

NRA presentation

Updates of Sea Area Monitoring regarding ALPS treated water

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IAEA Review of Safety Related Aspects of Handling ALPS-Treated Water
(Regulatory Session)

Today's contents

- Comprehensive Radiation Monitoring Plan(CRMP)
- Tritium concentration results in seawater samples at each monitoring point conducted by NRA before and after ALPS treated water discharge
- Inter-laboratory Comparison conducted jointly with the IAEA
 - Documentation of ILC procedures in English
- Consideration status for Integration of Sea Area Monitoring Data

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Comprehensive Radiation Monitoring Plan (1 of 2)

- “Comprehensive Radiation Monitoring Plan(CRMP)” for radiation monitoring related to the accident at TEPCO’s Fukushima Daiichi NPS was newly enacted on August 2, 2011. (Please see table 1, 2 and 3.)
 - ※The revisions of CRMP have been made to take into account the monitoring situation since the establishment of CRMP.
- On March 16, 2023, CRMP was revised to reflect the enhanced sea area monitoring and to reduce rumor-based adverse impacts on reputation by the discharge of ALPS Treated water.

Comprehensive Radiation Monitoring Plan (2 of 2)

Table 1

Coordination	Implementation of radiation monitoring	
<p>MOE/NRA</p> <ol style="list-style-type: none"> 1. Secretariat of Monitoring Coordination Meeting 2. Planning of land and sea areas and other monitoring 3. Coordinating the roles of relevant organizations 4. Providing scientific and technical advice to other organizations 5. Disseminating monitoring data of relevant organizations 	<p>MOE/NRA :</p> <p>Land and sea area (Soil, marine sediment, air, seawater, biota, waste etc.)</p>	<p>Fukushima prefecture</p>
	<p>MAFF/ FAJ : fishery products, agricultural soil, forests pastures</p>	
	<p>MHLW : supplied water, foodstuff</p>	
	<p>MLIT : ports, parks, sewage systems</p>	
	<p>MEXT : schools</p>	
	<p>TEPCO : Land and sea area</p>	
	<p>*NRA : check TEPCO's QMS</p>	

Change of monitoring program for tritium measurement

Table 2

Date	Change of monitoring program for tritium measurement
<p>Before and since 30th March, 2022) (Before ALPS treated water discharge)</p>	<p>① Before strengthening & expanding the tritium monitoring program (Before 30th March, 2022) 1) Tritium had been monitored by NRA, Fukushima Prefecture and TEPCO in some sea areas with detection limit higher than that of current monitoring since 2011.</p> <p>② After strengthening & expanding the tritium monitoring program (Since 30th March 2022) 1) Increasing the frequency of precise analysis of tritium※ 2) Applying rapid analysis for a preliminary report on tritium 3) Starting tritium monitoring by MOE & FAJ</p>
<p>24th August, 2023 (Commencement of ALPS treated water discharge)</p>	<p>N/C</p>
<p>Since 21th March, 2024 (After ALPS treated water discharge)</p>	<p>③ Strengthening & expanding the tritium monitoring system had been conducted since commence of ALPS treated water discharge w/Revision of the tritium monitoring program. 1) As a result of confirming the sea area monitoring data by the relevant organizations for about six months after the start of the ALPS treated water discharge, a slight increase in tritium concentration was observed at monitoring points in the nearshore sea area during the period of the ALPS treated water discharge. However, the tritium concentration level at monitoring points in the offshore area were no change to compare with that of before the ALPS treated water discharge. These precise analyses clearly showed the above fact.</p> <p>2) Based on these review results over a period of about six months, the monitoring program for tritium in the sea area monitoring was optimized.</p>

① Before strengthening & expanding the tritium monitoring program

Table 3-1-1

※ Before 30th March, 2022



水産庁



TEPCO

	NRA (Nuclear Regulation Authority)	MOE (Ministry of the Environment)	FAJ (Fisheries Agency, Japan)	Fukushima Pref	TEPCO (Tokyo Electric Power Company Holdings)
Sample	Seawater	—	—	Seawater	Seawater
Frequency	★Every month (Nearshore)	—	—	★Every month	★Every week (Nearshore) / ★Twice a month (Coast) / ★Every month (Coast)
Number of sampling points	★4 points (Nearshore)	—	—	★6 points	★7 points (Nearshore) / ★6 points (Coast) / ★1 point (Coast)
Detection limit	★0.4 Bq/L	—	—	★0.5 Bq/L	★1 Bq/L (Nearshore) / ★0.4 Bq/L (Coast) / ★0.1 Bq/L (Coast)

【Legend】 ★Precise analysis

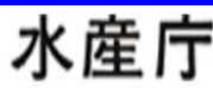
※Excluding open sea area

- Tritium has been monitored by NRA, Fukushima Prefecture and TEPCO in some sea areas with detection limit higher than that of current monitoring.

