

## Analysis Results and Future Surveys of Outlet Water of Additionally Installed ALPS (A) at the Fukushima Daiichi Nuclear Power Station

- Regarding additionally installed ALPS (Multi-nuclide Removal Equipment) (A) brought online from July 27<sup>th</sup> to August 5<sup>th</sup>(\*), it was confirmed that a higher than normal concentration of strontium 90 was present in the sample taken on July 28<sup>th</sup> of the outlet water (refer to figure in page 2). It was also confirmed that the water sampled at the same location on August 4<sup>th</sup> was below the regulatory concentration limit.

Analysis results of discharged water at outlet	July 28th	August 4th	Regulatory concentration limit
Strontium 90	93	2.7	30

[Unit: becquerel/liter]

- Analysis results from July 28<sup>th</sup> indicated that major radionuclides\* excluding Strontium 90 were below the regulatory concentration limit
  - Analysis results from August 4<sup>th</sup> indicated that the sum of the ratios to regulatory concentration limits for the seven major radionuclides including Strontium 90 were less than [1]
- \*: cesium 134, cesium 137, cobalt 60, antimony 125, ruthenium 106, iodine 129

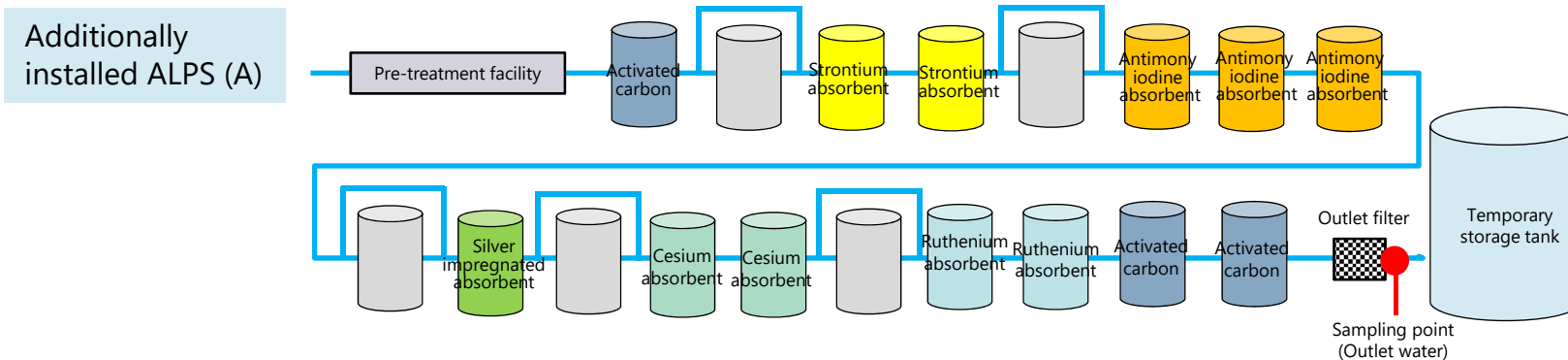
- All treated water are stored in tanks, and has not been discharged into the environment. Also, sampling was conducted when storing water treated between July 31<sup>st</sup> to August 5<sup>th</sup>(\*) in the temporary storage tank (refer to figure in page 3), and it was confirmed that strontium 90 concentration fell below the regulatory concentration limit (4.2 becquerel/liter). Based on these results, it is presumed that this case only represents a temporary increase in strontium 90 concentration.
- Water treated between July 27<sup>th</sup> to 30<sup>th</sup> are stored in the reused tank group. Reused tanks have stored strontium treated water in the past, and have been decontaminated. Therefore, while considering sampling results, purification using ALPS, etc. are to be performed repeatedly until the sum of the ratios to regulatory concentration limits for the 62 radionuclides subjected to removal by ALPS and carbon 14 becomes less than [1].
- Regarding the temporary increase in strontium 90 concentration, data from the upper stream sampling point ③ taken on July 28<sup>th</sup> (refer to figure on page 3) confirmed that purification was adequate. This suggests the cause of the increase to be in the treatment process after sampling point ③. To identify the cause, further sampling with additional sampling points was conducted on September 5<sup>th</sup>, and various analysis is to be conducted towards the end of September.
- Both the existing ALPS and additionally installed ALPS possess three systems each (with a total treatment capacity of 1,500m<sup>3</sup>). The existing ALPS used in the most recent purification treatment indicated strontium 90 concentration below the regulatory concentration limit, so this does not impact daily purification treatment.

