

NRA presentation

D-1 Regulatory aspects on source monitoring

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IAEA Regulatory Review Mission on ALPS Treated Water Handling

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1. NRA's review on TEPCO's Source Monitoring program
 - 1-1 TEPCO's plan for Source Monitoring
 - 1-2 TEPCO's Quality Management for analysis work
2. NRA's verifications by regulatory inspections
3. Analysis of nuclides in ALPS treated water conducted by the NRA independently



1. NRA's review on TEPCO's Source Monitoring program

- NRA reviews whether the TEPCO's Source Monitoring program (plans and systems of analysis of ALPS treated water) described in the Implementation Plan conforms to the regulatory requirements*1.
- In the review, NRA judge the appropriateness whether the monitoring program will be conducted based on the quality management system established in the Implementation Plan according to the relevant ordinances*2, which has been approved by the NRA.

*1 **Items required for Measures which should be taken at Fukushima Daiichi NPS in line with the Designation as the Specified Nuclear Facility**

- By taking appropriate measures such as operation management, maintenance management, radiation control, radioactive waste management, emergency measure and on-site and off-site environmental radiation monitoring, etc., "II. Items concerning Measures to be taken for Design and Facilities" shall be ensured to be appropriately and reliably implemented, and workers' and on-site and off-site safety shall be ensured...

*2 **NRA Ordinance for Fukushima Daiichi NPS NRA Ordinance for Quality Control**

- Licensee shall plan, implement, evaluate and improve the operational safety based on the quality management system



1-1 TEPCO's plan for Source Monitoring program

Outline of TEPCO's plan for source monitoring

- Analytical facilities
 - Chemical analysis building, Unit 5 & 6 analysis room, etc. in the Fukushima Daiichi NPS site

- Organization



- Monitoring procedures in the operation of discharge
 - TEPCO will sample every batch* before discharge
 - * Approximately 10,000 m³ (Ten tanks of 1,000 m³)
 - The analysis of the sample will take 2 months.
- Target nuclides to be monitored
 - Determined after the source term is identified



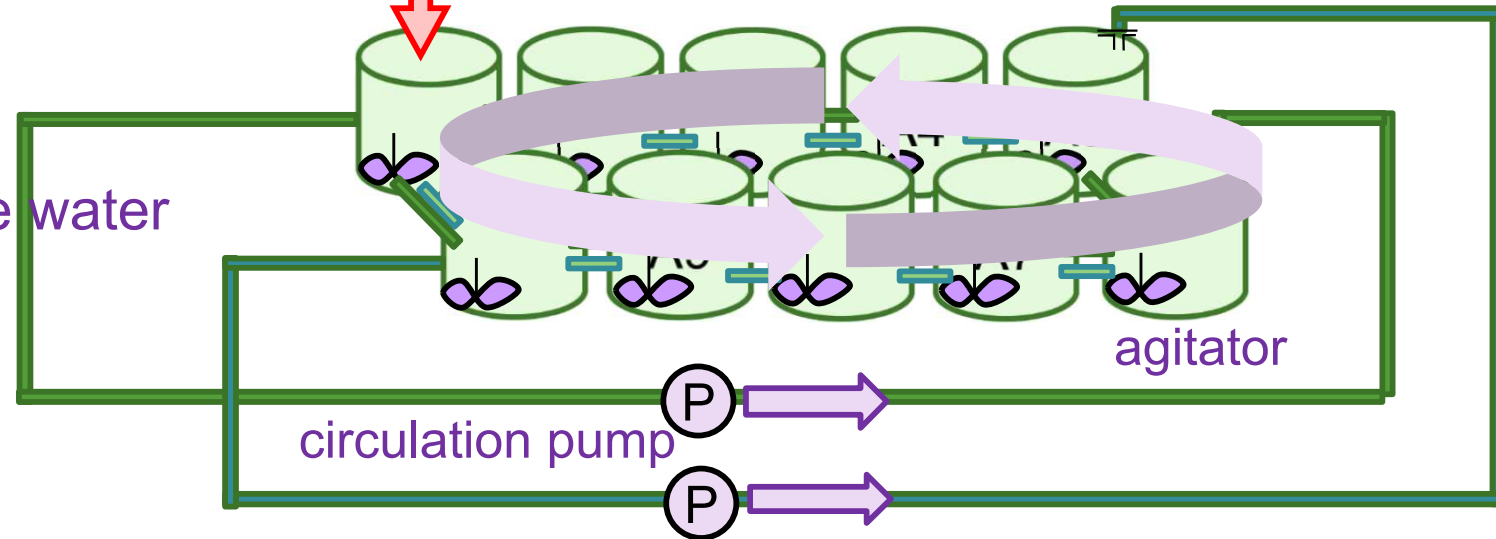
1-1 TEPCO's plan for Source Monitoring program