② After strengthening & expanding the tritium monitoring program

※ Since 30th March, 2022

Table 3-1-2

	 NRA (Nuclear Regulation Authority)	 MOE (Ministry of the Environment)	 水産庁 (Fisheries Agency, Japan)	 Fukushima Pref	 TEPCO (Tokyo Electric Power Company Holdings)
Sample	Seawater	Seawater	Fish	Seawater	Seawater
Frequency	★Every month (Nearshore) / ★Every 3 months(Offshore)	○Every week ★Every month	○Daily ★200 samples / year	○Every week ★Every month	○Daily - Every month ☆Three times a month ★Every month
Number of sampling points	★4 points(Nearshore) / ★16 points(Offshore)	○11 points ★3 points (29 points for every 3 months)	○2 points ★Pacific side of the eastern Japan	○9 points ★9 points	○14 points ☆16 points ★36 points
Detection limit	★0.1 Bq/L	○10 Bq/L ★0.1 Bq/L	○10 Bq/kg fresh ★0.4 Bq/kg fresh	○10 Bq/L ★0.1 Bq/L	○10 Bq/L ☆0.4 Bq/L ★0.1 Bq/L

【Legend】 ○Rapid analysis, ☆Precise analysis(TEPCO Analysis), ★Precise analysis

※Number of analysis days: Rapid analysis(1-5 days), Precise analysis (Approximately 2 months)

In addition, some other nuclides in seawater, sea sediment and marine biota are measured regularly.

➤ The changes made by strengthening and expanding the tritium monitoring program are shown in blue box and letters.

③ Revision of the tritium monitoring program

As of 25th Nov, 2024



水産庁



TEPCO

	NRA (Nuclear Regulation Authority)	MOE (Ministry of the Environment)	FAJ (Fisheries Agency, Japan)	Fukushima Pref	TEPCO (Tokyo Electric Power Company Holdings)
Sample	Seawater	Seawater	Fish	Seawater	Seawater
Frequency	★Every month - Every 3 months	○Every week →One time during the discharge/ Twice during the discharge— One time a month during the suspension ★Every month → — / Every 3 months	○Daily →Four times a week during the discharge—One time a week during the suspension ★200 samples / year	○Every week →Every week during the discharge/ One time a month during the suspension ★Every month	○Daily - Every month →Daily during the discharge - Every week during the suspension/ Twice a week during the discharge - Every month during the suspension / Every week/ Every month ☆Three times a month ★Every month
Number of sampling points	★20 points	○11 points →20 points / 3 points ★3 points (29 points for every 3 months) →0 / 29 points	○2 points ★Pacific side of the eastern Japan	○9 points ★9 points	○14 points →4/6/1/3 points ☆16 points ★36 points
Detection limit	★0.1 Bq/L	○10 Bq/L ★0.1 Bq/L	○10 Bq/kg fresh ★0.4 Bq/kg fresh	○10 Bq/L ★0.1 Bq/L	○10 Bq/L ☆0.4 Bq/L ★0.1 Bq/L
Analytical result	★below DL - 3.5Bq/L	○below DL - 20 Bq/L ★below DL - 5.0Bq/L	○below DL ★below DL	○below DL ★below DL-1.6 Bq/L	○ below DL-48 Bq/L ☆ below DL-50 Bq/L ★ below DL-12 Bq/L
Official Website	https://radioactivity.nra.go.jp/en/results#sec-10	https://shorisui-monitoring.env.go.jp/en/	https://www.jfa.maff.go.jp/e/inspection/index.html	https://www.pref.fukushima.lg.jp/site/portal/moni-k.html	https://www.tepco.co.jp/decommission/progress/watertreatment/

【Legend】 ○Rapid analysis, ☆Precise analysis(TEPCO Analysis), ★Precise analysis

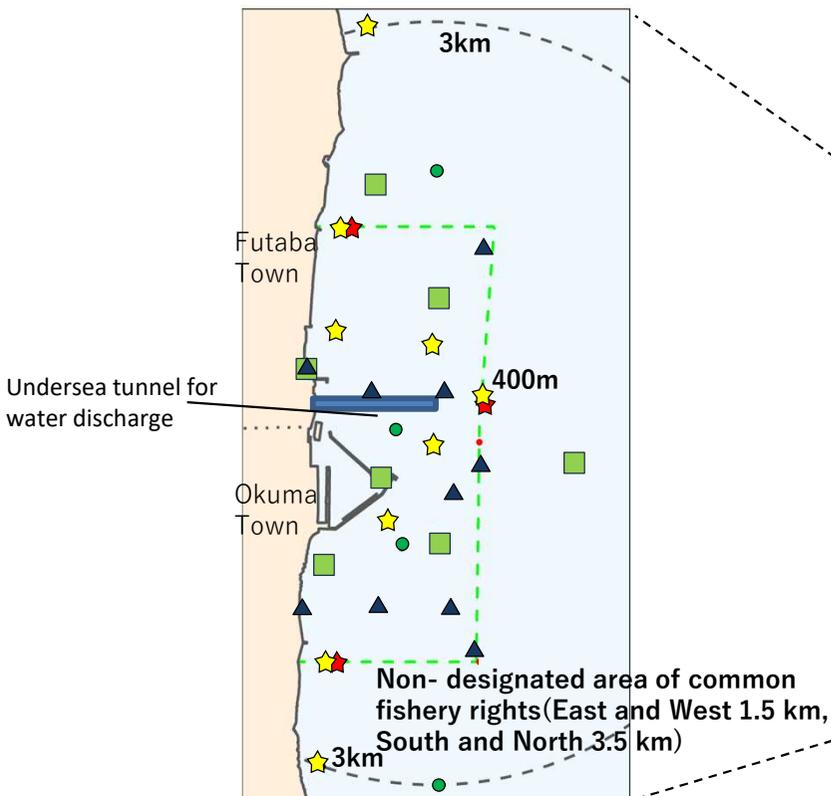
In addition, some other nuclides in seawater, sea sediment and marine biota are measured regularly. 9

