) were detected. **(Reference C)**
- The No. 1-2 hole is prominent in the boring core analysis as well, but this is assessed to be the result of past leaks, since high concentrations of cesium were found in terms of height within areas near to the past leak points. **(Reference D) (Reference E)**
- The high levels of all beta radiation and the complex underground structure of the trench in the No. 1-3 hole area suggests that a cause other than past leaks, such as a leak from the trench, may be possible. Therefore, an area survey and detailed risk mitigation countermeasures will be deliberated. **(Reference E)**

(3) Groundwater Analysis Results from between the Unit 2/3 Intake and the Unit 3/4 Intakes

- Since one thousand and several hundred Bq/L of all beta radiation and several thousand Bq/L of tritium were detected from the No. 2 observation hole between Unit 2 and 3, and from the No. 3 observation hole between Unit 3 and 4 respectively, monitoring has been enhanced and additional observation holes are being established in the vicinity. Preparations are being made to implement the countermeasures that were implemented in the vicinity of No. 1 without delay in accordance with analysis results. **(Reference E)**

(4) Fluctuations in the Water Level of Groundwater

- Since fluctuations in the water level of ground area in the concerned areas seem to be affected by changes in the tides and rainfall, it is assumed that these fluctuations come and go with seawater inside the open culvert. As a result it is assumed that groundwater that contains the contamination detected in the No. 1 observation hole after May this year is coming and going, so countermeasures are being implemented (countermeasures will be mentioned later). Furthermore, based on water level data from newly established observation holes, a detailed analysis and assessment will be completed by the end of October. **(Reference F) (Reference G)**

(5) Analysis Results of Seawater in the Open Culvert for the Unit 1-4 Intake

- Fluctuations in radioactive material concentration caused by rainfall can also be seen on the inner side of the silt fence. In particular, these trends are remarkable on the inner side of the Unit 3 silt fence. Therefore, a survey of the area around the Unit 3 intake will be progressed. **(Reference H)**
- The concentration of tritium in the seawater in the port has risen to 2,300Bq/L on the north side of the Unit 1-4 intake channel. There are possibilities of fallout leakage, such as from rain from the seawall, or leaking of groundwater. Also, the concerned observation points are in an area that has already been installed with impermeable walls on the ocean side, and it is possible that these impermeable walls have been hindering flow. However, since concentrations in the seawater do not just rise, but also fall, it is assumed that dispersion into seawater is limited. Furthermore, analysis results from a newly established observation hole on the outer side of the impermeable wall on the ocean side (north side of east breakwater) are approximately the same as observation results taken on the north side of the Unit 1-4 intake. **(Reference I)**

- In order to confirm the impact from groundwater leaking into the port, additional holes will be bored on the north side of the Unit 1 intake and a survey will be conducted.

(6) Analysis Results of Seawater from inside the Port (outside the Unit 1-4 Intake Open Culvert) and at the Border of the Port

- Concentrations of tritium and all beta radiation inside the port on the outer side of the Unit 1-4 intake open culvert are almost below detectable limits (ND) (several tens Bq/L at most), and this appears to have no impact on the concentration fluctuations on the inner side of the Unit 1-4 intake open culvert. **(Reference J)**
- In the vicinity of the border of the port (port entrance, north intake, near the south intake) the concentration of tritium is almost below detectable limits (ND) (several tens Bq/L at most), and all types of all beta radiation are below detectable limits (ND) according to the most recent observation results, thereby showing concentrations to be the same or lower than those inside the port.

(7) Analysis Results of Seawater Offshore

- The results of seawater analysis taken 3 km offshore of the power station outside the port do not show any significant fluctuations. **(Reference K)**

Based on the above, the fluctuations in radiation concentrations are limited to inside the Unit 1-4 open culvert and have no impact offshore or inside the port. These results will be subject to a quantitative assessment through analysis of the behavior of concentrations within the port, and external third-party experts will be asked to make an assessment.

2. Countermeasures (Refer to reference materials)

(1) Ground Improvement through the injection of Chemicals

- Injection of chemicals into the ground between the Unit 1-2 intakes began on July 8, and as of July 20, 75 out of 231 chemical injections had been completed.
  The first round of improvements should be completed by around July 25, and the second round is to be completed by around August 10.**(Reference L)**
- Preparations have begun to confirm the scope of contamination between the Unit 1-2 intakes and implement countermeasures that encompass the confirmed scope of contamination. **(Reference M)**
- As an interim countermeasure until construction of an impermeable wall on the

ocean side, preparations have begun to implement ground improvements through chemical injection behind the seawall, between the Unit 2-3 intakes and the Unit 3-4 intakes. **(Reference M)**

(2) Draining of Contaminated Water from around the Vicinity of the Unit 2 Intakes and Sealing of the Branching Trench (Power Cable Trench)

- Extremely high concentrations of radioactivity have been detected at the No. 1-2 observation hole, which is closest to the area in which a leak of contaminated water from the Unit 2 screening room was discovered two years ago (April 2, 2011). High possibilities of either residual highly concentrated contaminated water from the countermeasures implemented two years ago slowly seeping around and leaking out, or the leak stopping countermeasures from two years ago degrading with time, were assessed.

  Therefore, a survey of the contaminated water inside the branching trench (power cable trench), which may be residual highly concentrated contaminated water from countermeasures implemented two years ago, is underway and the contaminated water will be drained and the concerned trench sealed by the end of October. **(Reference N)**

(3) Cleansing of Contamination in the Main Trench (Seawater Piping Trench)

- Due to the difference in height between the main trench (seawater piping trench) and the turbine buildings of each unit the conditions between each plant differ, but it is certain that a large volume of highly concentrated contaminated water is accumulating inside the main trench at Unit 2/3 (seawater piping trench). There is no hard proof that this water is directly causing the increases in concentrations, but in order to alleviate risk, a mobile cleansing unit will be used to clean the water inside the trench as early as possible (cleaning planned to commence in September). In addition, the installation of pipes to transport contaminated water to existing water treatment equipment, such as secondary cesium adsorption device (SARRY) and the cesium adsorption device, etc., will be accelerated (plan to be completed in September). **(Reference O)**

(4) Draining the Water from within the Main Trench (Seawater Piping Trench) and Sealing It

- Draining water from the main trench (seawater piping trench) requires shutting it off from the turbine building, so in order to remove accumulated water from the main trench, freezing tests must first by implemented as quickly as possible in order to solve certain technical issues, such as methods for freezing water that has high saline content and mitigating the effect on the structure from the increase in volume caused by the expansion of frozen water, etc., after which it will be determined whether this method can be applied or not. If possible, the plan is to remove water from the seawater piping trench after it is cut off by freezing, and sealing the trench closed. **(Reference P)**

(5) Impermeable Wall on the Ocean Side

- Advanced boring began in June 2012 and steel pipe sheet-piles began being inserted in April 2013. The ocean side impermeable wall on the ocean side of the seawall will be completed in September 2014, thereby providing even better water shielding performance.

As mentioned above, the power station is working together with the head office and coordinating with related departments to handle everything from sampling, analysis, and assessment, to countermeasure proposal and implementation and public relations in order to handle the situation quickly and with certainty.

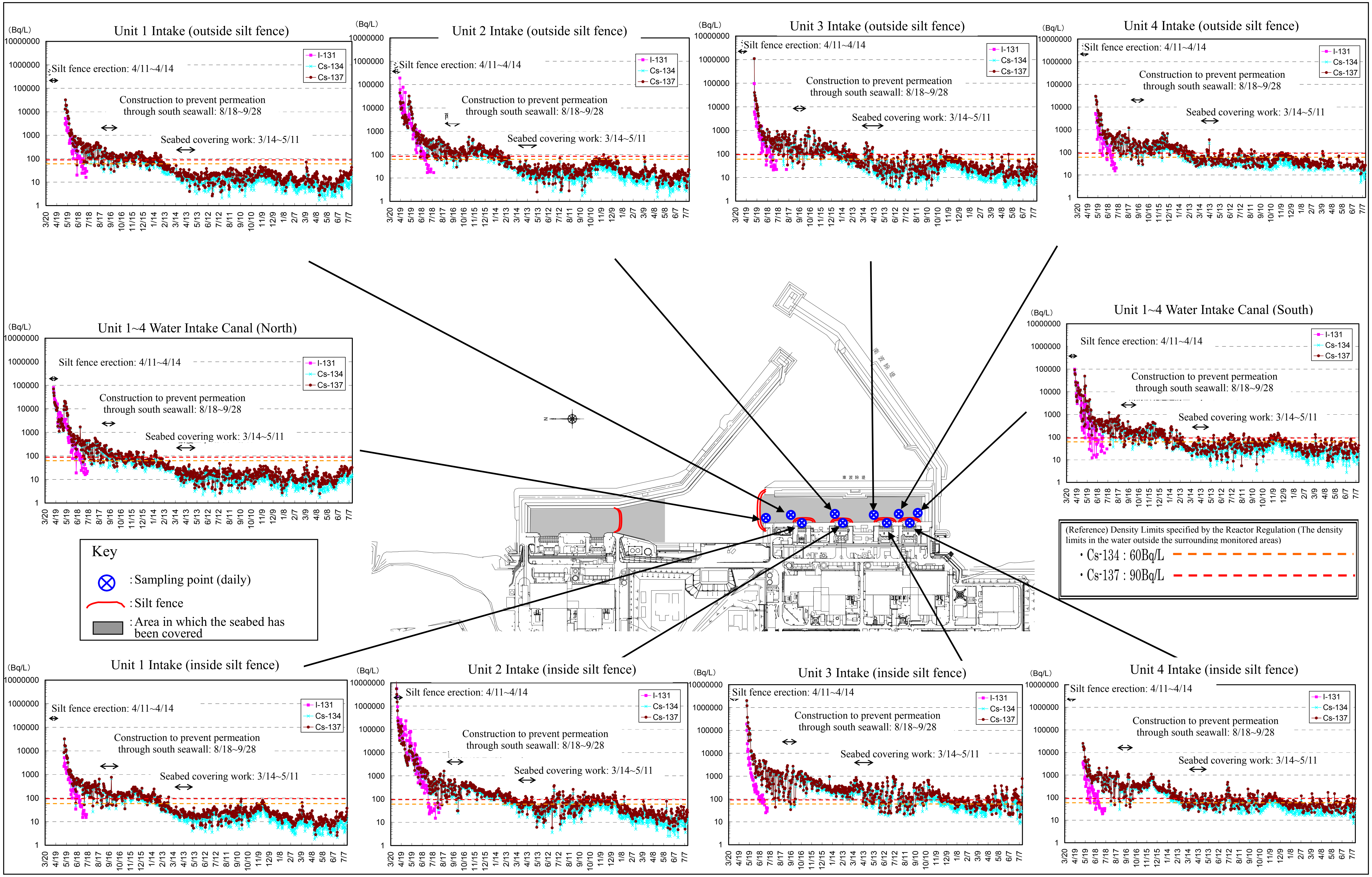
A flexible approach to handling the situation, such as appropriately reflecting changes in plans as a result of insight acquired from future survey results and contaminated water countermeasure committees, will be taken.

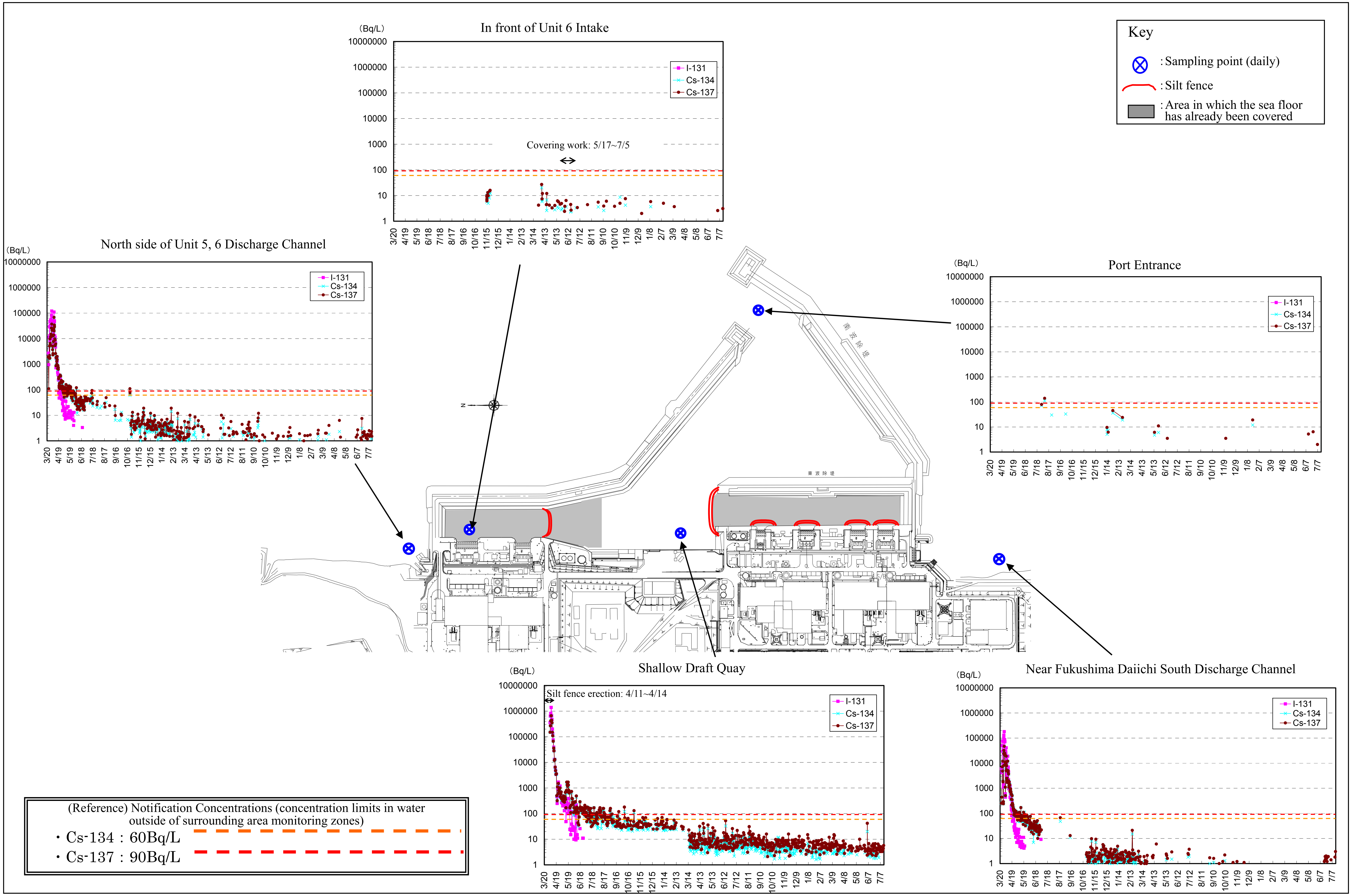
3. Reference Materials

Status of Implementation of Contaminated Water Countermeasures on the Ocean Side and Future Plans

