February 7, 2023

Results of ALPS Treated Water Marine Monitoring:
Seawater survey (other related nuclides) (October-November, 2022)

1. Outline of survey

(1) Date of sampling

October 28-November 1, 2022

(2) Sampling points

3 sampling points on the coastal waters in the Fukushima Prefecture (within 3 km of the proposed location of the ALPS treated water discharge outlet)

(3) Detail of the survey

Measurements of radioactive material concentration (other related nuclides*) in seawater.

*Measurements of radioactive material concentration (total 49 nuclides consisting of 8 alpha-emitting nuclides such as plutonium 238, 6 beta-emitting nuclides such as carbon 14, and 35 nuclides that emit gamma-ray or are evaluated assuming radioactive equilibrium) in seawater.

2. Outline of results

(1) Seawater survey (3 sampling points [6 samples])

6 of other related nuclides were detected in the seawater, Carbon14, Yttrium 90, Barium 137m, Plutonium 239 + 240 and Americium 241.
Concentrations of Carbon14 in seawater (with a target lower limit of detection of 0.0005 Bq/L) range from 0.0047 Bq/L to 0.0061 Bq/L.
Concentrations of Yttrium 90 in seawater (with a target lower limit of detection of 0.001 Bq/L) range from 0.00070 Bq/L to 0.0011 Bq/L.
Concentrations of Barium 137m in seawater (with a target lower limit of detection of 0.001 Bq/L) range from 0.017 Bq/L to 0.029 Bq/L.
Concentrations of Plutonium 239 + 240 in seawater (with a target lower limit of detection of 0.00002 Bq/L) range from 0.0000082 Bq/L to 0.000026 Bq/L.
Concentrations of Americium 241 in seawater (with a target lower limit of detection of 0.00002 Bq/L) range from 0.0000033 Bq/L to 0.000012 Bq/L.
Concentrations of all nuclides other than the 6 nuclides in seawater mentioned above correspond to below the lower limits of detection in all samples.

*1 Rhodium 103m, Rhodium 106, Tellurium 125m, Barium 137m, Praseodymium 144, Praseodymium 144m and Yttrium 90 are nuclides evaluated assuming radioactive equilibrium with the parent nuclides.

*2 Plutonium 239 and plutonium 240 are evaluated by the total value of plutonium 239 + 240 because alpha-ray energies are close to each other and alpha-ray peaks can not be separated.

*3 Americium 243, Curium 243 and Curium 244 are evaluated by gross alpha measurement.

The target lower limits of detection of each nuclide*4 are shown below.

Nuclides	Target lower limits of detection (Bq/L)
Barium 137m	0.001
Other gamma-ray emitting nuclides	- *5
Plutonium 238 Plutonium 239 + 240 Americium 241 Curium 242	0.00002
Americium 243 Curium 243 Curium 244	0.002
Strontium 89	0.005
Yttrium 90	0.001
Technetium 99	0.0004
Cadmium 113m	0.2
Nickel 63	20
Carbon 14	0.0005

*4 A target lower limit of detection means a value that is set for quality control to assure at least the detection up to the value when analysis is conducted. Each actual lower limit of detection differs according to samples, and is equal to or lower than a target lower limit of detection.

*5 The target lower limits of detection of other gamma-ray emitting nuclides are obtained through simultaneous measurements under a condition of satisfying the target lower limits of detection (in parentheses) for the following nuclides:
Ruthenium 106 (<1.2 Bq/L), Antimony 125 (<0.5 Bq/L) and Cobalt 60 (<0.3 Bq/L)

(Detailed are attached)
(Maps attached)