Today's contents

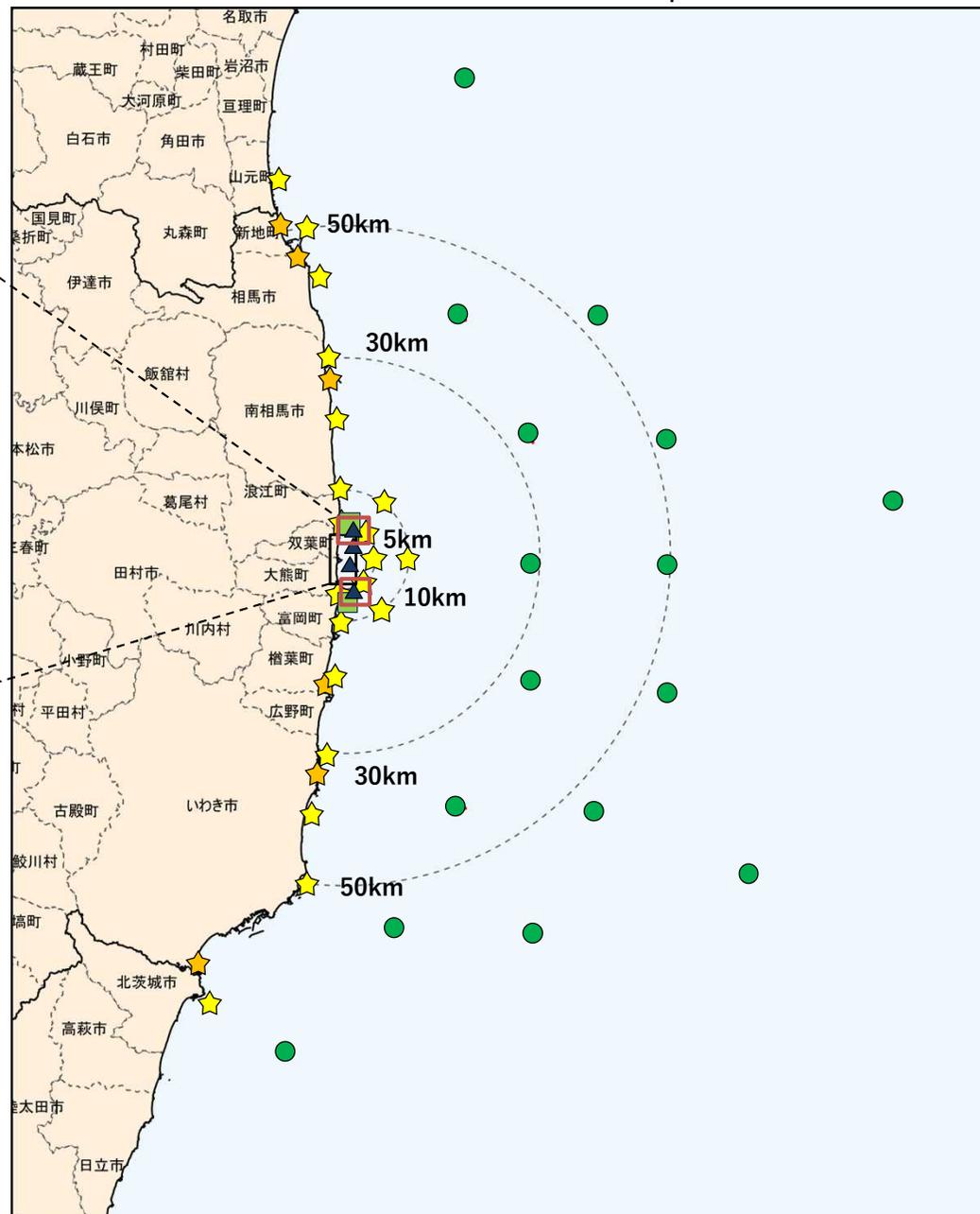
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Sea Area Monitoring regarding ALPS treated water

【Enlarged map (3 km radius)】



【Broader area map】



< Legend >

【MOE】

- ★ : Sampling points for tritium in seawater
 - ★ (red) : Sampling points for 7 major radionuclides, other related radionuclides
 - ★ (yellow) : Sampling points for tritium at beaches
- The monitoring of fish (on the boundary of common fishery rights area) and seaweed (at Ukedo and Tomioka fishing ports) is also conducted.