\* Revised from August 4<sup>th</sup> to August 5<sup>th</sup> (Revision on September 29, 2022)

# 1. Overview of Analysis Results (1)

- Additionally installed ALPS (A) has completed facility inspections being carried out since March 2022. It has been brought online from July 27<sup>th</sup> to August 5<sup>th</sup>(\*), and sampling of system water was conducted on July 28<sup>th</sup> and August 4<sup>th</sup>.
- When water sampled on July 28<sup>th</sup> at the outlet of additionally installed ALPS (A) was analyzed, it was confirmed that strontium 90 concentration was higher than normal (93 becquerel/liter).
- Concentration in the water sampled at the same location on August 4<sup>th</sup> was confirmed to be below the regulatory concentration limit (2.7 becquerel/liter). It was also confirmed that the sum of ratios to regulatory concentration limits of the seven major radionuclides including strontium 90 was less than [1].

\* Revised from August 4<sup>th</sup> to August 5<sup>th</sup> (Revision on September 29, 2022)



■ Analysis results of outlet water (for samples taken on July 28<sup>th</sup> and August 4<sup>th</sup>)

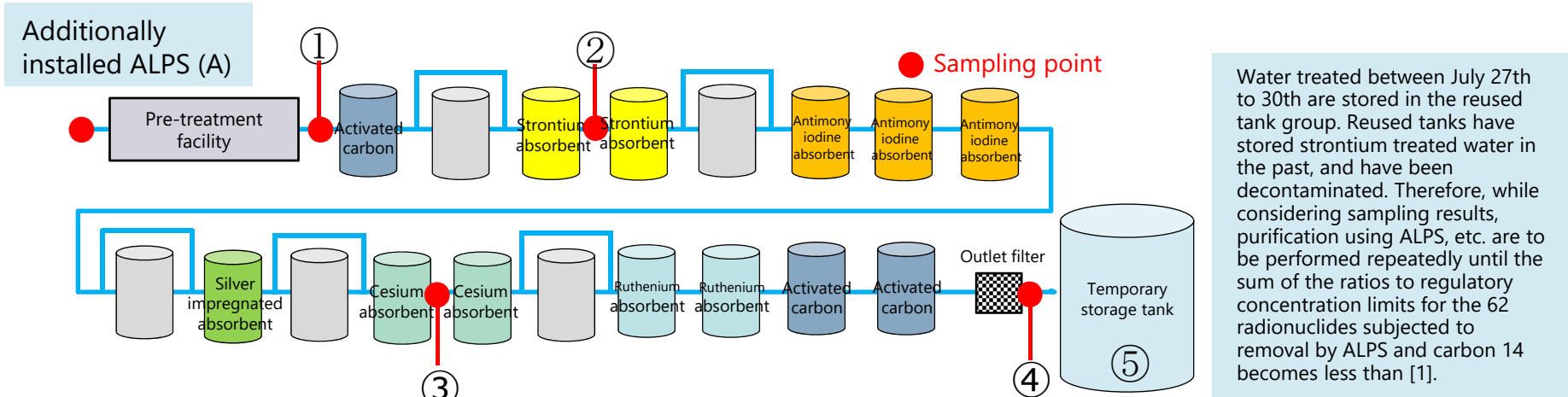
[Unit: becquerel/liter]