Procedures of discharge operation

① receive ALPS treated water

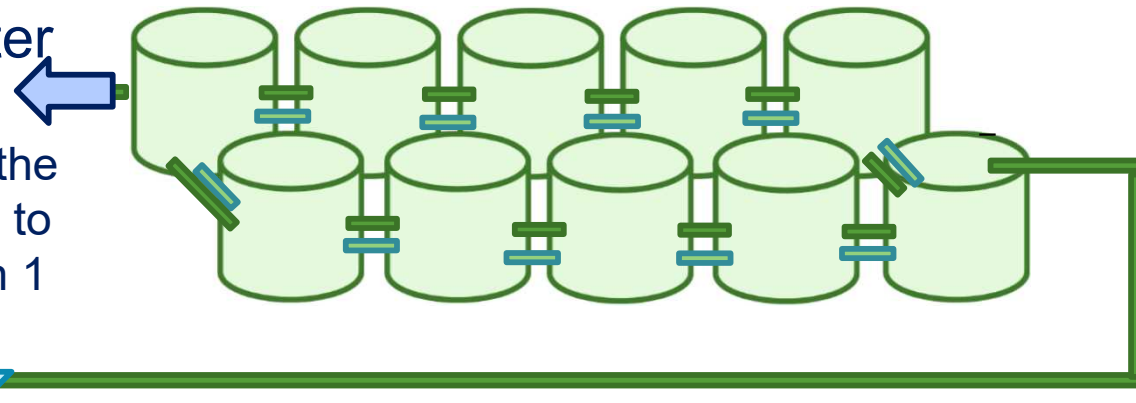


② circulate and agitate the water



③ sample and analyze ALPS treated water

- ✓ TEPCO measures the concentration of **H-3**
- ✓ TEPCO confirms that the sum of the ratios of the concentration of radionuclides **other than H-3** to each regulatory concentration limit is less than 1



④ transfer ALPS treated water for discharge



TEPCO's Specific measures on quality control

- TEPCO requires **the contractor**;
 - Quality control (ISO9001, ISO/IEC17025 accreditation) =>①
 - Securing human resources and competence of analysts and sampling staffs =>③
 - Establishing and revising of sampling & analysis procedures
 - Conducting sampling and analysis etc.
- Based on the QMS, **TEPCO conducts**;
 - Operation and maintenance of analytical facilities and instruments (including analytical environments) =>②
 - Showing analysis condition to the contractor
 - Competence control of analysts (the contractor) & supervisors (TEPCO staffs)
 - Supervising analysis works
 - Evaluation of analytical result data and handling of non-conforming etc.

1-2 TEPCO's Quality Management of analysis work



① Quality control of the contractor

TEPCO explains that the contractor secures the quality by:

- accreditation for analysis of Cs-134/137 and H-3 which are already obtained.
- Conducting equivalent level analysis as ISO/IEC-17025 for other nuclides
- Obtaining ISO/IEC-17025 accreditation for analysis of Sr-90 in the future.



➤ NRA understands that the quality of analysis will be ensured appropriately.