End of Document

Trends in Radioactive Material Concentration in Seawater in the Port

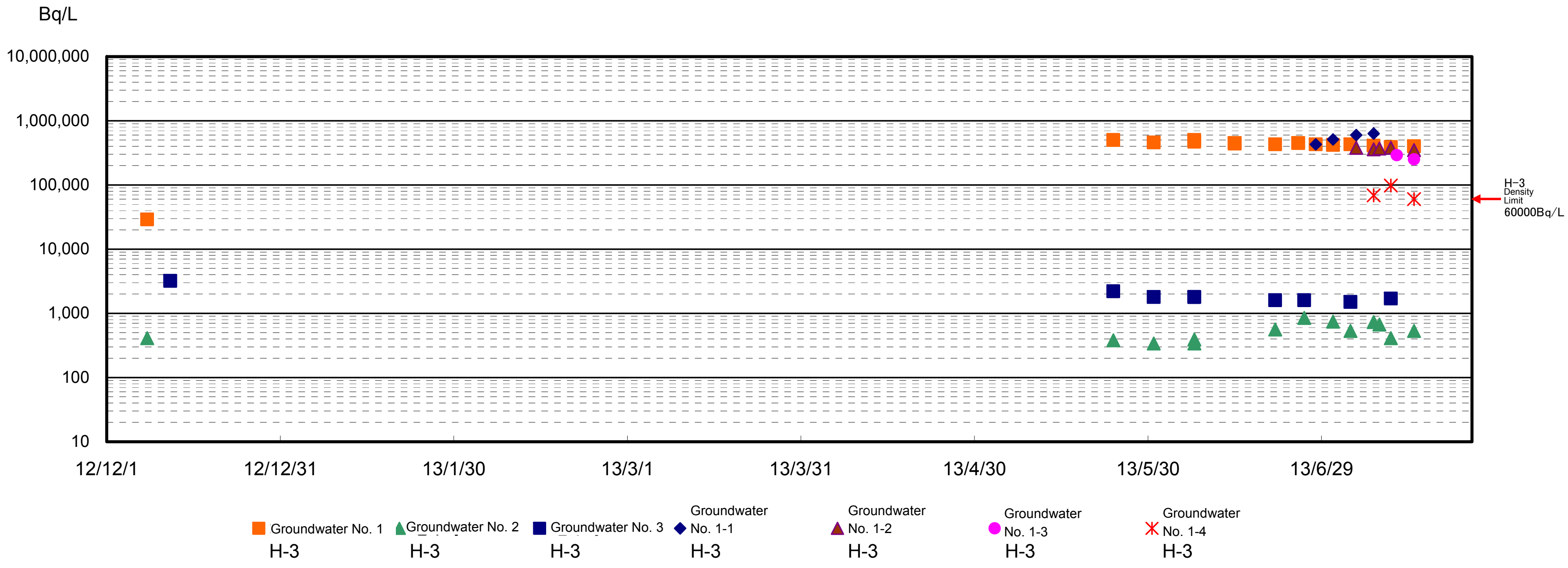




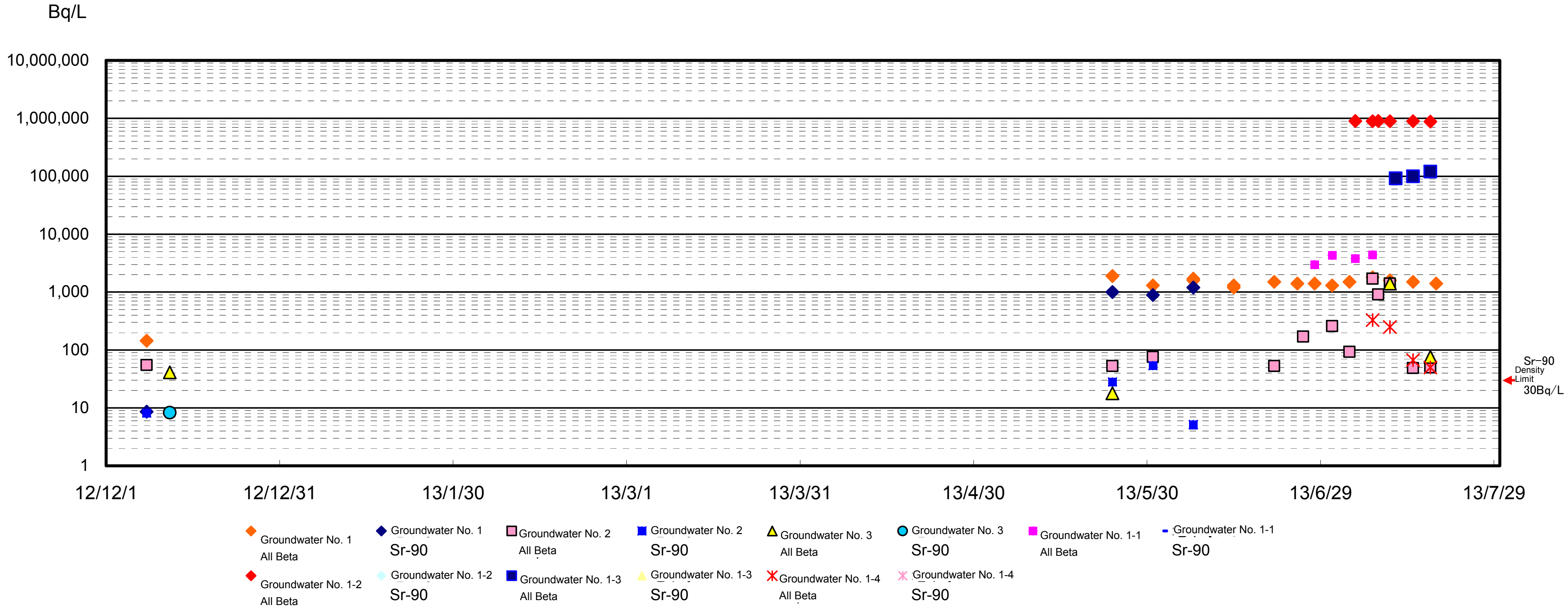
(Reference) Notification Concentrations (concentration limits in water outside of surrounding area monitoring zones)

- Cs-134 : 60Bq/L
- Cs-137 : 90Bq/L

Trends in Groundwater Tritium Concentrations



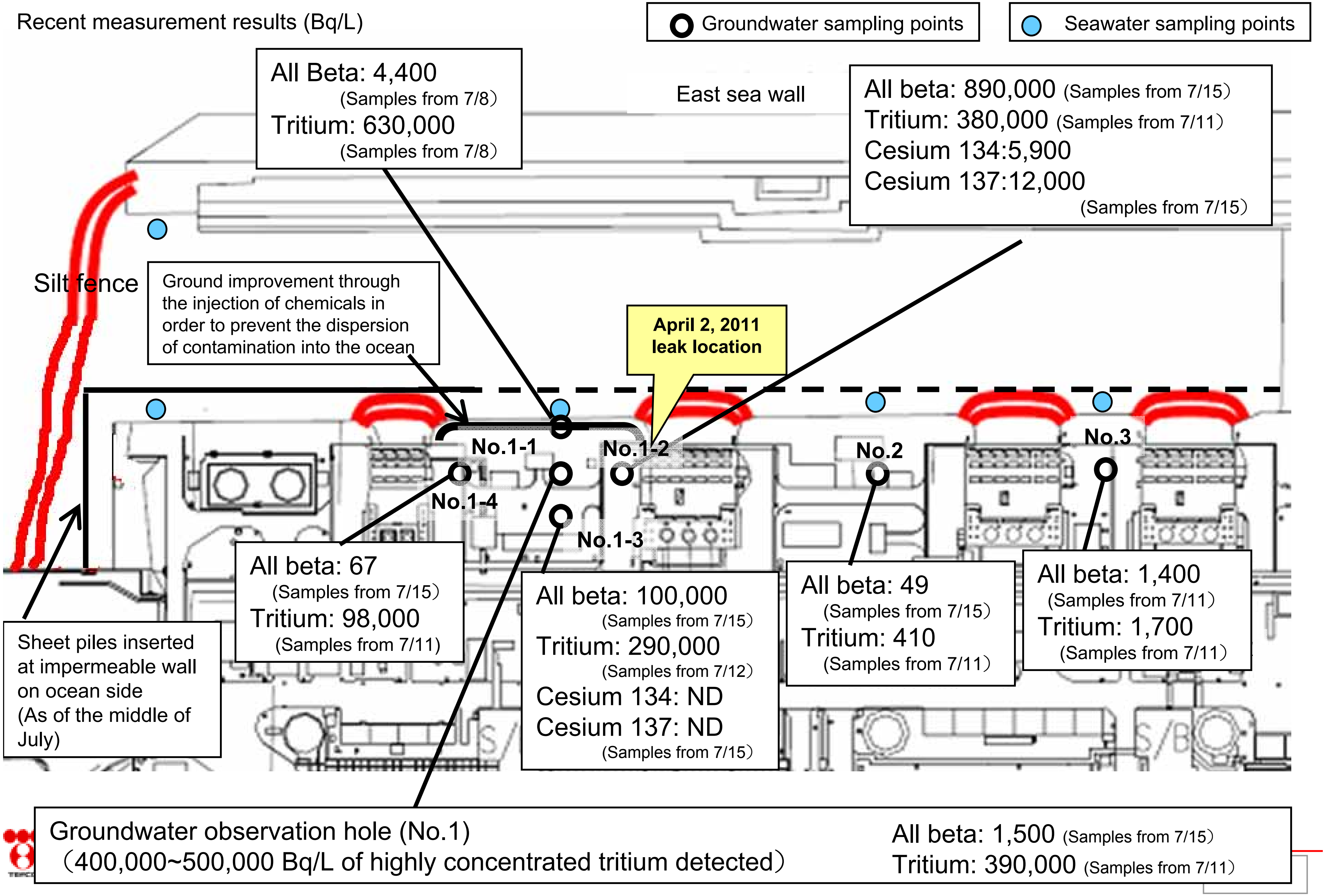
Trends in All Beta and Strontium concentrations in Groundwater



Reference C

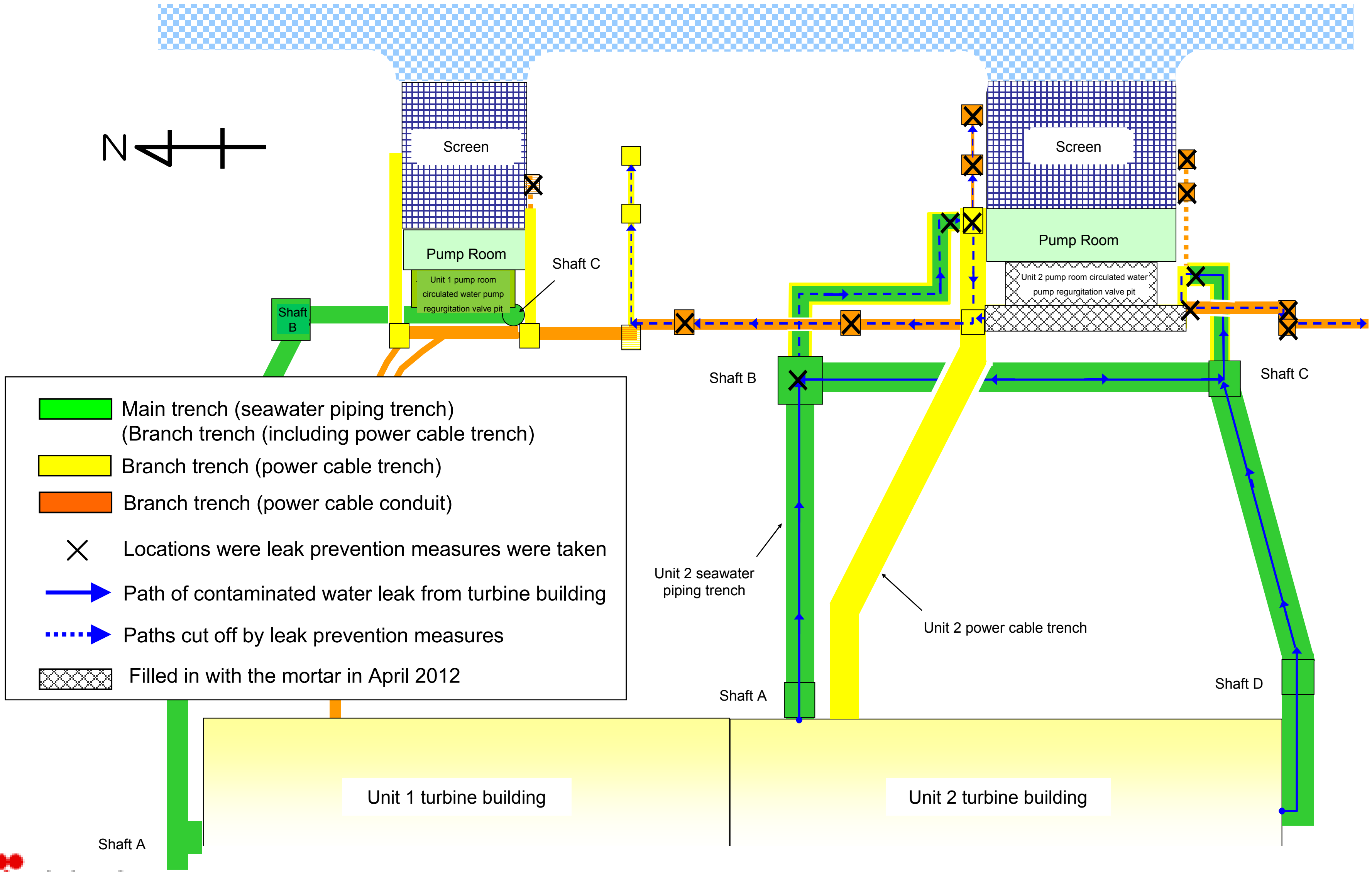
Groundwater Measurements from East Side of Turbine Building

Recent measurement results (Bq/L)



Condition of trenches in area 4m above sea level (Unit 1/2)

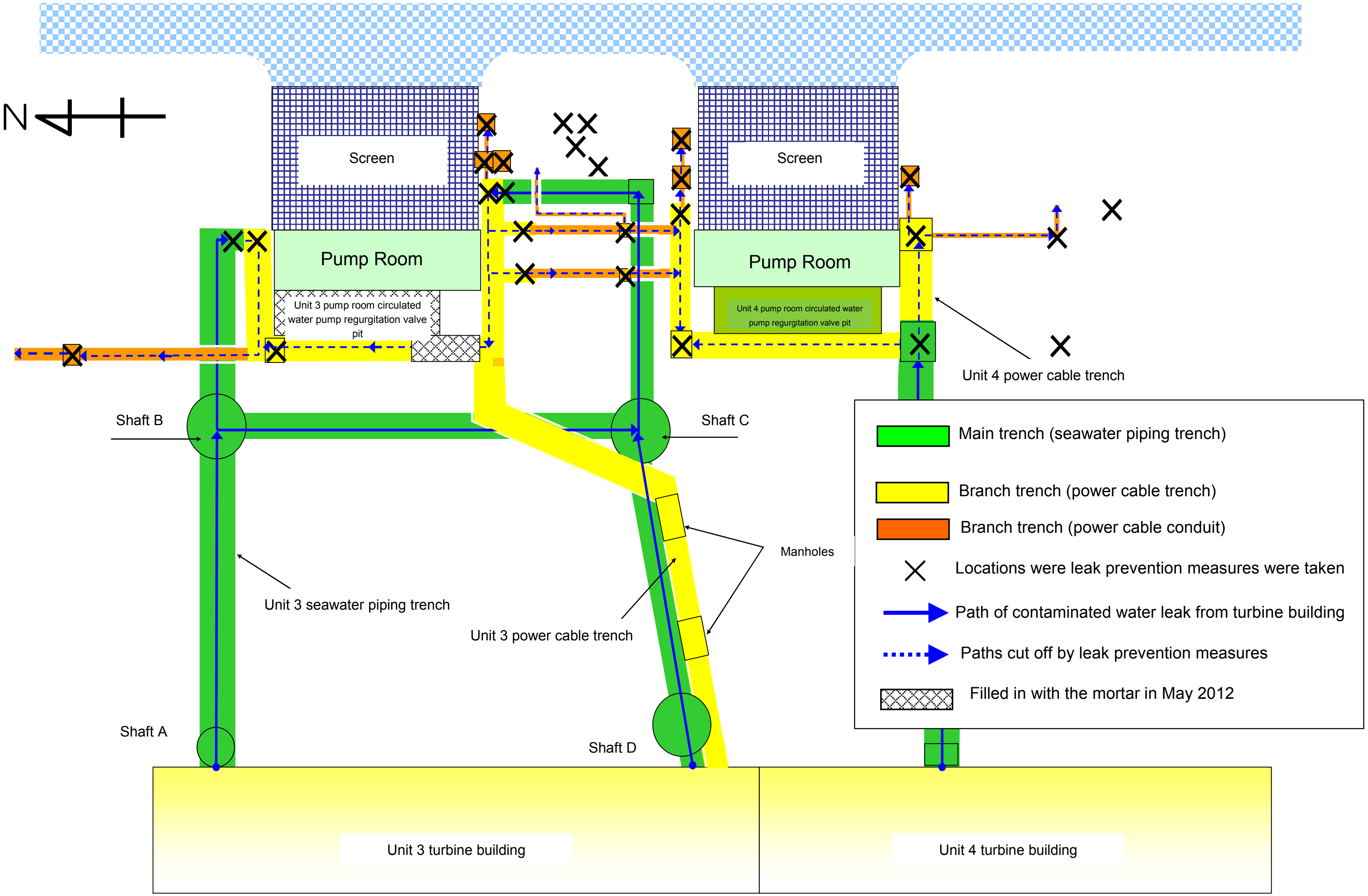
- The pits are basically sealed



Source: Plan for Preventing External Leakage of Water that includes Highly Concentrated Radioactive Substances at the Fukushima Daiichi Nuclear Power Station (Submitted to NISA on June 1, 2011) (partially revised and added to)