【NRA】

- : Sampling points for tritium in seawater

【TEPCO】

- ▲ : Main sampling points for tritium in seawater

【Fukushima Pref】

- : Sampling points for tritium in seawater

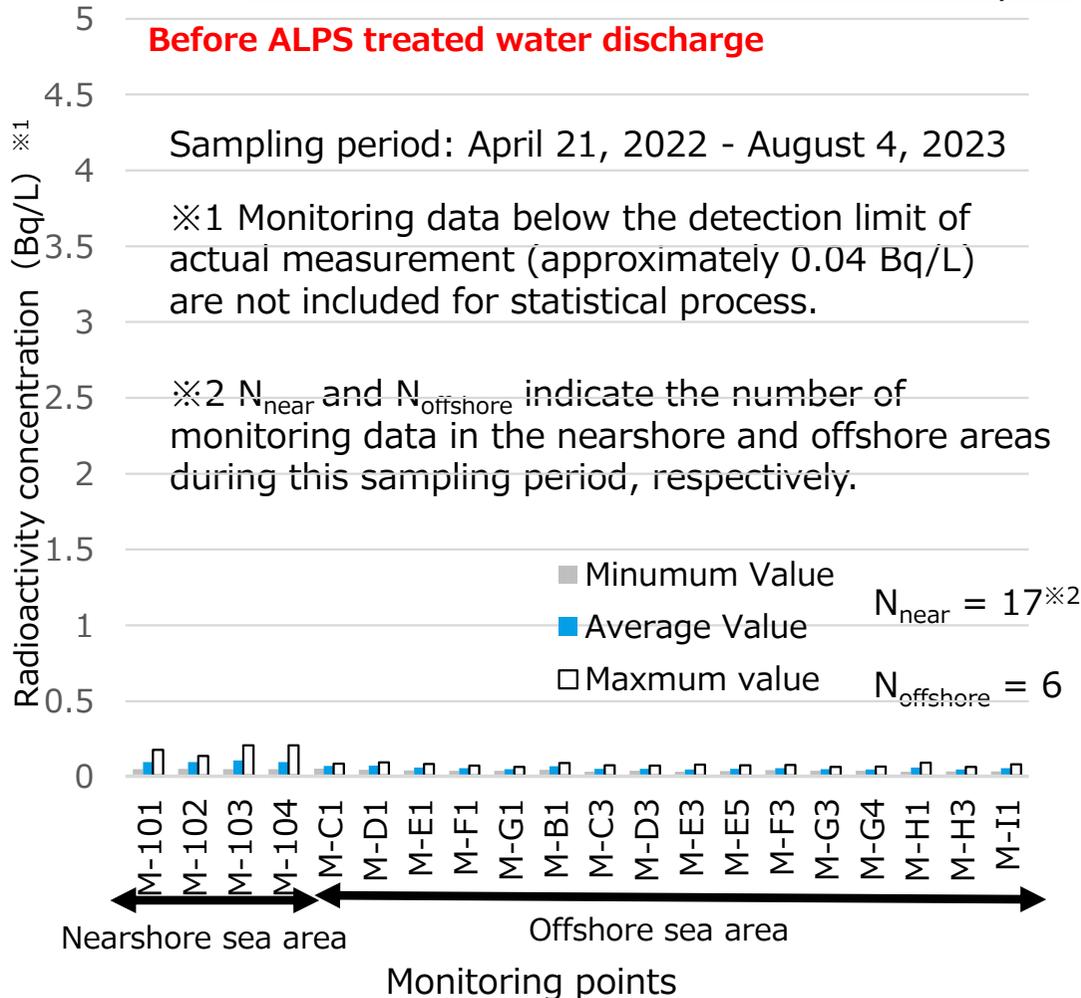
【FAJ】

- : Sampling points for tritium rapid analysis in fishery products

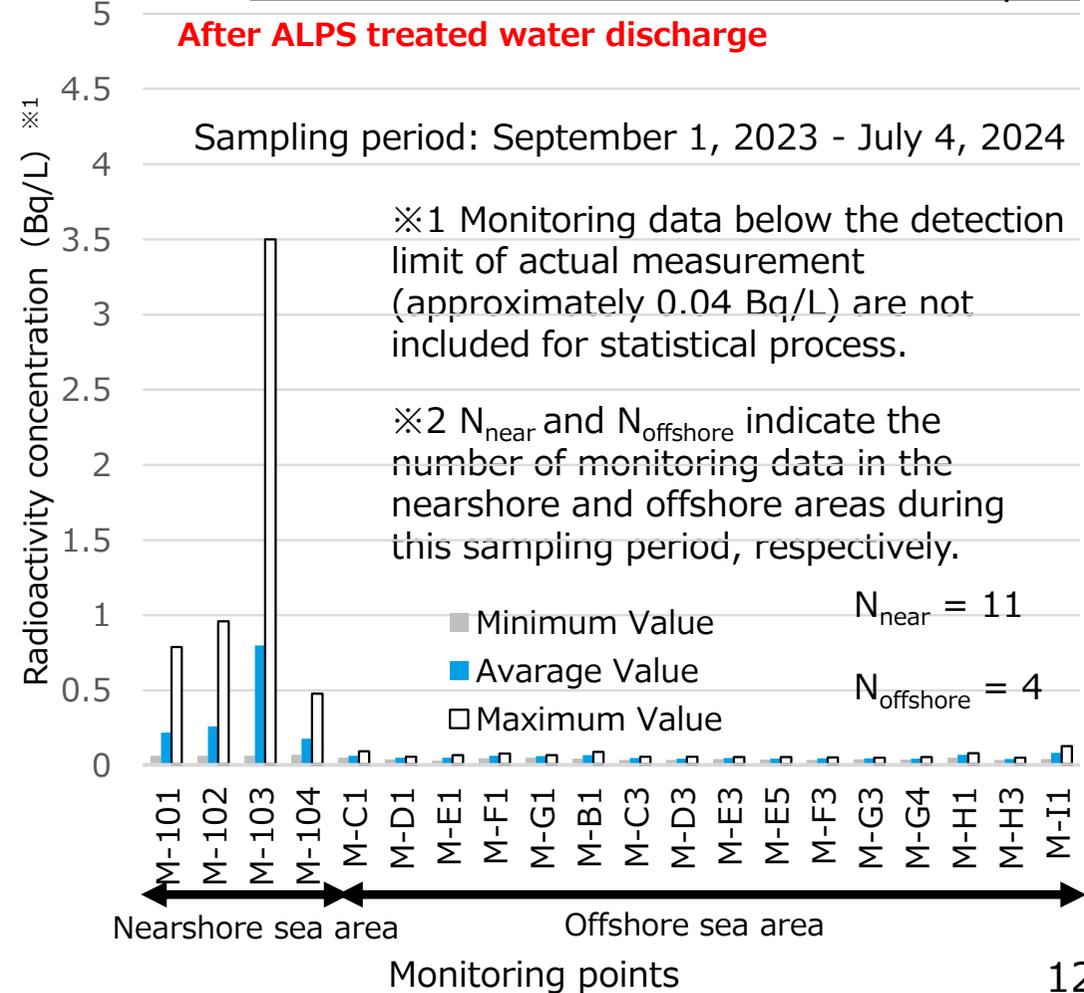
Tritium concentration in seawater samples at each monitoring point conducted by NRA before and after ALPS treated water discharge to the sea

- After the start of the ALPS treated water discharge, a slight increase in tritium concentration was observed at monitoring points in the nearshore sea area.
- The tritium concentration level at monitoring points in the offshore area were no change to compare with that of before the ALPS treated water discharge.
- After the start of discharge of ALPS treated water, the concentration is sufficiently low, approximately 1/10,000 of the regulatory concentration limit(60,000 Bq/L)to compared with maximum value and is not at a level that would affect people and/or the environment.

(Linear Scale) Tritium concentration in seawater samples



(Linear Scale) Tritium concentration in seawater samples



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- **Inter-laboratory Comparison conducted jointly with the IAEA**
 - Documentation of ILC procedures in English
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Inter-laboratory Comparison conducted jointly with the IAEA

- The IAEA has conducted **Inter-Laboratory Comparison (ILC)** as an effort to improve the international credibility and transparency of Sea Area Monitoring data.

ILC: The IAEA and Japan have organized annual joint sampling, and each analytical laboratory has individually conducted analyses to compare and evaluate the results.

- IAEA Marine Environment Laboratories and the Government of Japan (and related organizations) have also collaborated on monitoring of the surrounding seas around the TEPCO's Fukushima Daiichi NPS, focusing on the ILC. (Phase 1: 2014-2016, Phase 2: 2017-June 2021, Phase 3: July 2021-June 2023, Phase 4: July 2023-June 2024, Phase 5: July 2024- June 2025).