Attachement

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S3	2022/11/01	Surface layer	1.5	Ag-110m	< 0.08	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ba-137m	0.025 ± 0.0018	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ba-140	< 0.5	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cd-115m	< 5	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ce-141	< 0.1	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ce-144	< 0.4	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Co-58	< 0.07	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cs-136	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Eu-152	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Eu-154	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Eu-155	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Fe-59	< 0.3	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Gd-153	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Mn-54	< 0.07	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Nb-95	< 0.1	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pm-146	< 0.08	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pm-148	< 2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pm-148m	< 10	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pr-144	< 0.4	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pr-144m	< 0.4	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Rb-86	< 2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Rh-103m	< 0.07	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Rh-106	< 0.6	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ru-103	< 0.07	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Sb-124	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Sn-123	< 10	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Sn-126	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Tb-160	< 0.3	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Te-123m	< 0.05	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Te-125m	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Te-127	< 5	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Te-129	< 0.7	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Te-129m	< 3	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Y-91	< 40	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Zn-65	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pu-238	< 0.000006	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Pu-239+240	0.0000088 ± 0.0000022	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Am-241	0.0000069 ± 0.0000014	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cm-242	< 0.000003	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Am-243	< 0.002	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cm-243	< 0.002	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cm-244	< 0.002	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Sr-89	< 0.003	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Y-90	0.00073 ± 0.00015	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Tc-99	< 0.0004	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Cd-113m	< 0.2	Bq/L
E-S3	2022/11/01	Surface layer	1.5	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.

*2 Values below detection limit are shown by lower limit of detection (e.g., "<10 Bq/L" indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S3	2022/11/01	Bottom layer	7.7	Ag-110m	< 0.09	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ba-137m	0.029 ± 0.0021	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ba-140	< 0.5	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cd-115m	< 4	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ce-141	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ce-144	< 0.4	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Co-58	< 0.08	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cs-136	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Eu-152	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Eu-154	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Eu-155	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Fe-59	< 0.3	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Gd-153	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Mn-54	< 0.08	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Nb-95	< 0.1	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pm-146	< 0.07	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pm-148	< 3	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pm-148m	< 20	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pr-144	< 0.4	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pr-144m	< 0.4	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Rb-86	< 2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Rh-103m	< 0.07	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Rh-106	< 0.6	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ru-103	< 0.07	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Sb-124	< 0.3	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Sn-123	< 20	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Sn-126	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Tb-160	< 0.3	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Te-123m	< 0.05	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Te-125m	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Te-127	< 5	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Te-129	< 0.7	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Te-129m	< 3	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Y-91	< 40	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Zn-65	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pu-238	< 0.000006	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Pu-239+240	0.000011 ± 0.0000023	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Am-241	0.0000087 ± 0.0000016	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cm-242	< 0.000003	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Am-243	< 0.002	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cm-243	< 0.002	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cm-244	< 0.002	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Sr-89	< 0.003	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Y-90	0.0011 ± 0.00018	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Tc-99	< 0.0004	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Cd-113m	< 0.2	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.
*2 Values below detection limit are shown by lower limit of detection (e.g., "<10 Bq/L" indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S10	2022/10/28	Surface layer	1.5	Ag-110m	< 0.09	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ba-137m	0.025 ± 0.0017	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ba-140	< 0.7	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cd-115m	< 5	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ce-141	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ce-144	< 0.5	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Co-58	< 0.08	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cs-136	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Eu-152	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Eu-154	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Eu-155	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Fe-59	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Gd-153	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Mn-54	< 0.07	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Nb-95	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pm-146	< 0.08	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pm-148	< 4	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pm-148m	< 30	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pr-144	< 0.5	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pr-144m	< 0.5	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Rb-86	< 2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Rh-103m	< 0.09	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Rh-106	< 0.6	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ru-103	< 0.09	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Sb-124	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Sn-123	< 20	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Sn-126	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Tb-160	< 0.3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Te-123m	< 0.07	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Te-125m	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Te-127	< 6	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Te-129	< 0.7	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Te-129m	< 3	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Y-91	< 60	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Zn-65	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pu-238	< 0.000007	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Pu-239+240	0.000012 ± 0.0000028	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Am-241	0.0000046 ± 0.0000013	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cm-242	< 0.000004	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Am-243	< 0.002	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cm-243	< 0.002	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cm-244	< 0.002	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Sr-89	< 0.003	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Y-90	0.00088 ± 0.00016	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Tc-99	< 0.0004	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Cd-113m	< 0.2	Bq/L
E-S10	2022/10/28	Surface layer	1.5	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.