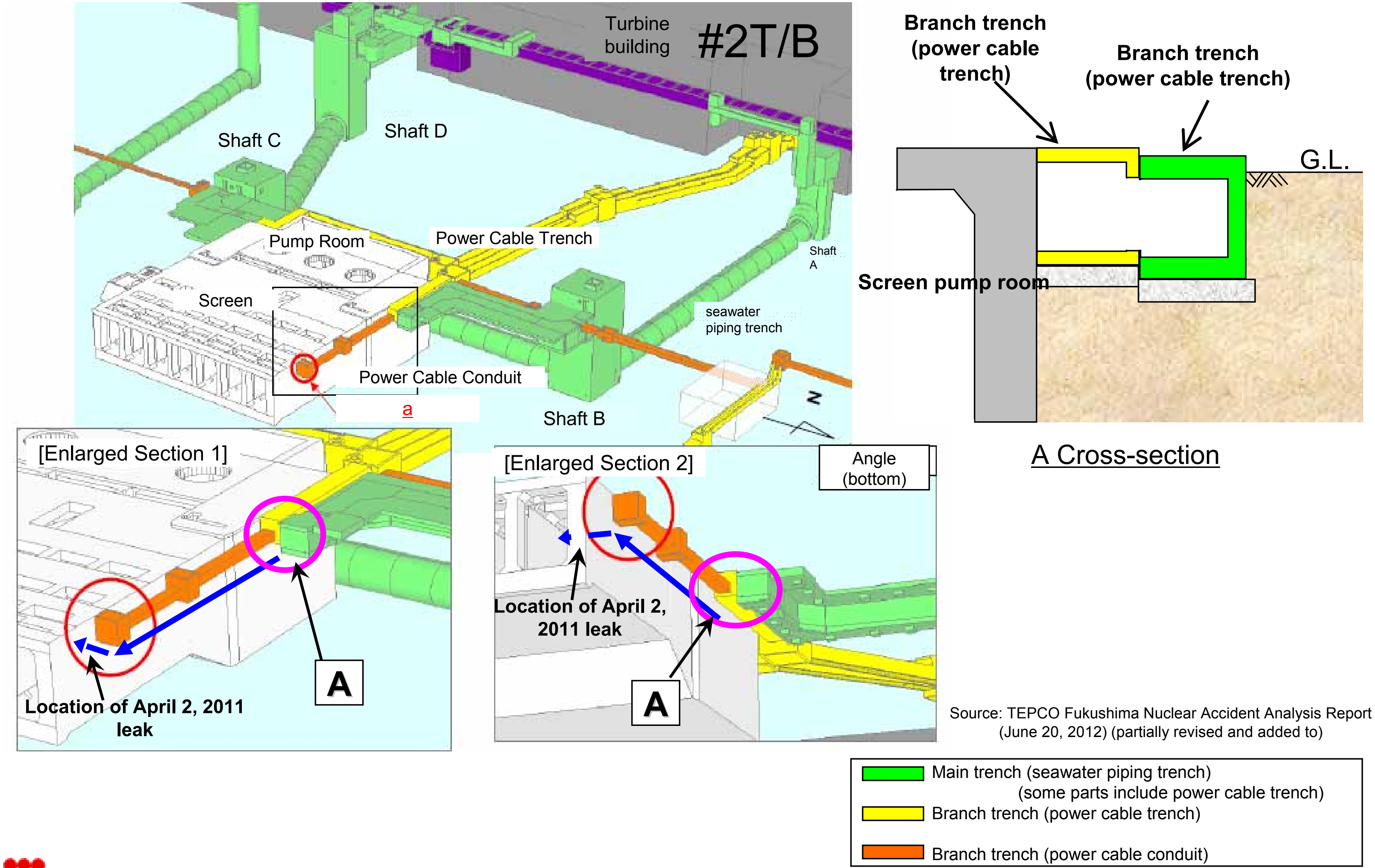
Condition of trenches in area 4m above sea level (Unit 3/4)

- The pits are basically sealed



Source: Plan for Preventing External Leakage of Water that includes Highly Concentrated Radioactive Substances at the Fukushima Daiichi Nuclear Power Station (Submitted to NISA on June 1, 2011) (partially revised and added to)

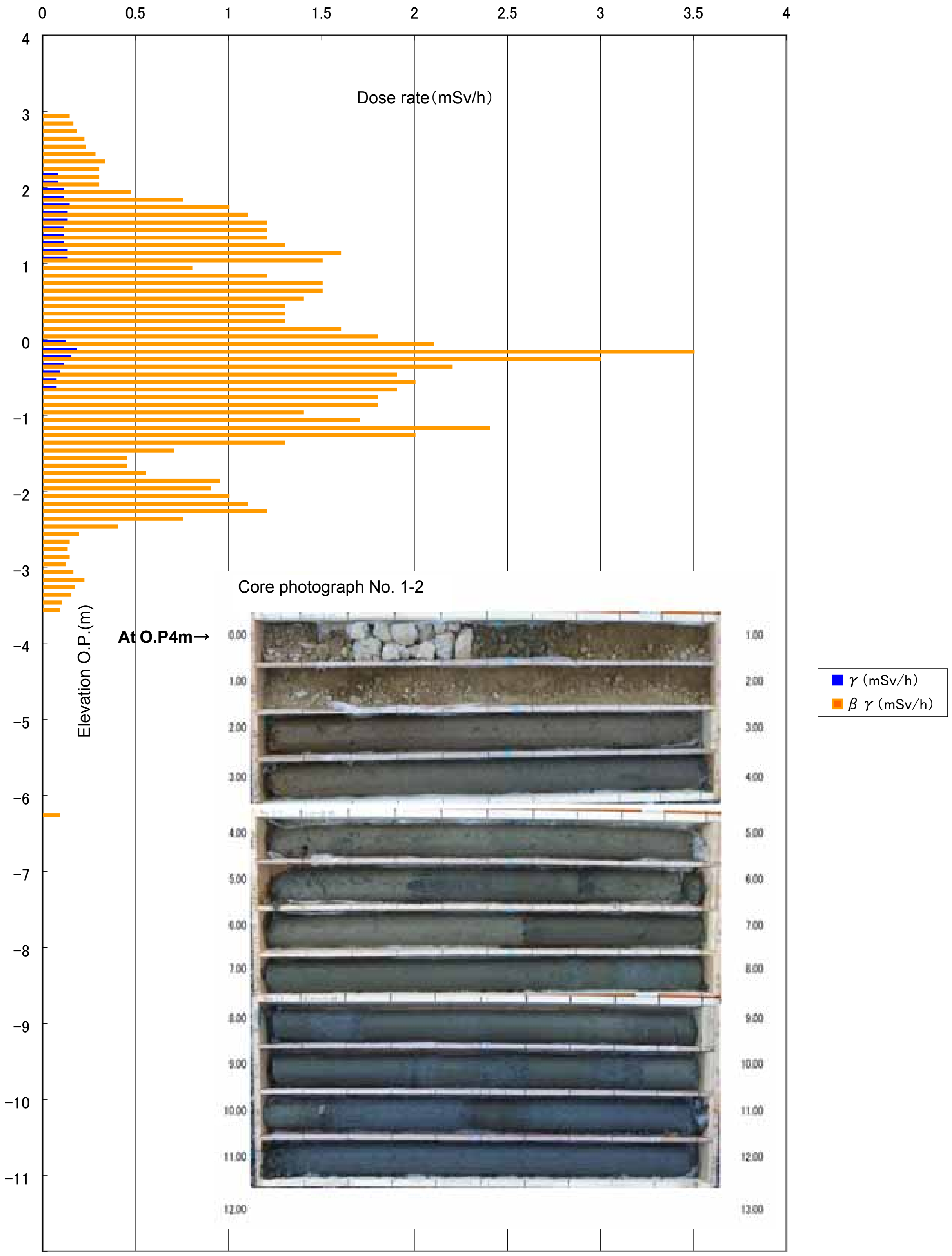
Leak locations/Estimated leak paths (Unit 2 ocean side trench location diagram)



Source: TEPCO Fukushima Nuclear Accident Analysis Report (June 20, 2012) (partially revised and added to)

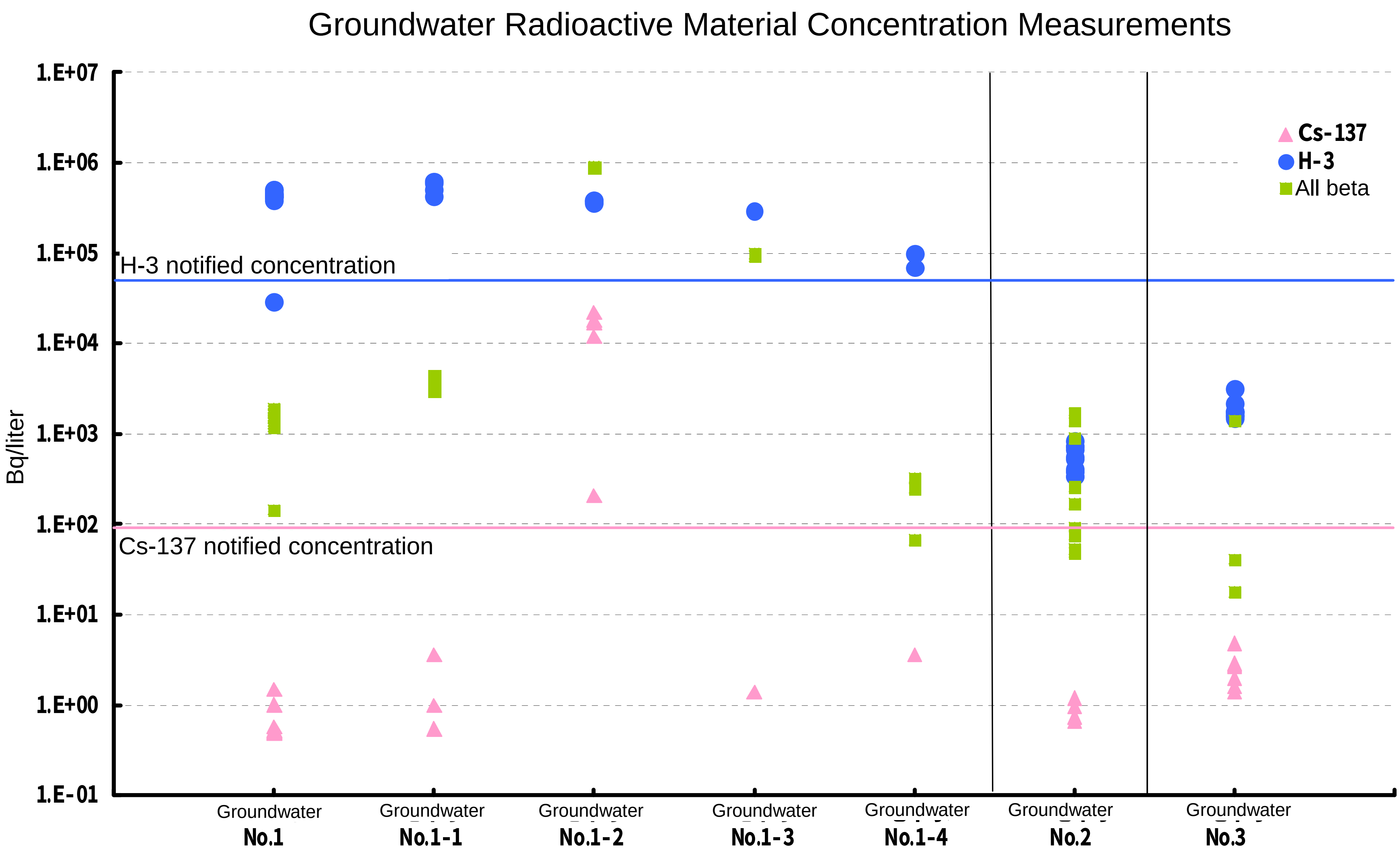
Reference D

Dose Rate Distribution for Boring Cores from Ocean Side Groundwater Observation Hole No. 1-2



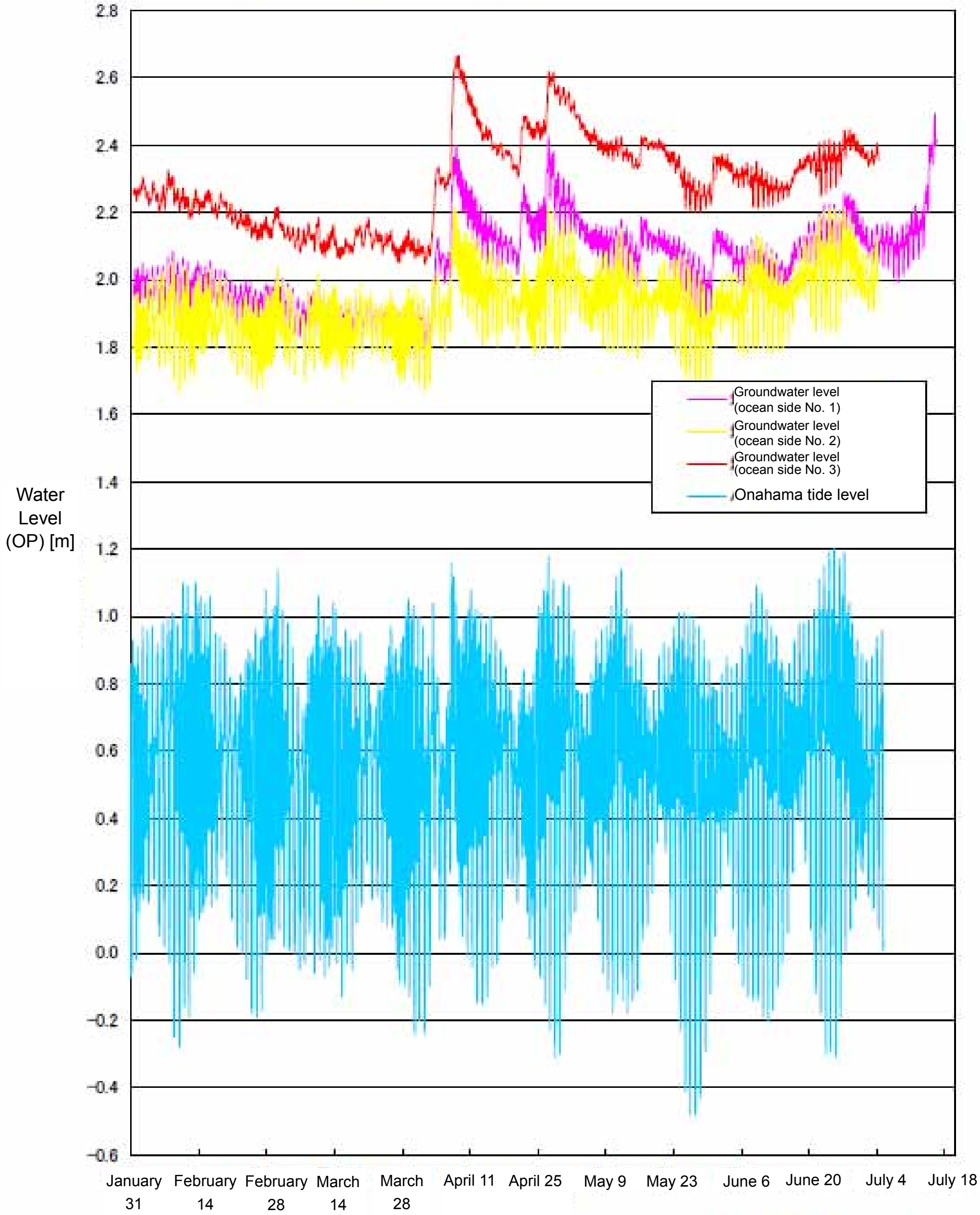
※ B.G level measurements are all 0

Groundwater Radioactive Material Concentration Measurements



Reference F

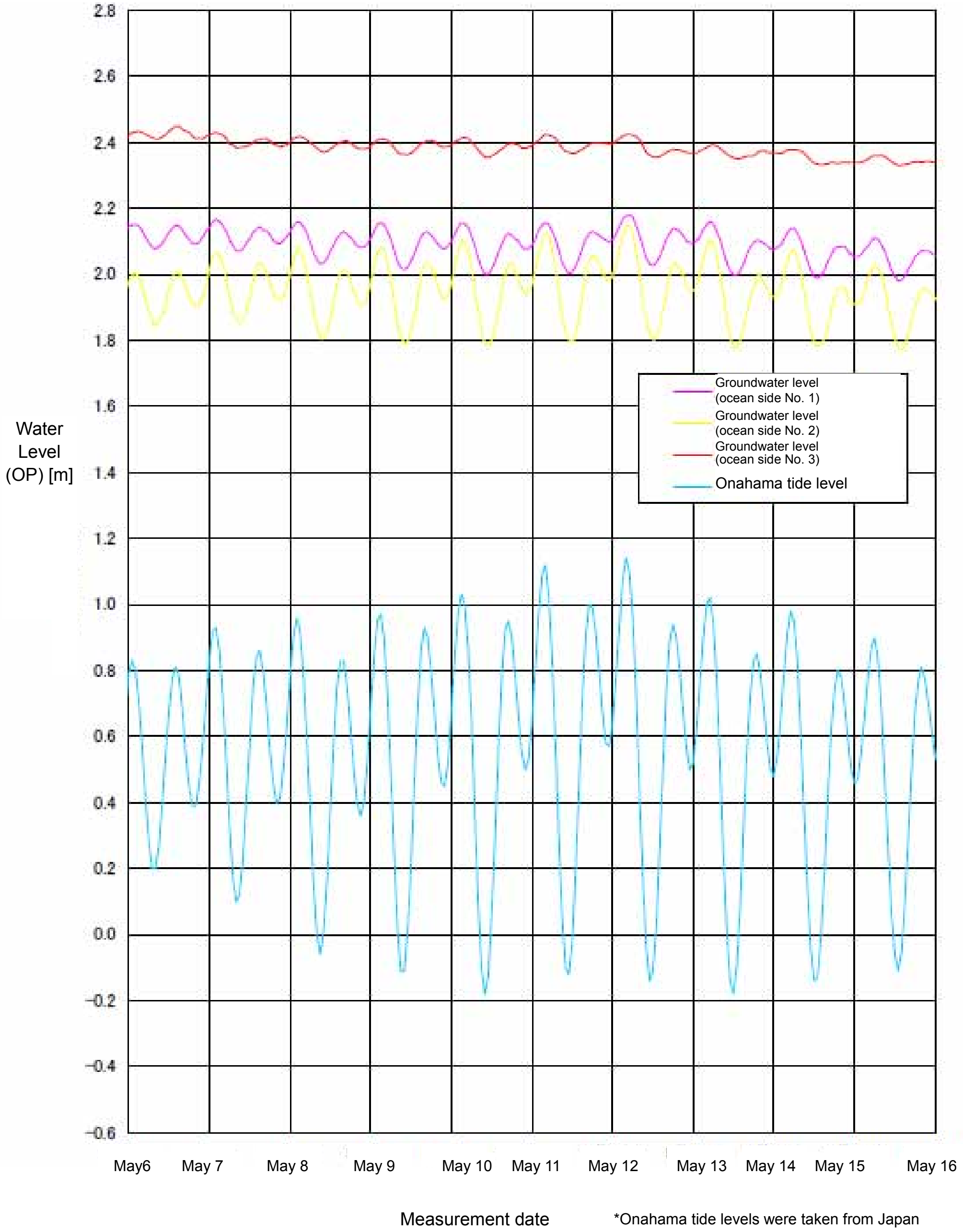
Groundwater levels in ocean-side boring holes No. 1~No. 3 and Onahama tide levels



*Onahama tide levels were taken from Japan Meteorological Agency website.