Radionuclide	Analysis results for July 28th	Analysis results for August 4th	Regulatory concentration limit
Cesium 134	Below detectable levels (<0.35)	Below detectable levels (<0.39)	60
Cesium 137	0.99	0.48	90
Cobalt 60	0.55	0.91	200
Antimony 125	Below detectable levels (<0.48)	Below detectable levels (<0.60)	800
Ruthenium 106	Below detectable levels (<1.3)	Below detectable levels (<1.5)	100
Strontium 90	93	2.7	30
Iodine 129	1.0	0.22	9

# 1. Overview of Analysis Results (2)

- The analysis results for each sampling point of the additionally installed ALPS (A) on July 28<sup>th</sup> are as presented below.
- Sampling was conducted when water treated between July 31<sup>st</sup> to August 5<sup>th</sup>(\*) was stored in the temporary storage tank (see figure ⑤ below), and it was confirmed that strontium 90 concentration was below the regulatory concentration limit (4.2 becquerel/liter). Based on these results, it is presumed that this case only represents a temporary increase in strontium 90 concentration.

\* Revised from August 4<sup>th</sup> to August 5<sup>th</sup> (Revision on September 29, 2022)



■ Analysis results for sampling points ①-④ (for samples taken on July 28<sup>th</sup>)

[Unit: becquerel/liter]

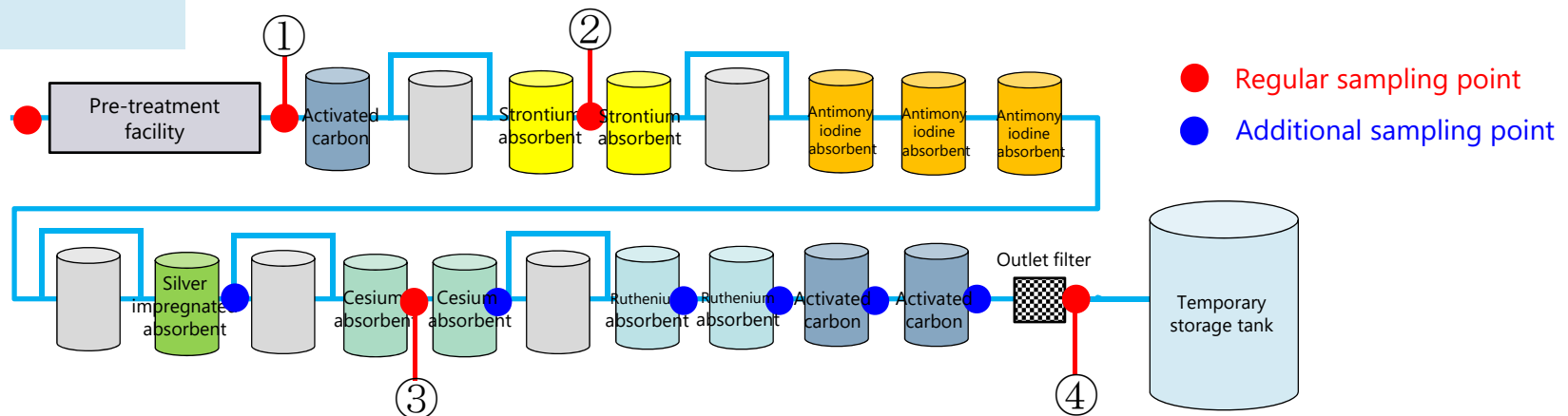
Radionuclide	①	②	③	④ (Outlet water)	Regulatory concentration limit
Cesium 134	99	-	Below detectable levels (<0.9)	Below detectable levels (<0.35)	60
Cesium 137	3,600	-	0.61	0.99	90
Cobalt 60	12	-	13	0.55	200
Antimony 125	2,100	-	2.4	Below detectable levels (<0.48)	800
Ruthenium 106	Below detectable levels (<200)	-	6.9	Below detectable levels (<1.3)	100
Strontium 90	59,000	250	Below detectable levels (<0.23)	93	30
Iodine 129	44	-	-	1.0	9