- The IAEA has also conducted a separate ILC since 2022 to corroborate the results of Sea Area Monitoring in Japan as part of the IAEA Review of Safety Related Aspects of Handling ALPS Treated Water at TEPCO's FDNPS.

- From 7 - 14 Nov, 2022, in addition to experts from the IAEA Marine Environment Laboratories, ones from analytical laboratories in Finland and Republic of Korea, which are members of ALMERA (Analytical Laboratories for the Measurement of Environmental Radioactivity), also visited Japan to confirm sample collection and pretreatment from the viewpoint of further improving transparency in this project.

In the IAEA report 2022 published in January 2024, the IAEA highly evaluated the continued high accuracy and competence of Japanese analytical laboratories that have been participating in the Comprehensive Radiation Monitoring Plan.

- ※ IAEA ILC Report : https://www.iaea.org/sites/default/files/1st_ilc_marine_monitoring.pdf

- From 16 -23 Oct, 2023, experts from the IAEA Marine Environment Laboratories as well as ones from analytical laboratories in Canada, China, and Republic of Korea also visited Japan to conduct marine samples collection and confirmation of pretreatment. IAEA is currently formulating this report.

- Experts from IAEA and analytical laboratories in Switzerland, China, and Republic of Korea visited Japan from October 7 to 15, 2024, to conduct verification of sample collection and pretreatment.

Seawater sampling



Members (7th Oct, 2024)



Documentation of ILC procedures in English



- The establishment of documentation on the ILC procedures we have implemented will be of global significance and will be known to IAEA experts and many overseas stakeholders..
- NRA believes that it could provide the IAEA with a tool for more reliable verification of collaboration.
- This documentation will cover the field of the rest in the future: marine biota and fishery products.