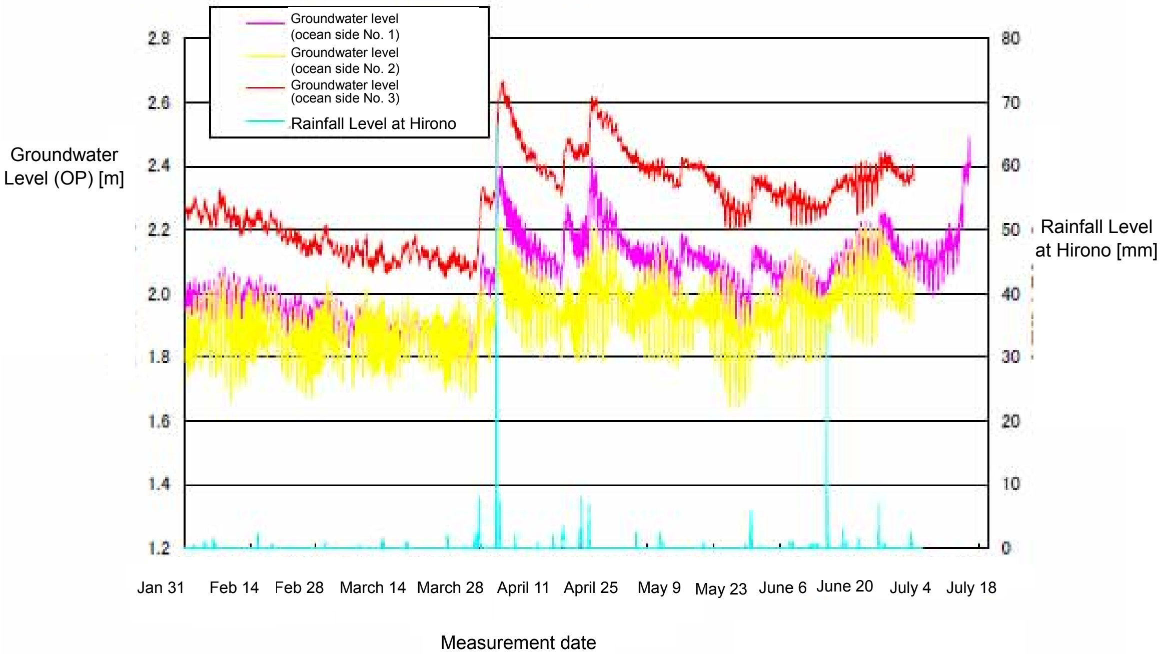
Groundwater levels in ocean-side boring holes No. 1~No. 3 and Onahama tide levels

(Enlarged Version)



*Onahama tide levels were taken from Japan Meteorological Agency website.

Groundwater levels in ocean-side boring holes No. 1~No. 3 and Rainfall levels at Hirono



Water Levels inside Groundwater Observation Holes

	Water level inside groundwater observation holes (OP:m) (Note 1)			
	No. 1－1	No. 1－2	No. 1－3	No. 1－4
10:00 AM July 9	1.80	1.82	―	1.83
10:00 AM July 11	1.91 (Note 2)	1.91	1.96	1.94
10:00 AM July 16	1.94 (Note 2)	2.22	2.22	2.25

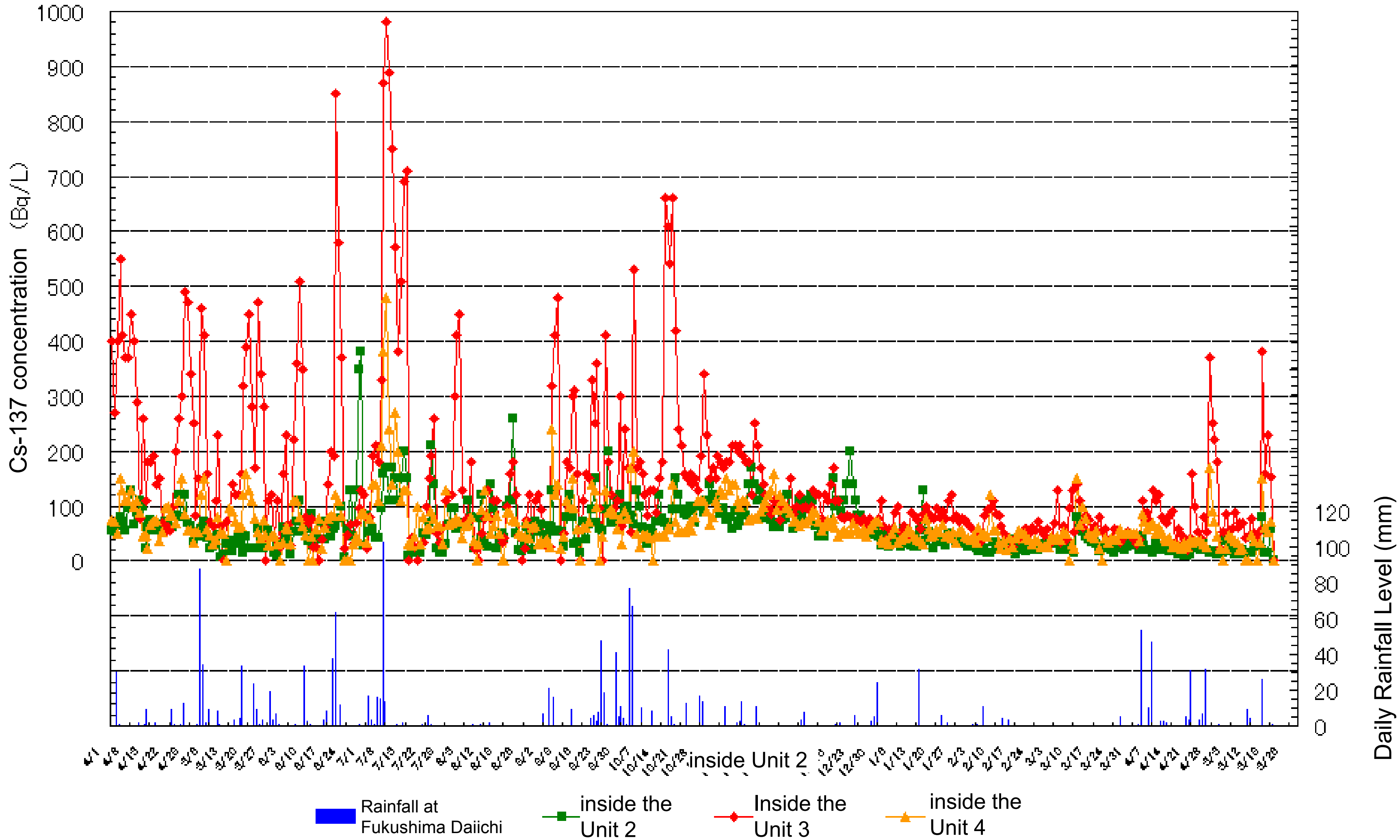
Note 1: Values for water levels inside holes are provisional since the standard elevation of observation holes is being confirmed

Note 2: Measurements taken after July 11 used for reference since No. 1-1is within the area subjected to chemical injections

Correlation Between Rainfall and the Concentration of Cesium inside the Silt Fence

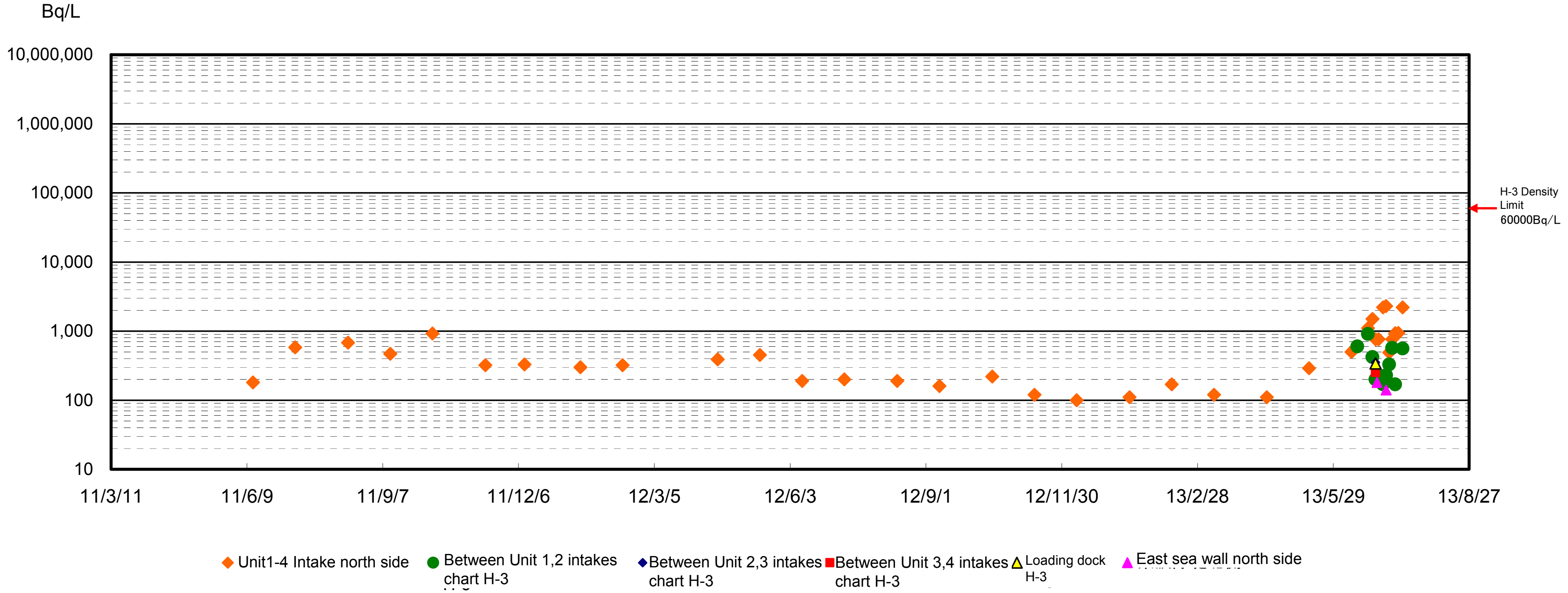
Reference H

Concentration of Cs-137 inside Fukushima Daiichi Unit 2,3,4 Silt Fence on Ocean Side
+ Rainfall Level (Fukushima Daiichi)

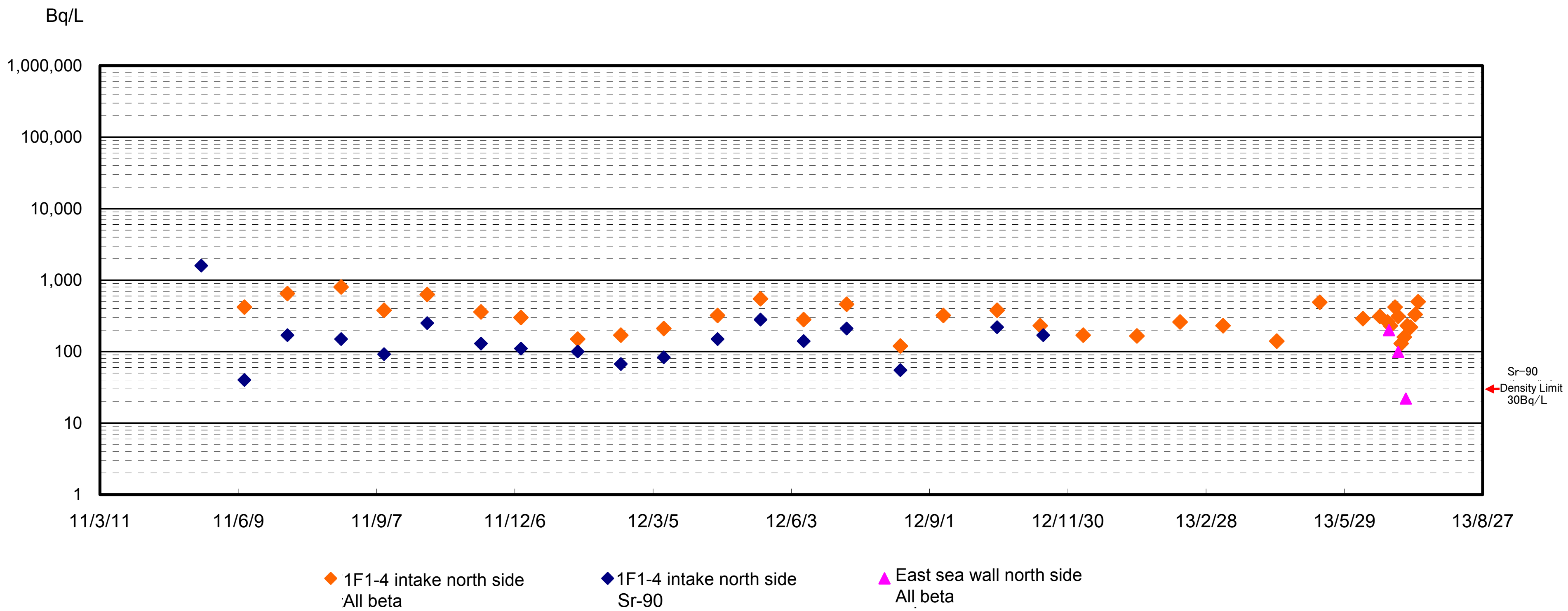


○ A correlation can be seen between the increase in the concentration inside the Unit 3 silt fence and rainfall