"-" indicates analysis not yet conducted

## 2. Currently Presumed Cause, Plan for Future Surveys

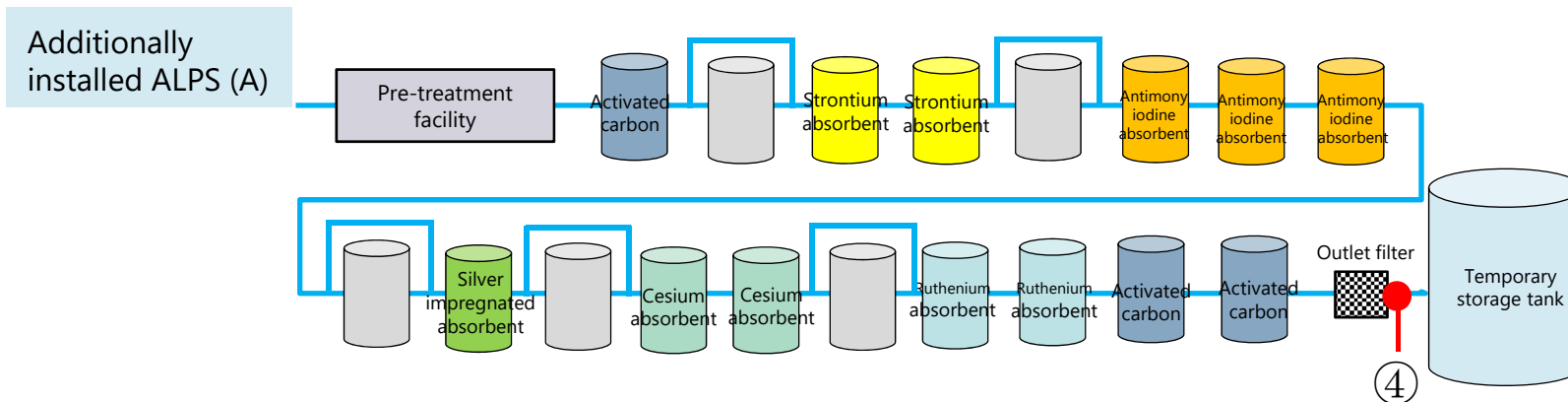
- Although higher than normal strontium 90 concentration was confirmed at the outlet of the additionally installed ALPS (A) (see figure below, sampling point ④), considering the concentration of strontium 90 at sampling point ③, it is presumed that the cause of the increase is in the treatment process after sampling point ③.
- Considering the presumed cause above, the additionally installed ALPS (A) was put on test operation on September 3<sup>rd</sup> and September 5<sup>th</sup> for the purpose of analyzing water at sampling point ③ as well as water at each absorption tower outlet immediately before and after sampling point ③. The water was sampled on September 5<sup>th</sup>.
- For the sampled water, we plan to conduct a combination of analysis such as measurement of radioactivity concentration of seven major nuclides, water quality analysis, etc., depending on the sampling location.
- Analysis is being conducted with the goal of completion by the end of September, and results will be announced as soon as survey results have been summarized. Also, any additional analysis required for the survey will be conducted as necessary.

Additionally installed ALPS (A)



### 3. Survey Status (Preliminary Report)

- Analysis of the additionally installed ALPS (A) outlet water (see figure below, sampling point ④) sampled on September 5<sup>th</sup> confirmed strontium 90 concentration to be below the regulatory concentration limit (0.71-0.81 becquerel/liter).



■ Analysis results (for samples taken on September 5<sup>th</sup>)

[Unit: becquerel/liter]

Radionuclide	Analysis results	Regulatory concentration limit
Cesium 134	Below detectable levels (<0.16-0.27)	60
Cesium 137	0.26-0.60	90
Cobalt 60	0.38-0.52	200
Antimony 125	Below detectable levels (<0.42-0.54)	800
Ruthenium 106	Below detectable levels (<1.2-1.4)	100
Strontium 90	0.71-0.81	30
Iodine 129	Currently under analysis	9

At sampling point ④ with the exception of iodine 129, each analysis is conducted for the three sampling bottles, and the minimum and maximum values are entered.