The Series of Environmental Radioactivity Measuring Methods

Method for sampling of Environmental Materials

Outline: This guideline was compiled that sampling and pretreatment of seawater(Chart Chapter I), marine sediment(Chapter II), marine biota(Chapter III) and sample distribution methods(Chapter IV) basically, equivalent to the Series of Environmental Radioactivity Measuring Methods. (No.16 Method for sampling of Environmental Materials)¹⁾.

I. Seawater

Collection by pump (point collection)

- 1) Fit a water sampling hose to the water inlet of the pump and tighten the hose band or wire.
- 2) Tighten with a hose band or a wire. Attach a 2m hose to the discharge port. Attach a 2 m hose to the discharge port.
- 3) Tie a weight of about 3-20 kg to the end of the hose on the suction side with a rope.
- 4) For submersible pumps, attach the hose to the discharge port and tighten the hose band or wire to prevent it from falling off.
- 5) Tighten the hose with a hose band or a wire to prevent it from falling off.
- 6) After the vessel has stopped, start the pumping pump, and then insert the hose into the sea.

Implementation procedure of sampling and pretreatment in seawater, marine sediment, and marine biota for IAEA interlaboratory comparison (ILC) 2024 Draft

Outline: This guideline was compiled that sampling and pretreatment of seawater(Chart Chapter I), marine sediment(Chapter II), marine biota(Chapter III) and sample distribution methods(Chapter IV) basically, equivalent to the Series of Environmental Radioactivity Measuring Methods. (No.16 Method for sampling of Environmental Materials)¹⁾.

I. Seawater

- 1) According to the method determined in coordination with the IAEA, the samples were processed as necessary.
 - 2) The seawater at IAEA ILC was collected in large plastic containers (400L tanks) by pumping. (Fig.1)
 - 3) The seawater was collected by pumping into a large plastic container (400L tanks) and transferred into a sample container (Cubitainer*).
 - 4) According to the sample codes given from IAEA specialists and Japanese supervisors, the samples were collected in large plastic containers (400L tanks) and transferred to the sample containers (cubitieres).
 - 5) According to the suggestions shown from IAEA specialists and Japanese supervisors, the samples were divided.
- * These are used for tritium.

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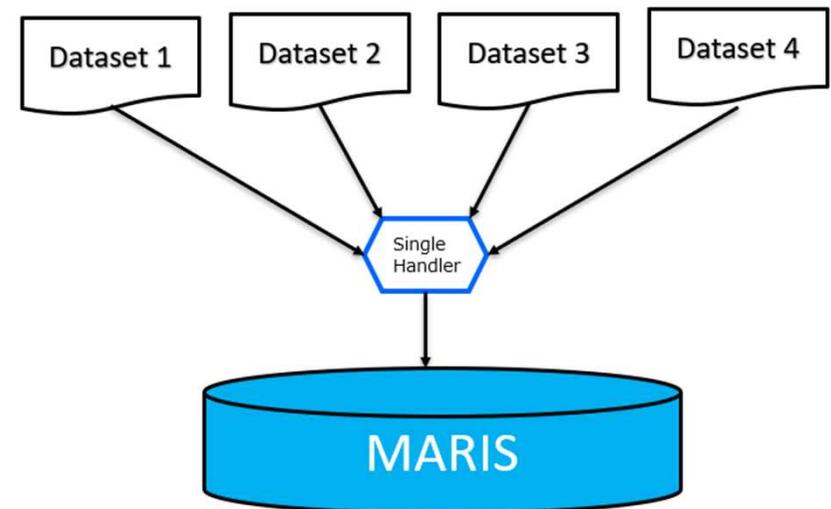
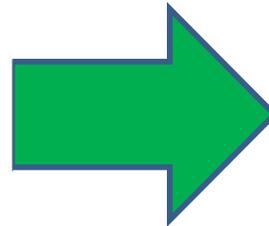
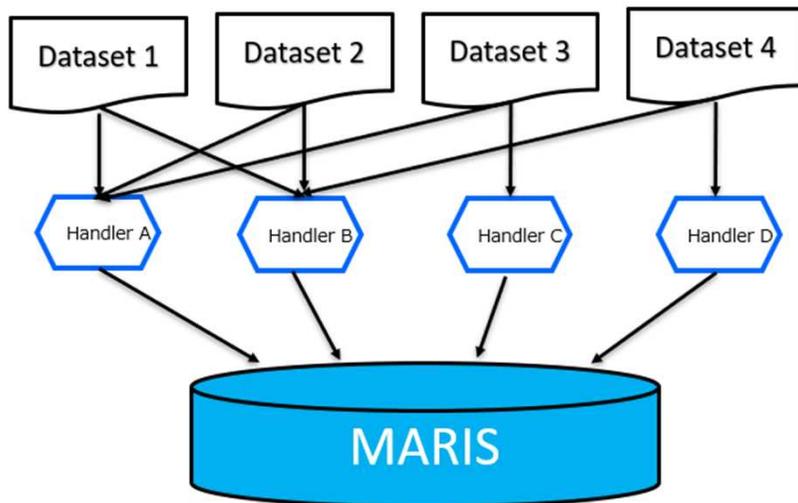
Consideration status for Integration of Sea Area Monitoring Data(1 of 2)



Further integration of information systems with respect to sea area monitoring data in Japan

Based on IAEA Task Force members' comments from the previous Review mission, **The IAEA Task Force recognizes that Government of Japan still needs to integrate up-to-date monitoring data.**

*The Information system: Each ministry, TEPCO, etc. have established databases (DBs) according to their own purposes, databases (DBs) and let the information available to the public on their websites.