Trends in tritium concentration in seawater



Trends in all beta, strontium concentrations in seawater



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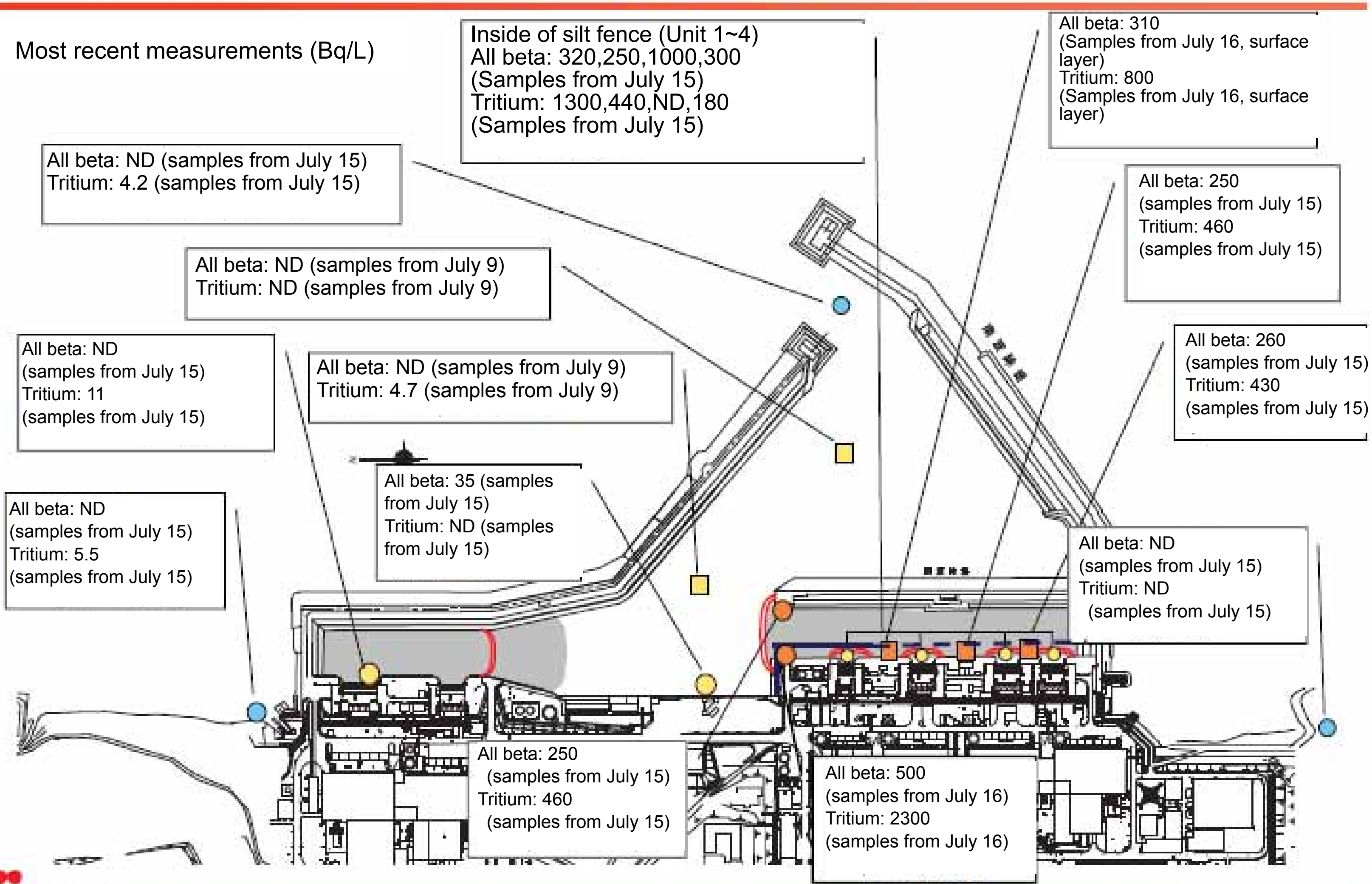
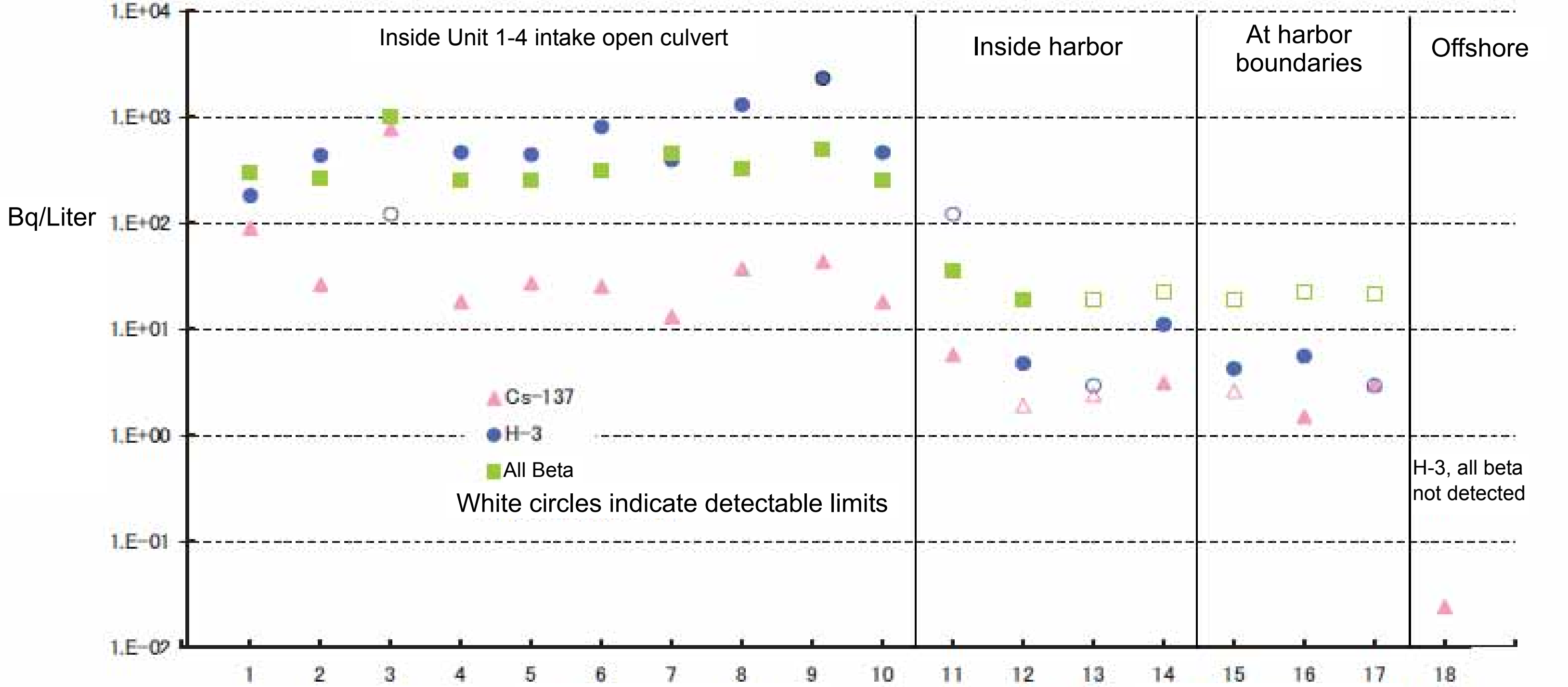
Seawater Measurements from inside and outside the Port

Reference J

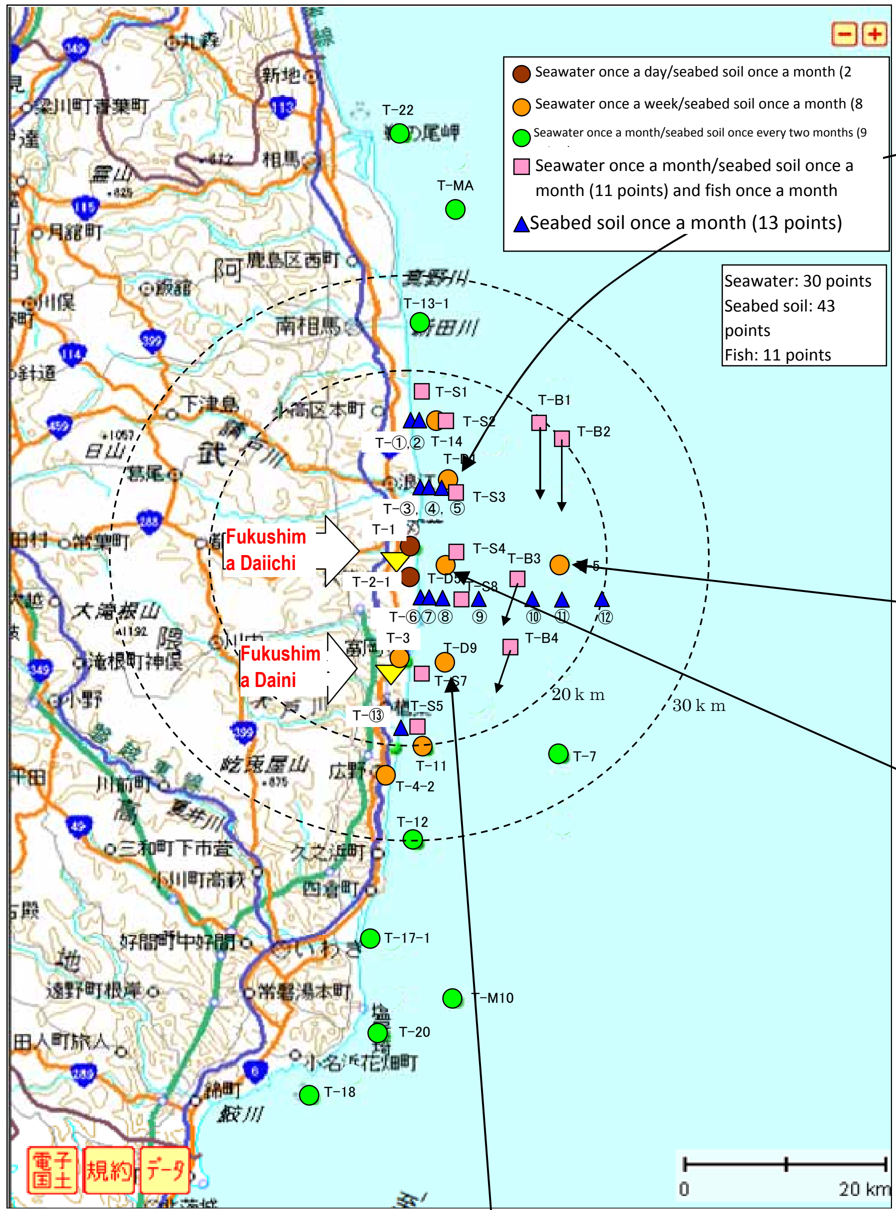


Radioactive Material Concentration Measurements for Seawater

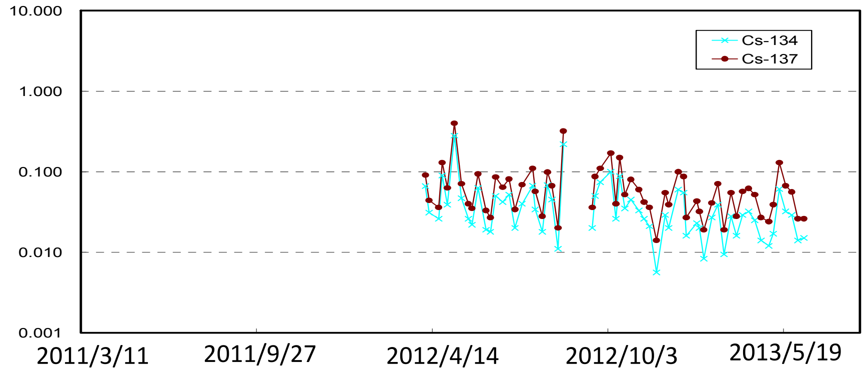


1: Inside of Unit 4 silt fence
2: between Unit 3-4 intakes
3: Inside of Unit 3 silt fence
4: Between Unit 2-3 intakes
5: Inside of Unit 2 silt fence
6: Between Unit 1-2 intakes (surface layer)
7: Between Unit 1-2 intakes (bottom layer)
8: Inside of Unit 1 silt fence
9: North side of Unit 1-4 intake
10: North side of east sea wall
11: Shallow Draft Quay
12: West inner side of port
13: East inner side of port
14: In front of Unit 6 intake
15: Port entrance
16: North side of Unit 5, 6 intake
17: Near south discharge
18: 3km offshore

福島第一原子力発電所周辺海域の海水中放射性セシウム濃度の経時変化

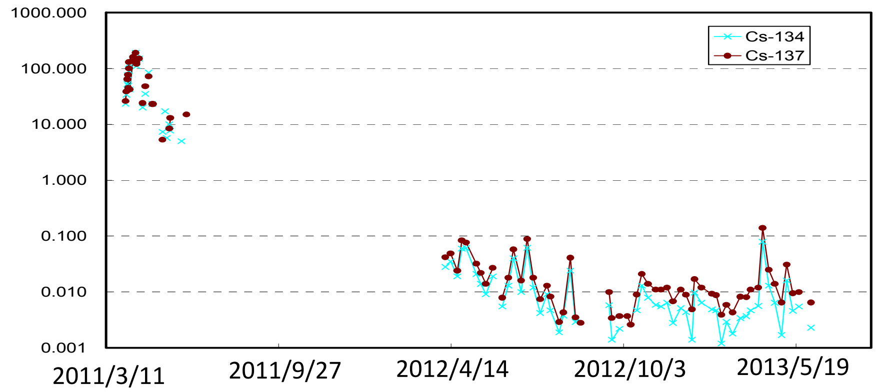


3km offshore of Ukedogawa (T-D1) Top layer seawater radiation concentration (Bq/L)



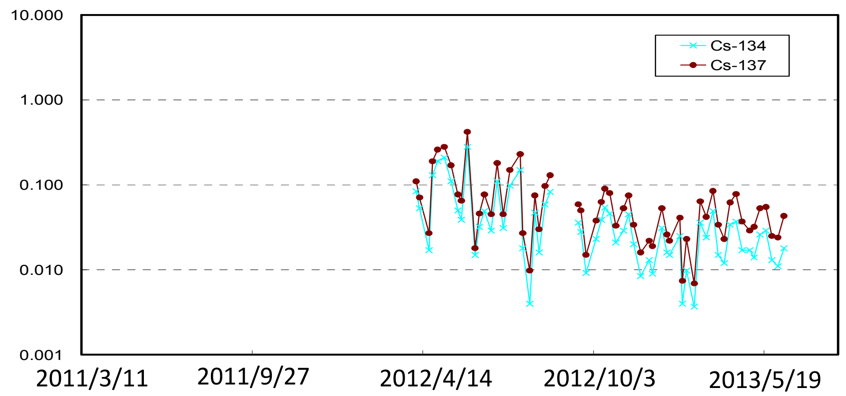
Neither tritium nor all beta were detected

15km offshore of Fukushima Daiichi site (T-5) Top layer seawater radiation concentration (Bq/L)



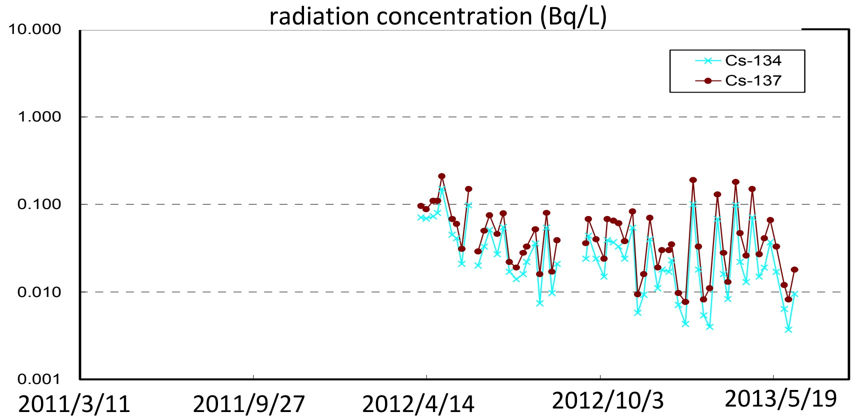
Neither tritium nor all beta were detected

3km offshore of Fukushima Daiichi site (T-D5) Top layer seawater radiation concentration (Bq/L)



Neither tritium nor all beta were detected

Fukushima Daini 3km offshore of site (T-D9) Top layer seawater radiation concentration (Bq/L)

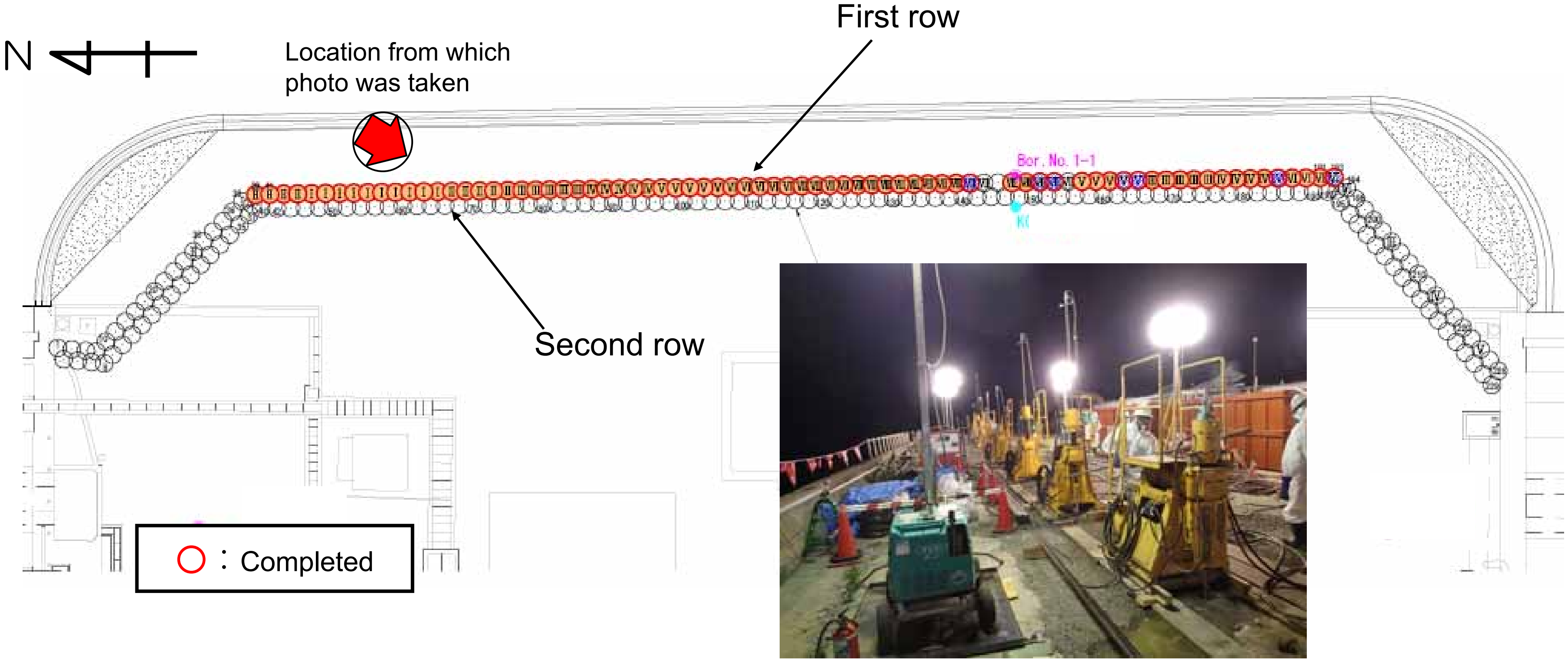


Cs-134 Density Limit:60Bq/L
Cs-137 Density Limit:90Bq/L
H-3 Density Limit:60000Bq/L