Materials of TEPCO after this pages are shown in 8th Review Meeting of ALPS treated water. 6
https://www.tepco.co.jp/en/hd/decommission/information/committee/pdf/2022/alps_22020701-e.pdf

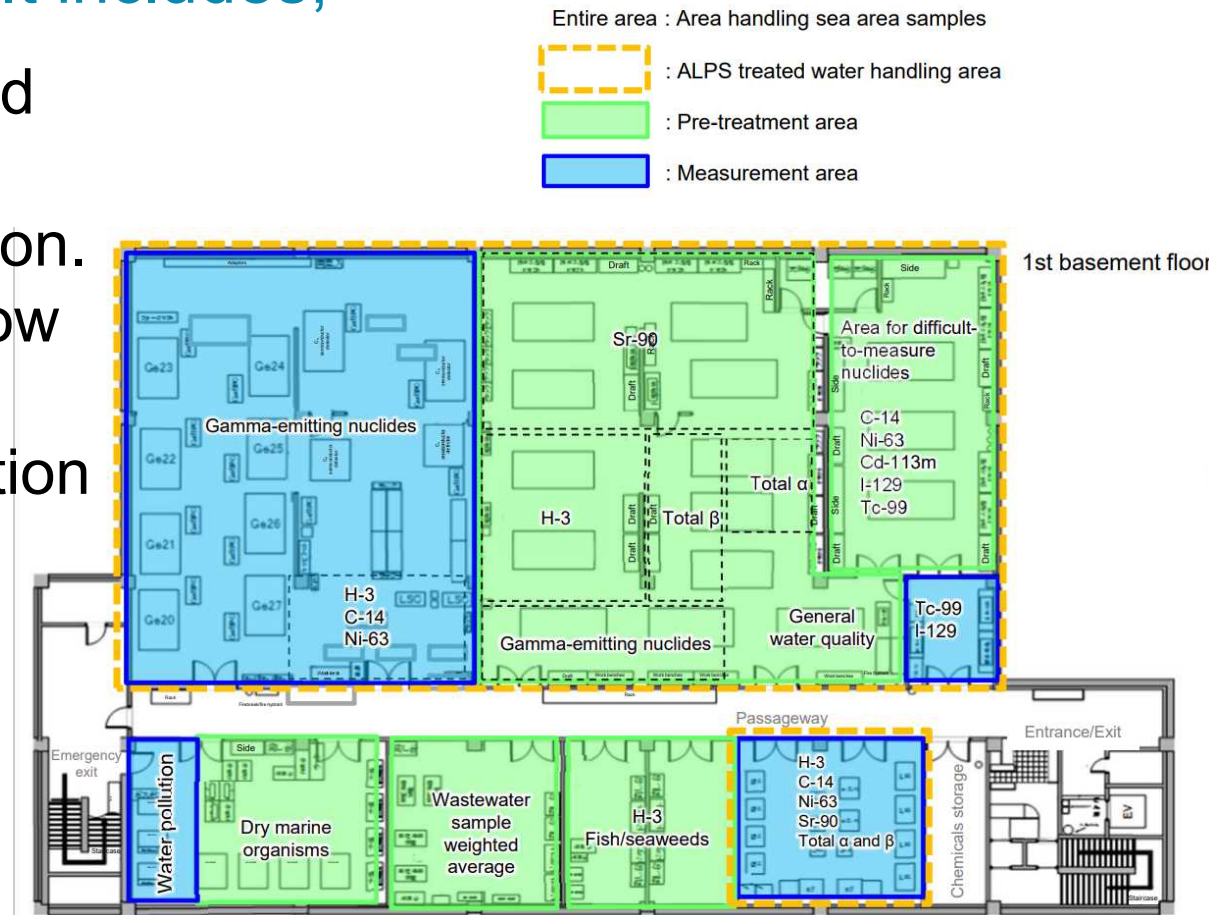
1-2 TEPCO's Quality Management of analysis work



② Analytical facilities and environments

TEPCO plans to conduct nuclide analysis of ALPS treated water in Chemical Analysis Building. It includes;

- Measurements to be conducted in basement floor not to be affected by atmosphere radiation.
- Limiting handling samples to low radioactivity.
- Periodical check of contamination level of the analytical environments and decontamination.
- Expanding the building in the future.