*2 Values below detection limit are shown by lower limit of detection (e.g., “<10 Bq/L” indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S10	2022/10/28	Bottom layer	12.2	Ag-110m	< 0.09	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ba-137m	0.027 ± 0.0020	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ba-140	< 0.7	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cd-115m	< 5	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ce-141	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ce-144	< 0.5	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Co-58	< 0.08	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cs-136	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Eu-152	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Eu-154	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Eu-155	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Fe-59	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Gd-153	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Mn-54	< 0.06	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Nb-95	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pm-146	< 0.08	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pm-148	< 4	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pm-148m	< 30	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pr-144	< 0.5	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pr-144m	< 0.5	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Rb-86	< 2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Rh-103m	< 0.09	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Rh-106	< 0.6	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ru-103	< 0.09	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Sb-124	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Sn-123	< 20	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Sn-126	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Tb-160	< 0.3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Te-123m	< 0.07	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Te-125m	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Te-127	< 6	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Te-129	< 0.7	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Te-129m	< 3	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Y-91	< 40	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Zn-65	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pu-238	< 0.000006	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Pu-239+240	0.000026 ± 0.0000037	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Am-241	0.000012 ± 0.0000020	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cm-242	< 0.000004	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Am-243	< 0.002	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cm-243	< 0.002	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cm-244	< 0.002	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Sr-89	< 0.003	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Y-90	0.00073 ± 0.00016	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Tc-99	< 0.0004	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Cd-113m	< 0.2	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.
*2 Values below detection limit are shown by lower limit of detection (e.g., "<10 Bq/L" indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S15	2022/10/31	Surface layer	1.5	Ag-110m	< 0.09	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ba-137m	0.017 ± 0.0012	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ba-140	< 0.6	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cd-115m	< 4	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ce-141	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ce-144	< 0.5	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Co-58	< 0.07	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cs-136	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Eu-152	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Eu-154	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Eu-155	< 0.3	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Fe-59	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Gd-153	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Mn-54	< 0.06	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Nb-95	< 0.1	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pm-146	< 0.08	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pm-148	< 3	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pm-148m	< 10	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pr-144	< 0.5	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pr-144m	< 0.5	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Rb-86	< 2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Rh-103m	< 0.08	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Rh-106	< 0.6	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ru-103	< 0.08	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Sb-124	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Sn-123	< 20	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Sn-126	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Tb-160	< 0.3	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Te-123m	< 0.07	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Te-125m	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Te-127	< 6	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Te-129	< 0.7	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Te-129m	< 3	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Y-91	< 40	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Zn-65	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pu-238	< 0.000006	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Pu-239+240	0.000011 ± 0.0000023	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Am-241	0.0000033 ± 0.0000011	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cm-242	< 0.000004	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Am-243	< 0.002	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cm-243	< 0.002	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cm-244	< 0.002	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Sr-89	< 0.003	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Y-90	0.00073 ± 0.00016	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Tc-99	< 0.0004	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Cd-113m	< 0.2	Bq/L
E-S15	2022/10/31	Surface layer	1.5	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.

*2 Values below detection limit are shown by lower limit of detection (e.g., “<10 Bq/L” indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S15	2022/10/31	Bottom layer	6.4	Ag-110m	< 0.09	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ba-137m	0.017 ± 0.0012	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ba-140	< 0.6	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cd-115m	< 5	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ce-141	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ce-144	< 0.5	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Co-58	< 0.07	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cs-136	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Eu-152	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Eu-154	< 0.3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Eu-155	< 0.3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Fe-59	< 0.3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Gd-153	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Mn-54	< 0.06	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Nb-95	< 0.1	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pm-146	< 0.09	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pm-148	< 3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pm-148m	< 30	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pr-144	< 0.5	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pr-144m	< 0.5	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Rb-86	< 2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Rh-103m	< 0.09	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Rh-106	< 0.6	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ru-103	< 0.09	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Sb-124	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Sn-123	< 20	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Sn-126	< 0.3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Tb-160	< 0.3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Te-123m	< 0.08	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Te-125m	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Te-127	< 6	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Te-129	< 0.7	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Te-129m	< 3	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Y-91	< 40	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Zn-65	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pu-238	< 0.000006	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Pu-239+240	0.0000082 ± 0.0000020	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Am-241	0.0000061 ± 0.0000015	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cm-242	< 0.000004	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Am-243	< 0.002	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cm-243	< 0.002	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cm-244	< 0.002	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Sr-89	< 0.003	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Y-90	0.00070 ± 0.00015	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Tc-99	< 0.0004	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Cd-113m	< 0.2	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	Ni-63	< 10	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.
*2 Values below detection limit are shown by lower limit of detection (e.g., "<10 Bq/L" indicates a value below 10 Bq/L).