Progress Status of Ground Improvements behind Bank Protection

Progress Status of Ground Improvements behind Bank Protection

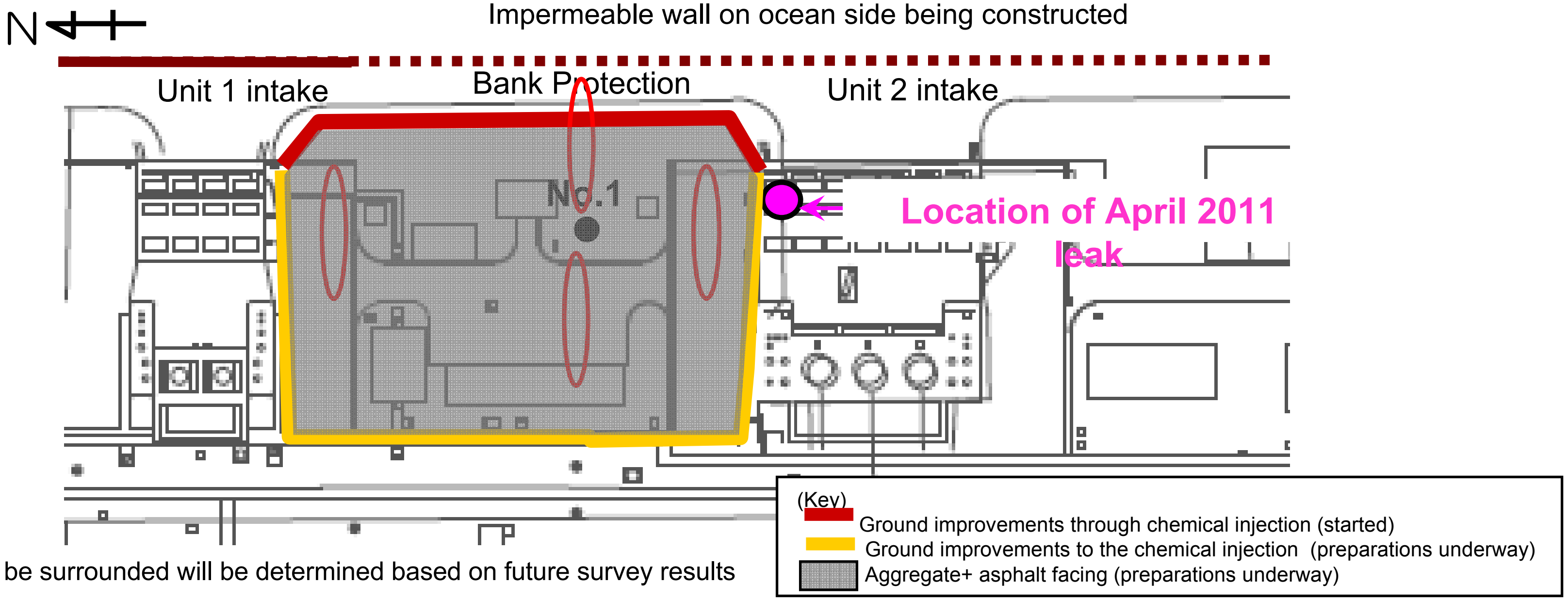
- Ground improvements commenced on July 8.(Work times: 7 PM to 7 AM)
- As of the morning of July 21, 75 injections have been completed
  (first round: 117, second round: 114 for a total of 231 injections)
- First row should be completed around July 25. Second row should be completed around August 10.



Additional Countermeasures behind the Bank Protection

(1) Additional countermeasures between unit 1-2 intakes

- Ground improvements commenced on July 8
- After completion of current chemical injections the range of chemical injections will be expanded behind the seawall to surround the mountainside and effort to suppress the dispersion of radioactive materials.
- The location of chemical injections needs to be considered due to obstacles on the mountainside, such as buildings and pipes, etc., but surrounding of the mountainside should be completed by the end of October (details to be deliberated)
- Preparations are being made to apply facing consisting of an aggregate layer and asphalt to the surface of the ground after the mountainside is surrounded by ground improvements in order to prevent the infiltration of rainfall.

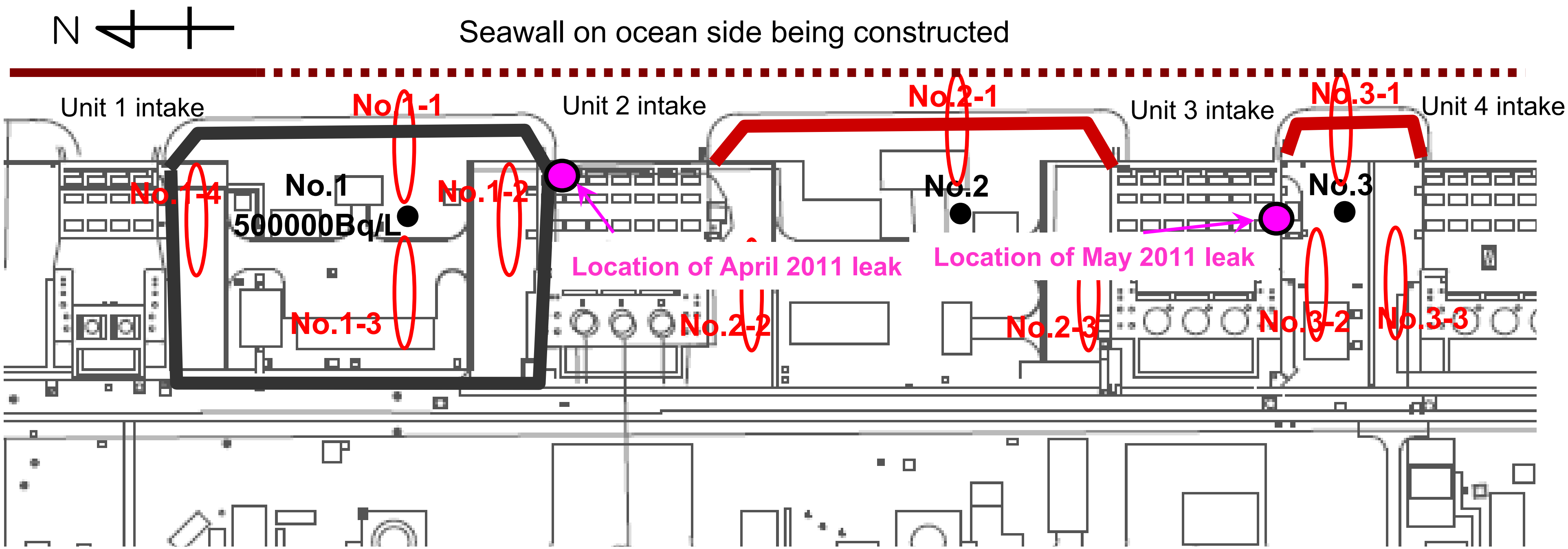


※ The area to be surrounded will be determined based on future survey results

※ The area to be faced will be determined based on future survey results

(2) Additional Countermeasures for between the Unit 2-3 intakes/Unit 3-4 Intakes

- Preparation and deliberation of ground improvements through chemical injections such as those being implemented between the Unit 1-2 intakes are underway.

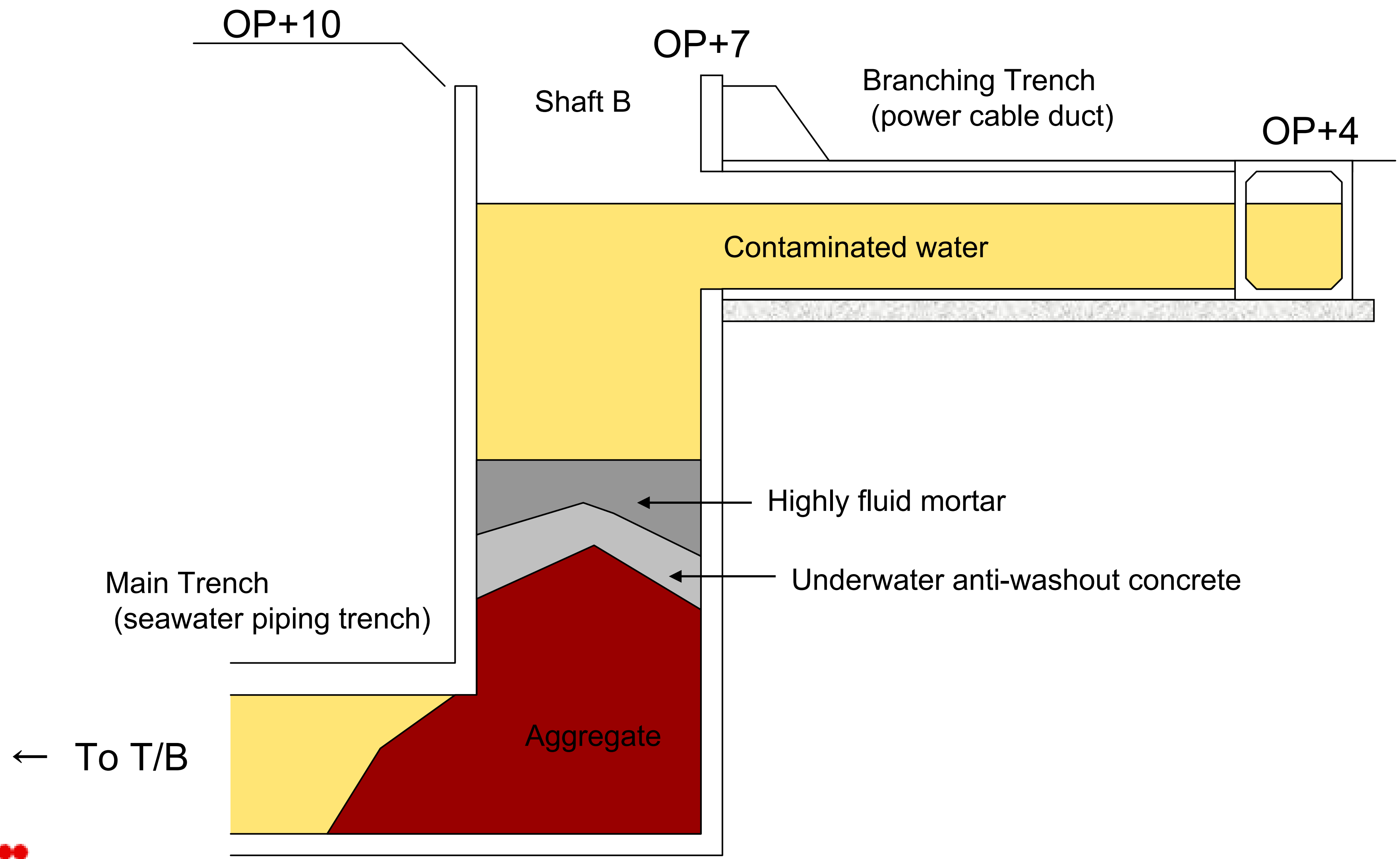


(Key)
Ground improvements through chemical injection (behind seawall between Units 2-3 and 3-4)

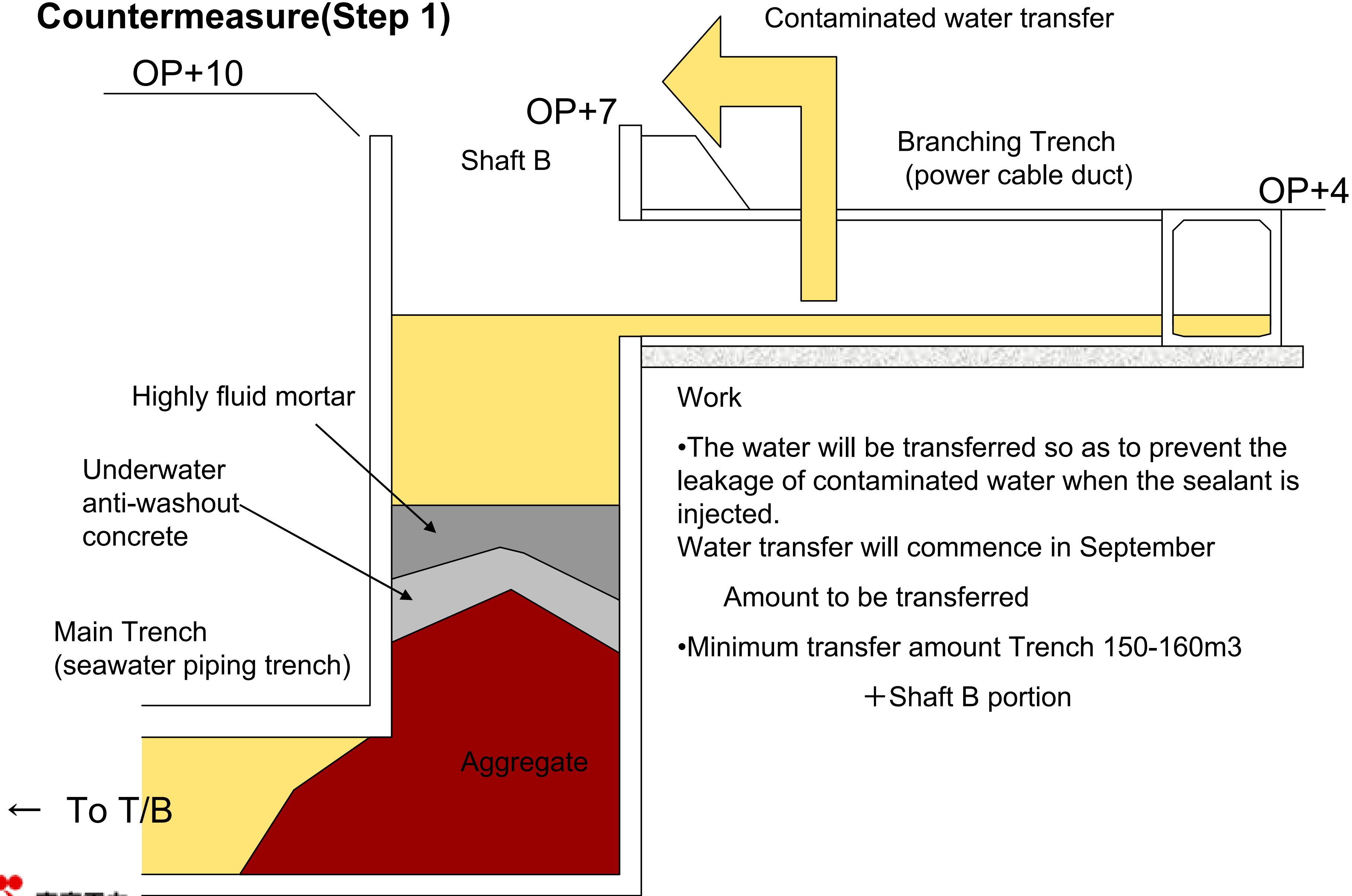
Branch Trench (Power Cable Duct) Sealing Plan

Sealing the Branching Trench (Power Cable Duct)

Current State



Countermeasure(Step 1)



Work

•The water will be transferred so as to prevent the leakage of contaminated water when the sealant is injected.