➤ NRA understands that the facilities and environments are maintained for the analysis of ALPS treated water



③ Competence of analysts

The Contractor secure and maintain the competence of analysts:

- High skilled analysts have been increased and they maintain competence so that they can analyze difficult nuclides to measure, such as C-14.
- Analysis skill tests have been conducted with domestic and overseas analysis institution in order to be assessed from a third-party perspective.
 - Proficiency Test Exercise (provided by IAEA)
- Checking the competence of analysts by using the preconditioned samples (nuclides for which ISO/IEC-17025 accreditation obtained)

TEPCO periodically check that the competence of analysts are properly secured and also maintain the competence of supervisors (TEPCO's staffs)

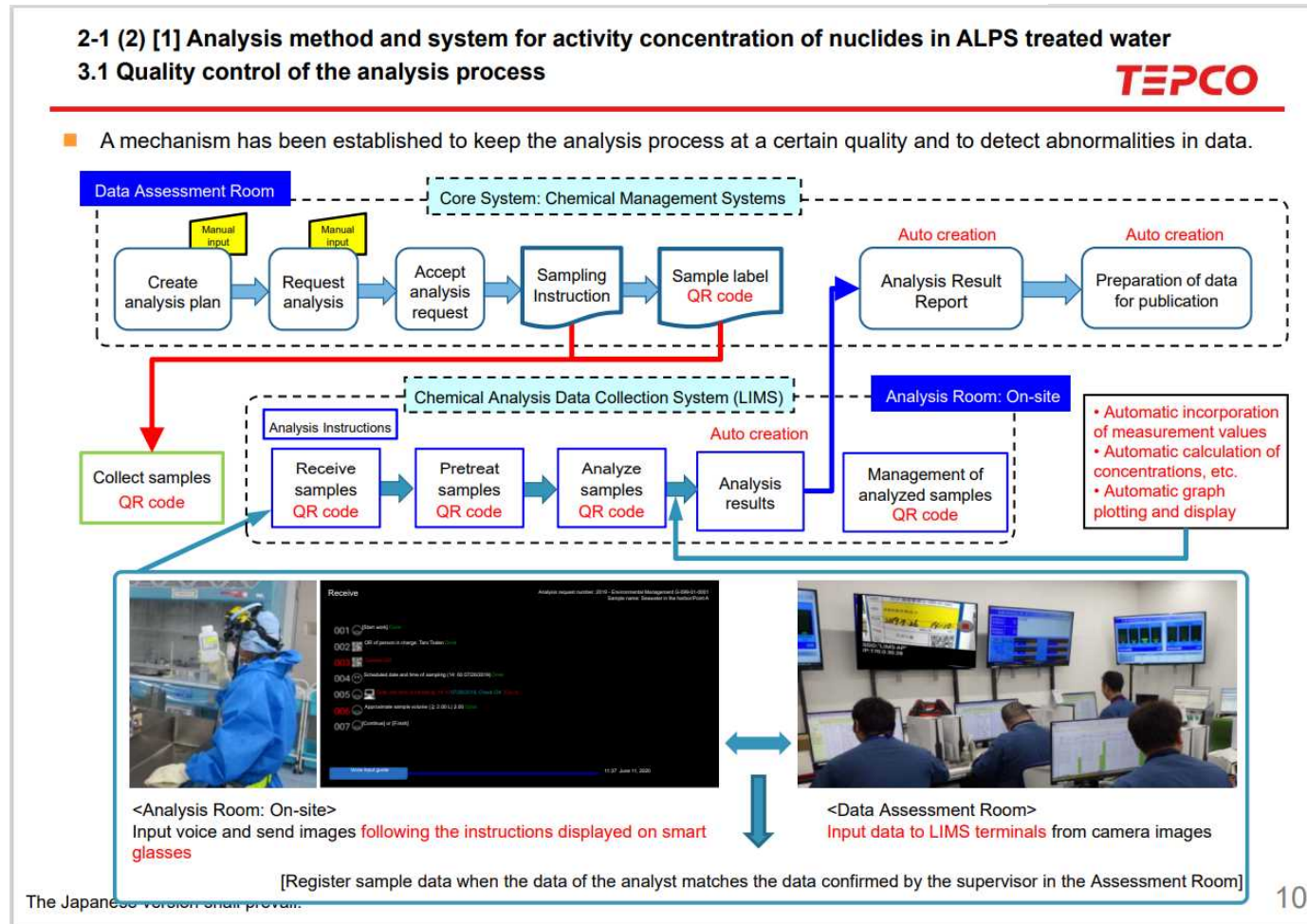
- NRA understands that there is a system to secure and maintain the competence of analyst.