Analysis results for other related nuclides in seawater at sampling points within 3 km of the discharge outlet

Sampling point	Sampling date (yyyy/mm/dd)	Sampling layer	Sampling depth (m)	Nuclide	Radioactivity concentration*1,*2	Unit
E-S3	2022/11/01	Surface layer	1.5	C-14	0.0047 ± 0.00013	Bq/L
E-S3	2022/11/01	Bottom layer	7.7	C-14	0.0052 ± 0.00014	Bq/L
E-S10	2022/10/28	Surface layer	1.5	C-14	0.0061 ± 0.00016	Bq/L
E-S10	2022/10/28	Bottom layer	12.2	C-14	0.0061 ± 0.00016	Bq/L
E-S15	2022/10/31	Surface layer	1.5	C-14	0.0048 ± 0.00013	Bq/L
E-S15	2022/10/31	Bottom layer	6.4	C-14	0.0059 ± 0.00015	Bq/L

*1 Radioactivity concentrations are presented as radioactivity concentration ± combined standard uncertainty.

*2 Values below detection limit are shown by lower limit of detection (e.g., “<10 Bq/L” indicates a value below 10 Bq/L).

(Attachment)

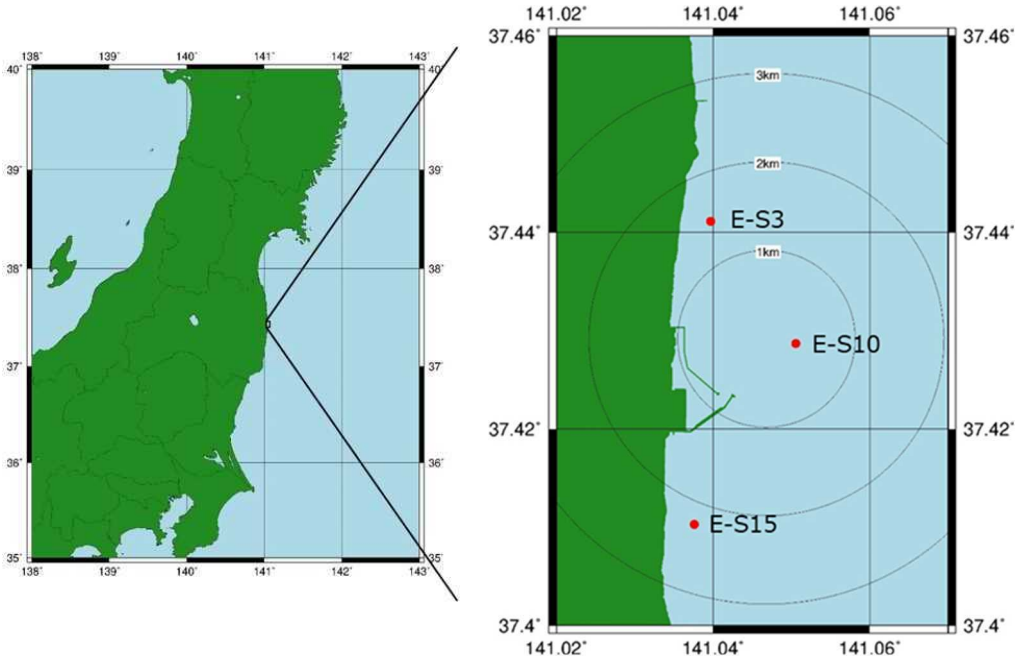

Fig. 1 Sampling points within 3 km of the proposed location of the ALPS treated water discharge outlet