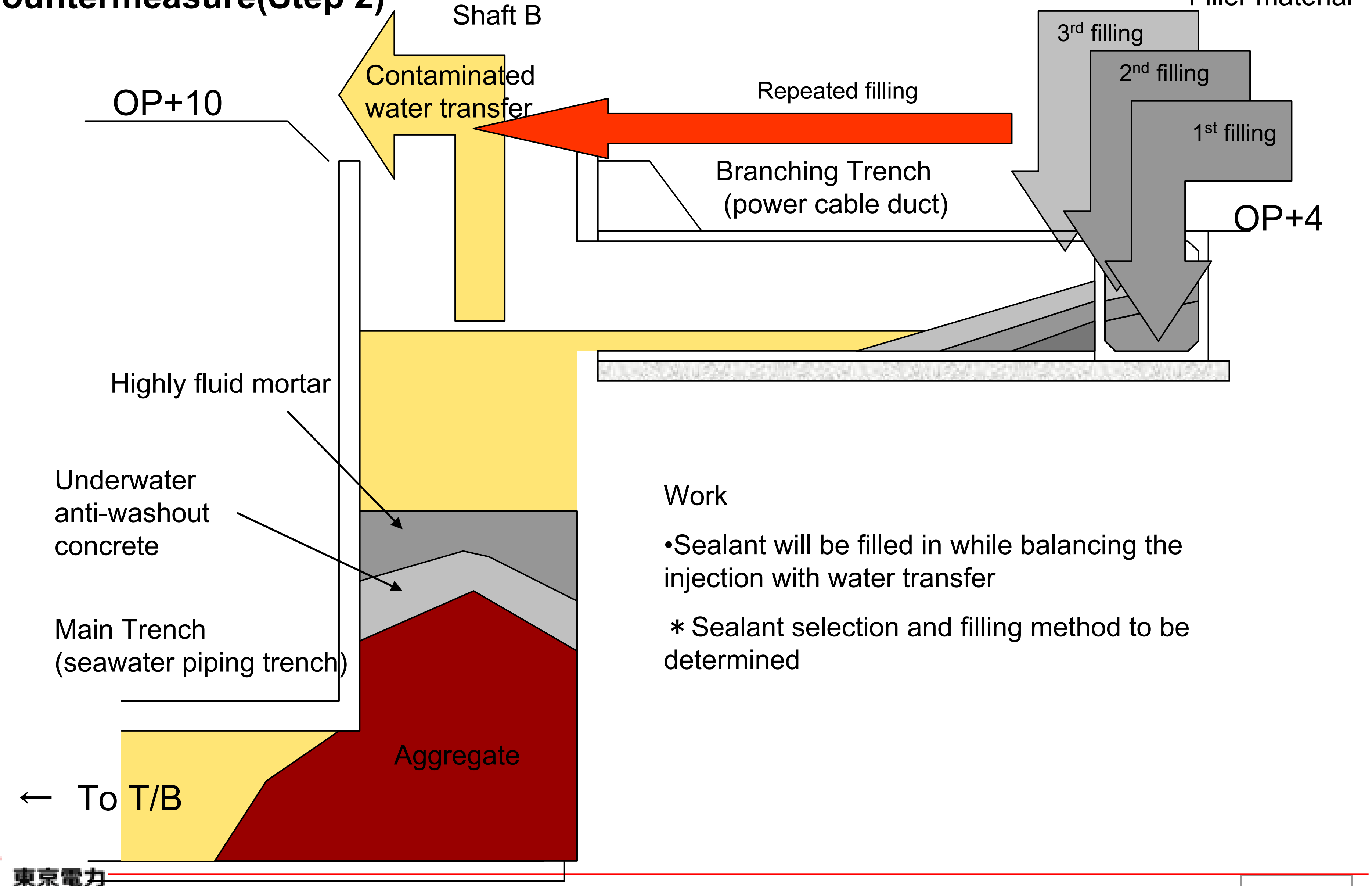
Water transfer will commence in September

Amount to be transferred

•Minimum transfer amount Trench 150-160m3

＋Shaft B portion

Countermeasure(Step 2)



Work

•Sealant will be filled in while balancing the injection with water transfer

＊Sealant selection and filling method to be determined

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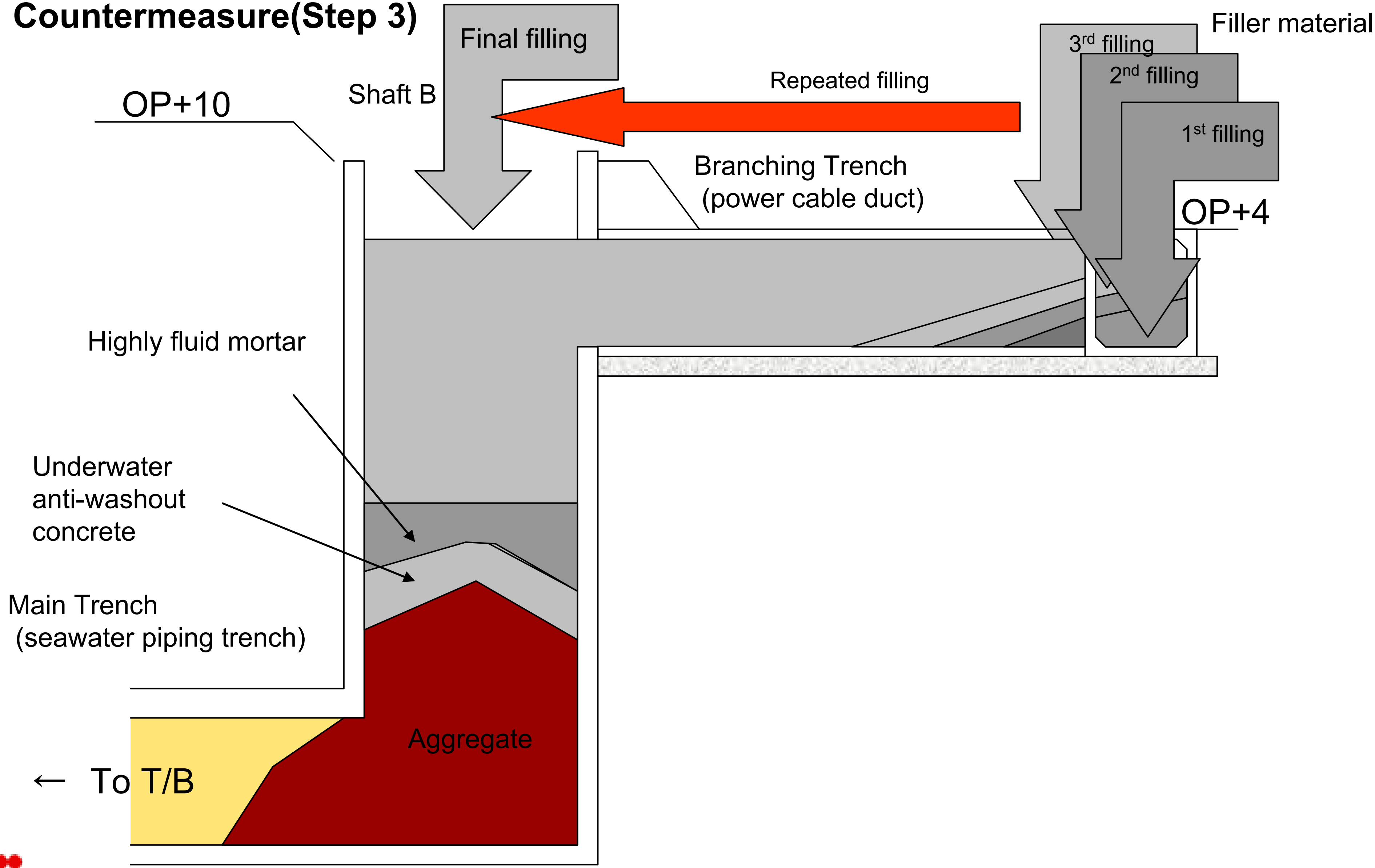
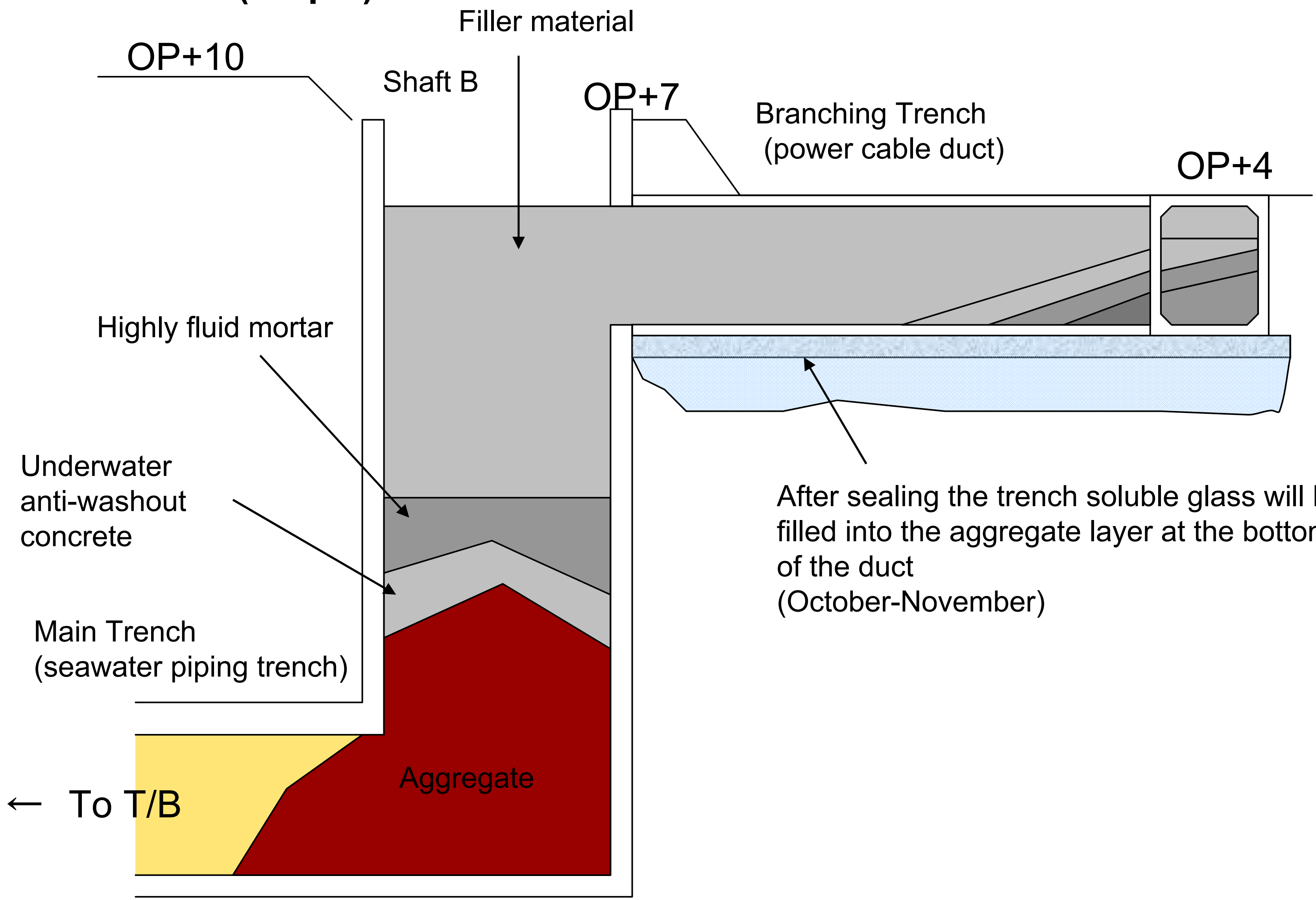
Countermeasure(Step 3)



Countermeasure(Step 4)



Concentration Reduction Measures for Contaminated Water inside the Main Piping Trench (Seawater Piping Trench)

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Concentration Reduction Measures for Contaminated Water inside the Main Piping Trench (Seawater Piping Trench) (1)

<Concentration Reduction Measures>

Since the turbine building has not been waterproofed concentration reduction measures will be implemented in the form of transferring contaminated water into the turbine building from inside the trench and treating the contaminated water inside the trench.

- Transfer to the turbine building

If the concentration of contaminated water inside the trench is higher than that of the turbine building it is possible to reduce the concentration of contaminated water by transferring it to the turbine building

(Reducing concentration by transferring contaminated water from the trench into the turbine building)

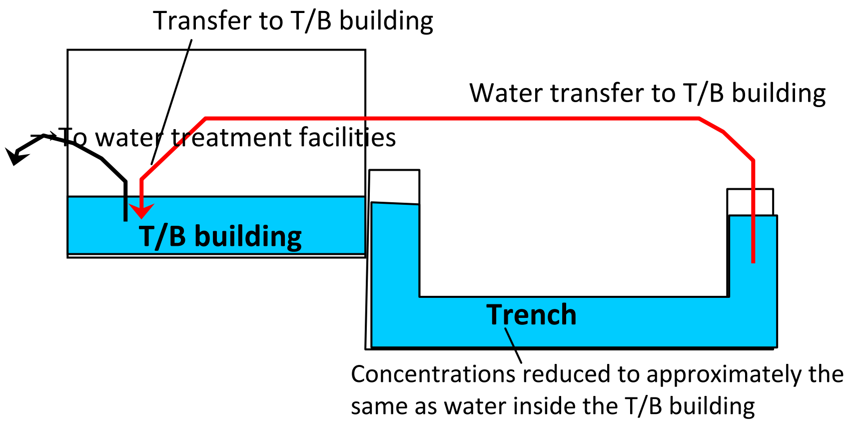
- Transferred to water treatment facilities (existing facilities) and treating contaminated water

Along with transferring contaminated water to the turbine building it is possible to reduce high concentrations inside the trench. This requires some adjustments since the current flow contaminated water is going a different way.

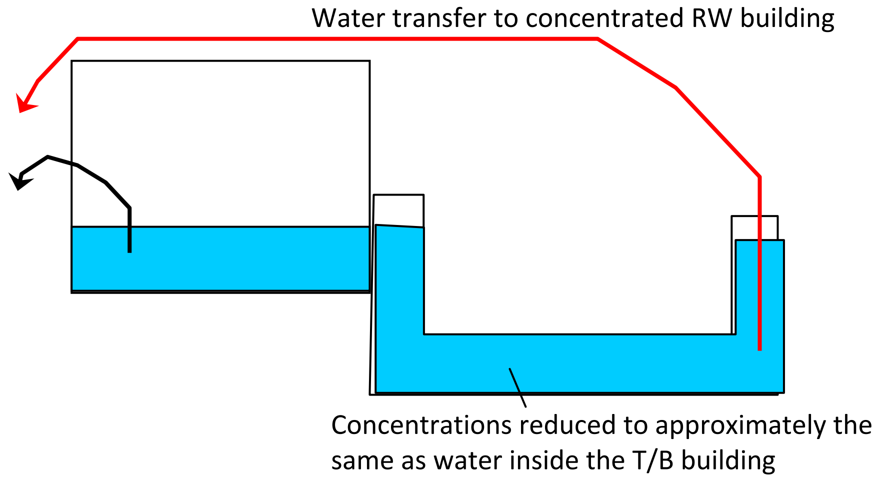
- Installation of treatment equipment and treating contaminated water

A closed system where contaminated water is removed from the shaft treated with treating equipment (additional) and then returned to the shaft will be created.

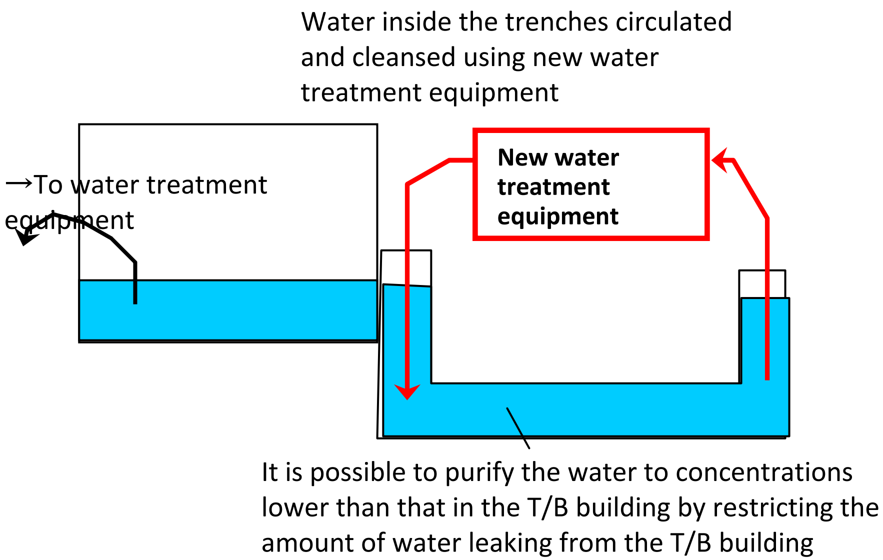
Concentration Reduction Measures for Contaminated Water inside the Main Piping Trench (Seawater Piping Trench) (2)



Transferred to turbine building



Transferred to water treatment facilities (concentrated RW building)