➤ IAEA collects and publishes data from DBs all over the world including Japanese monitoring data.

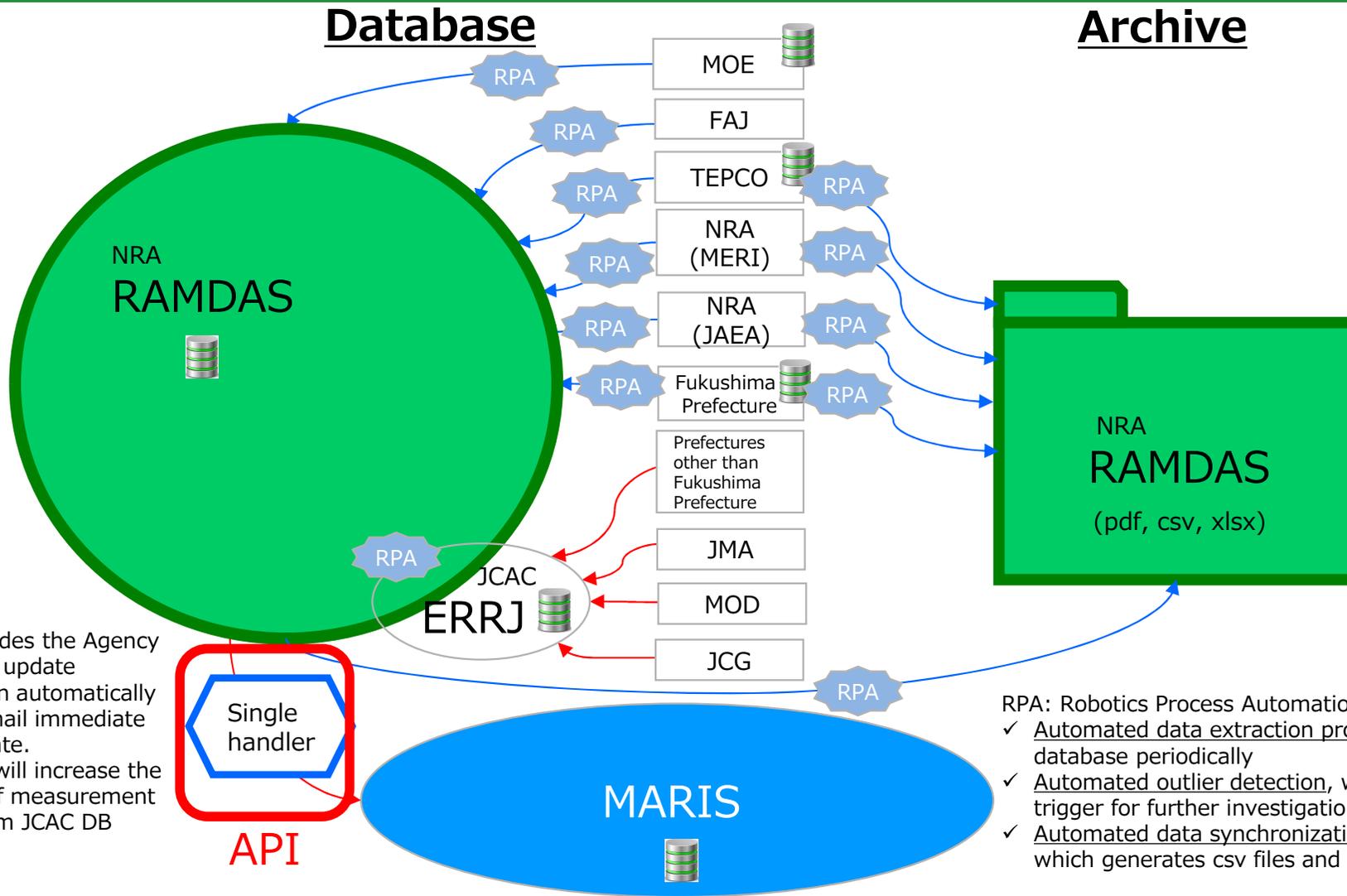
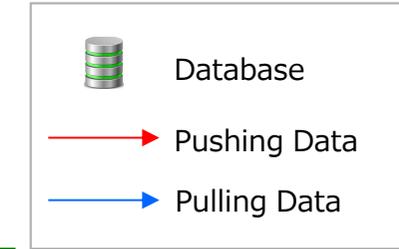
➤ NRA considers to **integrate the information of each DB** in the portal site of the RAMDAS with an interface that is highly compatible with the IAEA's next-generation DB.