## 4. Impact on ALPS Treatment (1)

- The ALPS process at the Fukushima Daiichi Nuclear Power Station can remove 62 types of radioactive materials to below the regulatory concentration limit by passing the water to be purified through adsorbent towers filled with adsorbent (activated carbon, ion-exchange material, etc.), mainly at the Existing ALPS and additionally ALPS.
- As indicated below, both existing ALPS and additionally installed ALPS possess three systems. This provides adequate capacity to the volume of water to be purified (130m<sup>3</sup>/day, based on FY2021 results), and daily purification treatment is not affected when surveys are being conducted on additionally installed ALPS (A) to identify cause.

### Existing ALPS

— A system: treatment capacity 250m<sup>3</sup>/day

— B system: treatment capacity 250m<sup>3</sup>/day

— C system: treatment capacity 250m<sup>3</sup>/day

### Additionally installed ALPS

— A system: treatment capacity 250m<sup>3</sup>/day

— B system: treatment capacity 250m<sup>3</sup>/day

— C system: treatment capacity 250m<sup>3</sup>/day

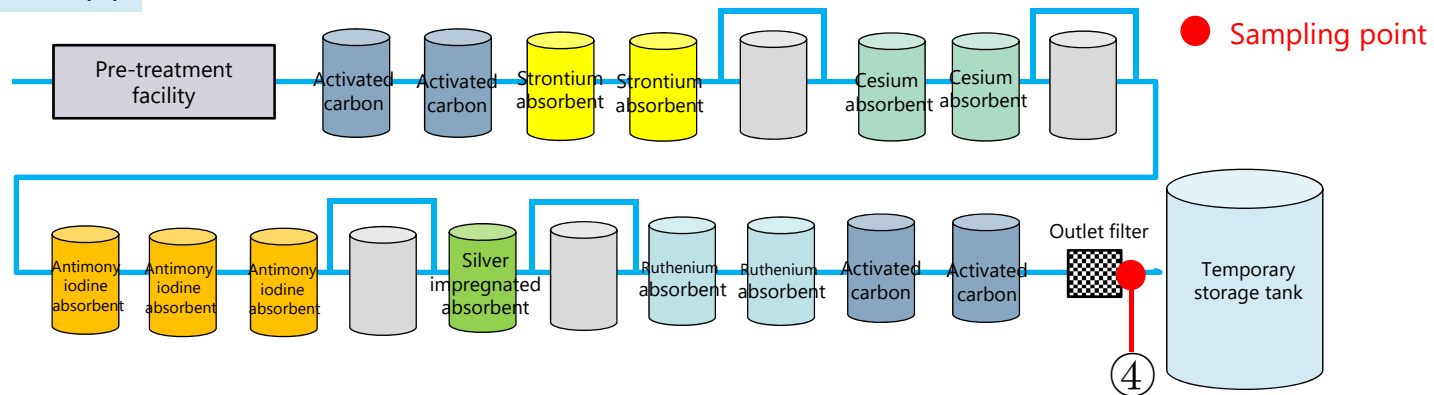


Existing ALPS

## 4. Impact on ALPS Treatment (2)

- The most recent purification treatment has been performed on the existing ALPS, and it has been confirmed that strontium 90 concentration was below the regulatory concentration limit and the sum of ratios to regulatory concentration limit was below 1 (for the seven major radionuclides).

Existing ALPS (B)



■ Analysis results (for most recent sample)

[Unit: becquerel/liter]

Radionuclide	Analysis results for July 6 <sup>th</sup> , existing ALPS (A)	Analysis results for August 12 <sup>th</sup> , existing ALPS (B)	Regulatory concentration limit
Cesium 134	Below detectable levels (<0.29)	Below detectable levels (<0.29)	60
Cesium 137	Below detectable levels (<0.13)	0.34	90
Cobalt 60	Below detectable levels (<0.16)	0.41	200
Antimony 125	Below detectable levels (<0.41)	0.50	800
Ruthenium 106	Below detectable levels (<1.1)	Below detectable levels (<1.3)	100
Strontium 90	Below detectable levels (<0.11)	0.09	30
Iodine 129	0.22	0.11	9