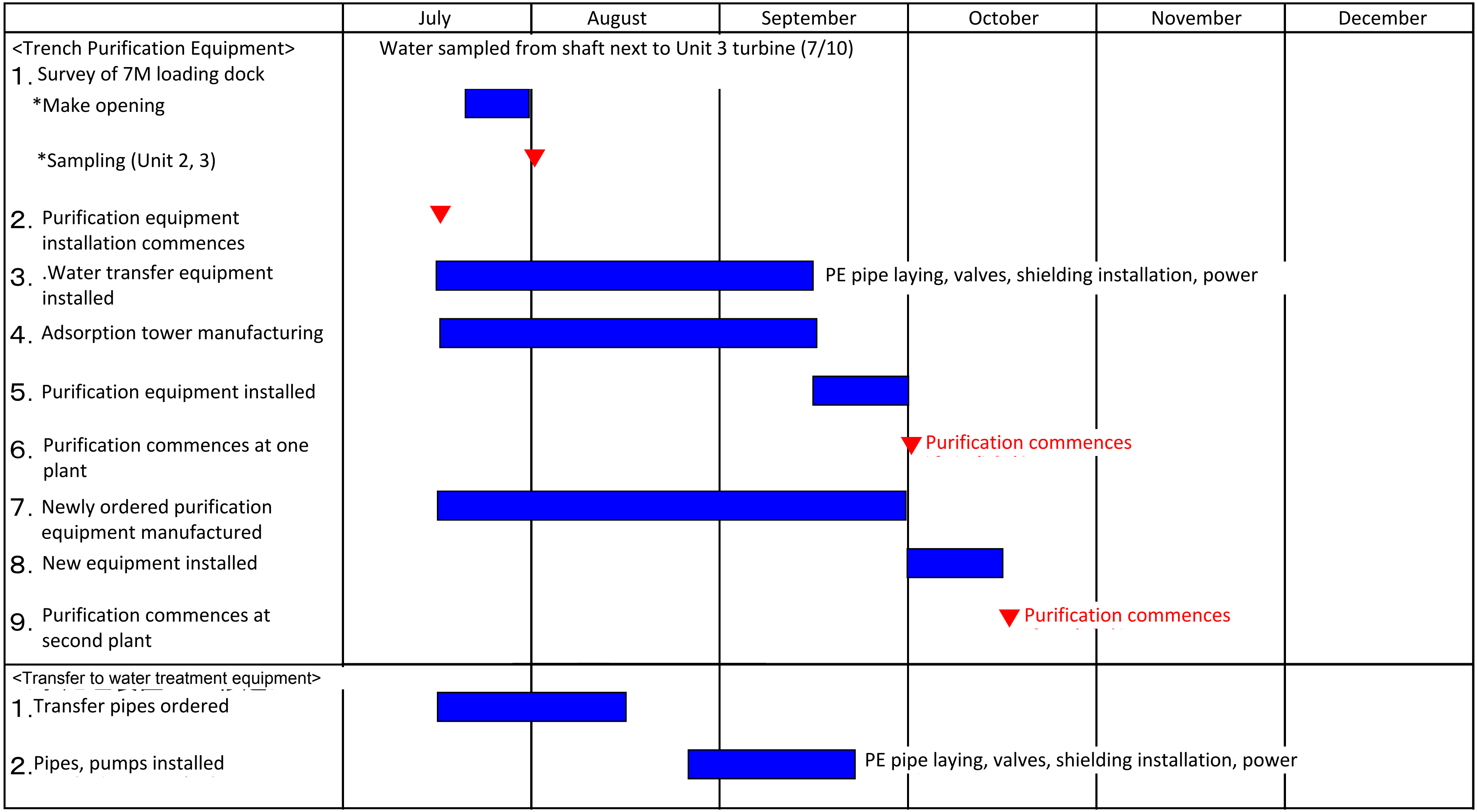


Additional installation of equipment for treating water inside the trench

Concentration Reduction Measures for Contaminated Water inside the Main Piping Trench (Seawater Piping Trench) (3)

<table>
<tr><th>Method</th><th>Characteristics</th><th>Concentration reduction limits</th><th>Assessment</th></tr>
<tr><td rowspan="2">T/B transfer</td><td>Increase in contamination concentrations in the turbine building (worsening of work environment)</td><td rowspan="2">Trench concentrations can be reduced by half or one third even if they are high and based on dose measurements it is highly probable that the concentrations in Unit 3 are high</td><td rowspan="2">×</td></tr>
<tr><td>Increase exposure during piping work conducted in the high dose areas in ocean side yard</td></tr>
<tr><td rowspan="3">Transfer to water treatment facilities</td><td>Transfer route in the case of connection to the Unit 4 valve unit needs to be considered, and may have impacts such as increases in doses in the concentrated RW building</td><td rowspan="3">Concentrations can be reduced to the same level as contaminated water currently inside the turbine building</td><td rowspan="3">○</td></tr>
<tr><td>Heavy load on current water treatment equipment if the concentrations of the water being treated increase</td></tr>
<tr><td>Increase exposure during piping work conducted in the high dose areas in ocean side yard</td></tr>
<tr><td rowspan="3">Treatment equipment installation</td><td>Sr purification possible with right media</td><td rowspan="3">Possible to purify the water to concentrations lower than that in the turbine building (depends on restricting the flow from the building)</td><td rowspan="3">◎</td></tr>
<tr><td>Installation space these to be secured</td></tr>
<tr><td>Increase exposure during piping work conducted in the high dose areas in ocean side yard</td></tr>
</table>

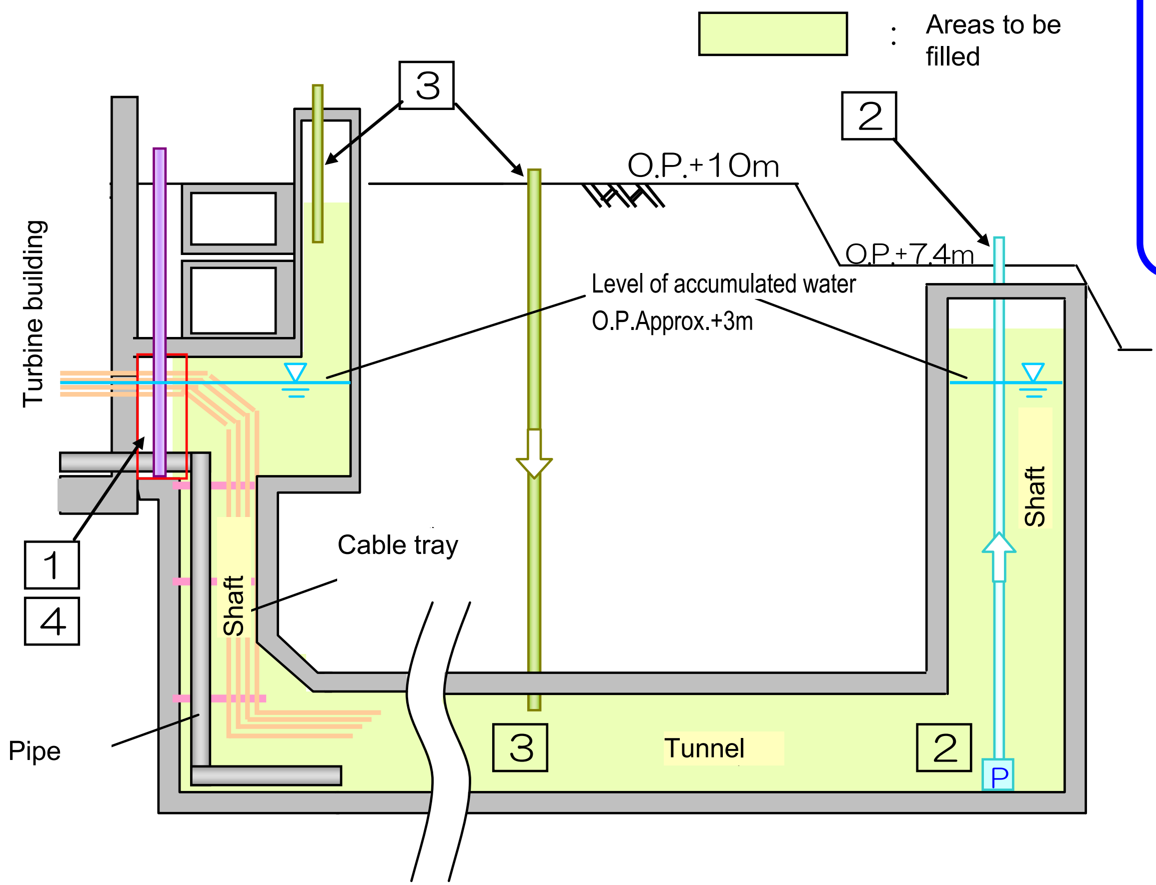
Concentration Reduction Measures for Contaminated Water inside the Main Piping Trench (Seawater Piping Trench) (4)



Measures for Early Draining of Contaminated Water from Main Piping (Seawater Piping Trench)

Measures for Early Draining of Contaminated Water from Main Piping (Seawater Piping Trench)

Unit 2 work proposal



Proving method through freezing tests

1

Waterproofing the connection to the building through freezing

※ Freezing water in gaps in the earth is accepted practice, but since this water has never been directly frozen…

2

Contaminated water in the trench will be transferred

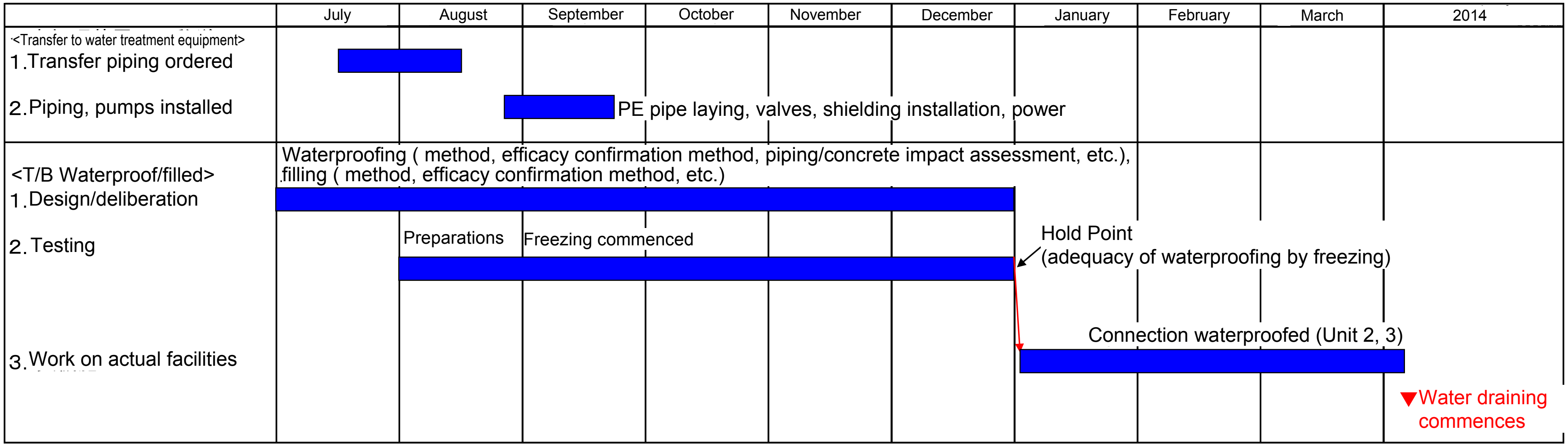
3

The trench and the shaft will be filled

4

The connection with the building will be thawed and then filled

Schedule for draining the main piping trench (see water pipe trench) the water (proposal)



Issues Surrounding the Early Drainage of Contaminated Water from the Main Piping Trench (Seawater Piping Trench)

The following issues must be addressed with before draining the contaminated water from the trench. Beginning in 2013 methods for waterproofing, draining, and filling the trench will be examined and the adequacy of those methods confirmed.

■ **Waterproofing the connections with buildings through freezing**

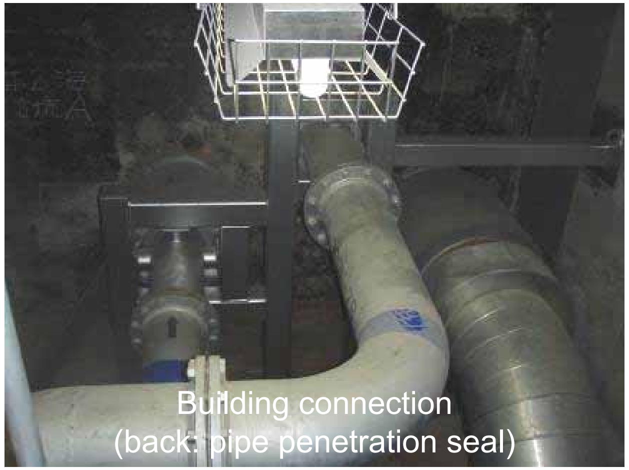
- Stopping gap water in the earth by freezing is an accepted practice but we have never directly frozen water → Whether or not this is a viable means of waterproofing needs to be confirmed
- Impact on the trench and piping during freezing
- Method for confirming waterproofing after waterproofing freezing (because there will no longer be access to the inside of the trench)

■ **Methods for draining and filling the trench**

- Hindrances to installation of pumps in shafts (pipes, supports, etc.)
- Groundwater flow after drainage and until filling of the trench
- Methods for filling trenches that have obstacles such as pipes
- Method of confirmation after filling is complete (because there'll no longer be access to the inside of the trench)

Freezing tests on contaminated water in the main piping trench (seawater piping trench)

- **Freezing test objective: To confirm the validity of waterproofing connections through freezing**



Building connection
(back: pipe penetration seal)

Inside the shaft (top→bottom)

Things to be confirmed to the test (issues)

- Whether or not waterproofing is possible by direct freezing of water and waterproofing performance
- The impact of equipment (the pipes/cable trays) on waterproofing performance
- The impact of water inside pipes on waterproofing performance
- The impact of cooling from outside the trench on waterproofing performance
- The impact of the number of rows of frozen pipes on waterproof performance

Execution Schedule

- Test plan, preparation: from July 2013
- Freezing tests, assessment: from September through December 2013

※ Freezing will commence in September in consideration of outside air temperature

 ※ Photograph taken prior to accident

Reference

Current Status of Contaminated Water Countermeasures on the Ocean Side and Future Plans

Positional Relationship	Countermeasures Objectives	Countermeasure Location	Countermeasure Method	Unit 1 Intake	Unit 2 Intake	Unit 3 Intake	Unit 4 Intake
Near the sea wall	Prevent leaks of contaminated water into the ocean	Unit 1-4 water intake canal exit	Prevent the migration of seawater from the water intake canal to the port by the silt fence	Countermeasures implemented			
		Screen Pump Room	Prevent the migration of seawater into the Screen Pump Room from the silt fence and stop logs	Countermeasures implemented	Countermeasures implemented	Countermeasures implemented	Countermeasures implemented
		Back of bank protection between each unit	Improve the ground behind the bank protection sheet-piles and prevent contaminated water from dispersing into the ocean	○Work began on July 8 (first round underway) ○Progress: 68/231(7/20) ○First row to be completed on July 25 ○Second row to be completed on August 10 ○Surrounding of contaminated region on mountain side (end of October 2013) and facing preparations underway	Countermeasures being prepared or deliberated	Countermeasures being prepared or deliberated	
		Seawall on ocean side	Prevent contaminated water from flowing into the ocean by installing steel sheet-piles in front of the bank protection.	○Advanced boring commenced on June 29, 2012 ○Steel sheet-pile insertion commenced on April 2, 2013 ○Piles inserted near south side of Unit 1 screen pump room, piles being inserted near south side intake ○Completion planned for September 2014			
	Draining (of contaminated water) and sealing the branching trench (power cable trench)	Location of leak present between March-June, 2011 right after the disaster	Seal the leak by filling the leak with soluble glass	No leaks	Waterproofed on April 6, 2011	Waterproofed on May 11, 2011	No leaks
		Main manhole pit of the branching trench (power cable trench)	Seal the main manhole pit of the branching trench (power cable trench) with concrete	Main manhole pit filled in in June 2011			
		Branching trench (power cable trench) waterproofing and filling the bottom of the trench with aggregate	Implementation of internal survey in order to implement countermeasures	There is little chance of contaminated water accumulating due to the relationship between height of the connection between the T/B and the main trench (seawater piping trench)	Internal survey results show accumulated contaminated water (July 2012)	Survey plan to be drafted	Survey plan to be drafted
			Removal of contaminated water and solidification or sealing of inside of trench		Emergency countermeasures implemented ○Draining and filling (completed in October 2013) ○Filling of bottom with aggregate (completed in	Implemented after specifying extent based on survey results	Implemented after specifying extent based on survey results
Near T/B building	Draining (of contaminated water) and sealing of main trench (seawater piping tench)	Inside main trench (seawater piping trench)	Water treated in order to reduce concentrations inside main trench (seawater piping trench)	There is little chance of contaminated water accumulating due to the relationship between height of the connection between the T/B and the main trench (seawater piping trench). Priority given to Unit 2 and Unit 3, Countermeasures to be deliberated	Internal contaminated water concentrtions are being measured and concentration reduction countermeasures are being implemented, such as circulating contaminated water with the T/B ○Concentration reduction countermeasures commenced at the end of September 2013		Unit 2 and Unit 3 will be given priority since survey results show that at present time the concentrations within accumulated water inside the building differ from those inside the main trench (seawater piping trench). Countermeasures to be deliberated
			Seal off from T/B, draing water and fill		The connection between the T/B and the trench (seawater piping trench) will be sealed by freezing after which water will be drained and the inside of the trench filled. (Being deliberated) ○Method for freezing the connection to be examined in December 2013 ○Preparations/freezing to be begin in January 2014 ○Water transferred and the trench filled starting in April 2014 at the earliest		

Key

Light blue	Countermeasures implemented
Orange	Being deliberated
Yellow	Implementation and preparations underway
White	Unlikely