NRA will continue to consider the integration of information through our portal site with related agencies.

Consideration for integration of Sea Area Monitoring Data(2 of 2)

Near Future
As of 1st April 2027



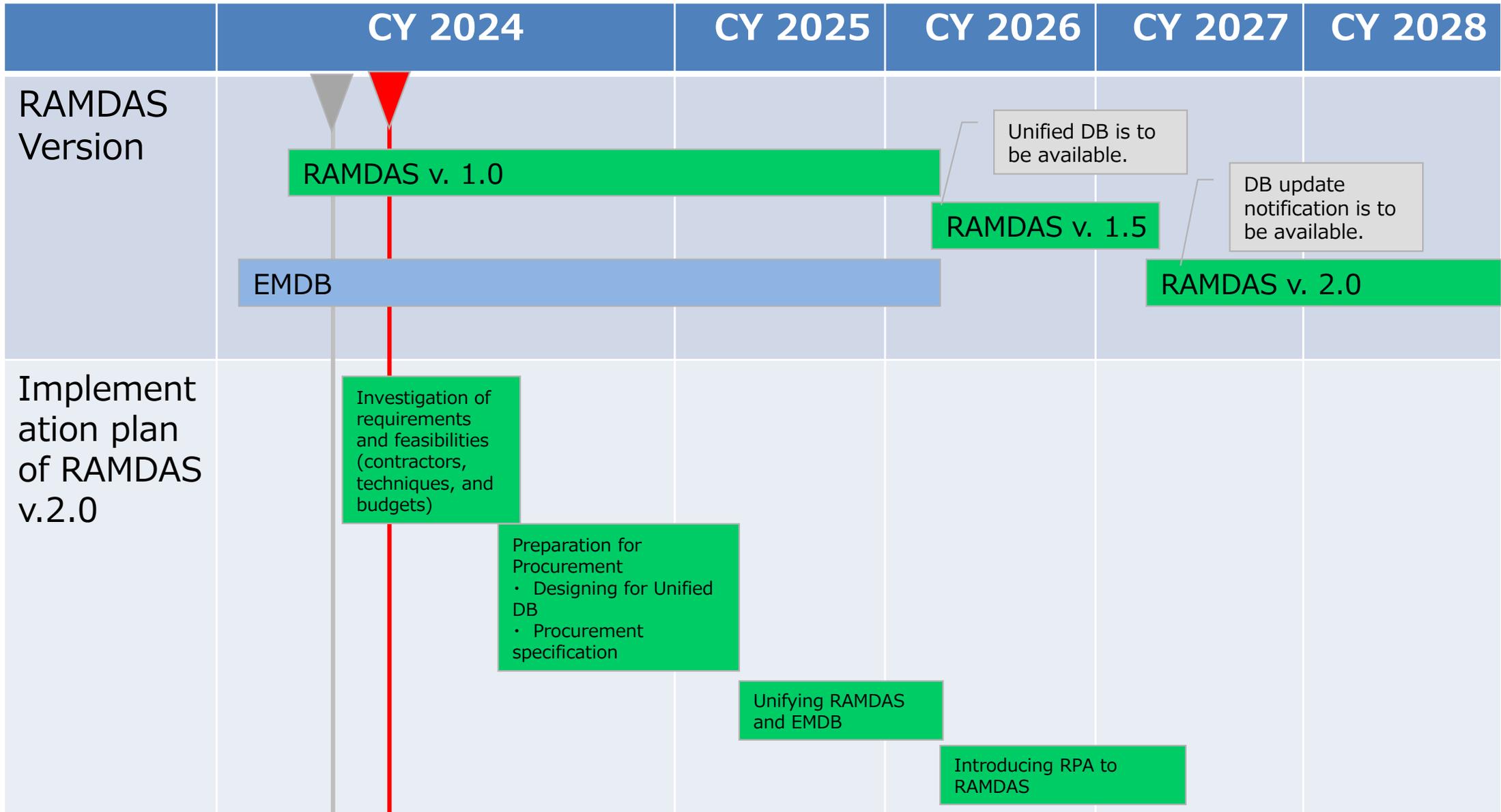
- RPA: Robotics Process Automation
- ✓ Automated data extraction process, which feeds data to database periodically
 - ✓ Automated outlier detection, which gives alert to NRA as a trigger for further investigation
 - ✓ Automated data synchronization between DB and Archive, which generates csv files and sends them to archive

- ✓ NRA provides the Agency with a DB update notification automatically through email immediately after update.
- ✓ RAMDAS will increase the number of measurement points from JCAC DB (ERRJ).

- We can provide data in CSV files, but there may be another effective way of providing data. The idea is to create an **Application Programming Interface (API)** for the database and have the IAEA make API calls. In that case, there is no need to save the data in a file on RAMDAS data server. The IAEA can retrieve the data by calling the API whenever the IAEA needs it.
- If we provide a CSV file, we need to adjust the freshness of the data and create the CSV file in batches, and the data will inevitably be outdated. For this reason, we say that we can also provide the database as is.

Project Schedule

Table 4



 NRA would like to help reduce the effort and burden of consolidating worldwide marine monitoring data through our initiatives.