1-2 TEPCO's Quality Management of analysis work

④ Process

TEPCO's plan for analytical procedures



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➤ NRA understands some processes are automated so that the quality is maintained stable and erroneous inputs are prevented.



④ Process

TEPCO's plan for devices used for reading analytical data

2-1 (2) [1] Analysis method and system for activity concentration of nuclides in ALPS treated water
3.2 Quality control of the analysis process

TEPCO

- Smart glasses are used as on-site control terminals of the Chemical Analysis Data Collection System (LIMS)

Camera

- Reads QR codes
- Sends video images

Headphones

Microphone

- Conversation with staff in the Assessment Room
- Respond to instructions given by the SG

Sharing sounds and images

Smart glasses: SG

- Display instructions
- Display analysis results
- Display trend graphs

Analysis

Check trend graph 1st Sample number CS

Deviation from AL Variation detected (1) Variation detected

Define (Good) Detection limit

Re-measurement

Back (Cam)

Work hold

Assessment Room

Voice input guide

Data Assessment Room (New Office Main Building)

Some troubles happened in the past such as handling wrong sample erroneously, mistranscription of sampling data, or variation of analysis result depending on each analyst, so prevention of errors and technique standardization of each analysts is important.

- NRA understands some devices to prevent human errors will be installed in the analytical process.



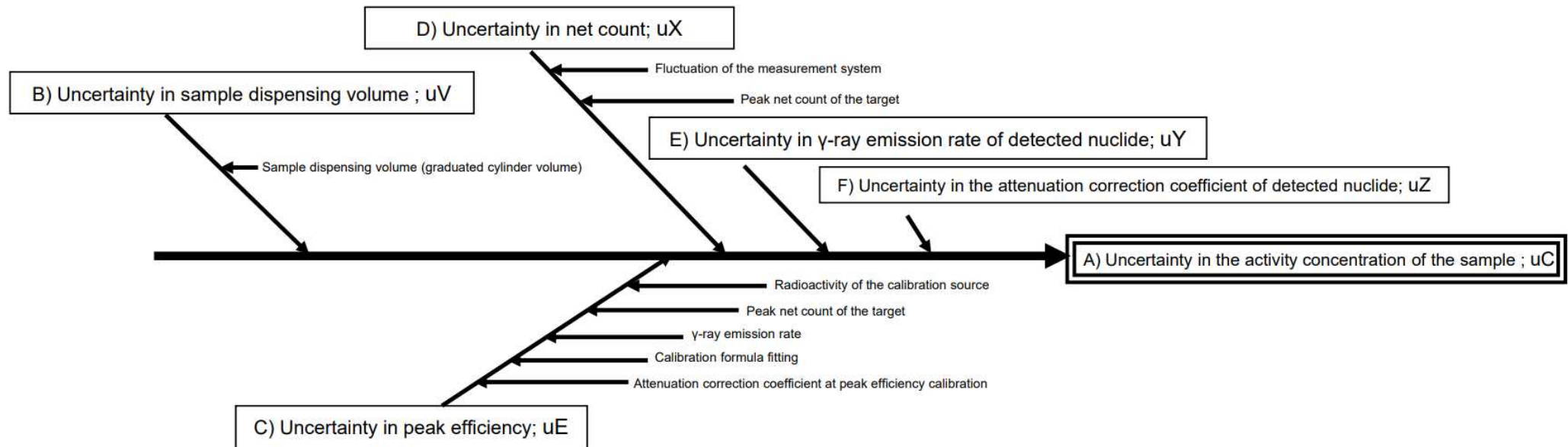
④ Process

• Consideration on Uncertainties

TEPCO characterize uncertainties from;

- sample dispensing volume amounts
- calibration of analytical instruments
- measurement environments or preprocessing etc.

and evaluate the total variation of nuclide analysis results.



➤ NRA understands that each contribution factors to uncertainties are characterized and considered appropriately.1



1-2 TEPCO's Quality Management of analysis work

⑤ Verification of analysis results

TEPCO will adopt new methods in nuclides analysis as well as conventional methods and verify analysis results by;

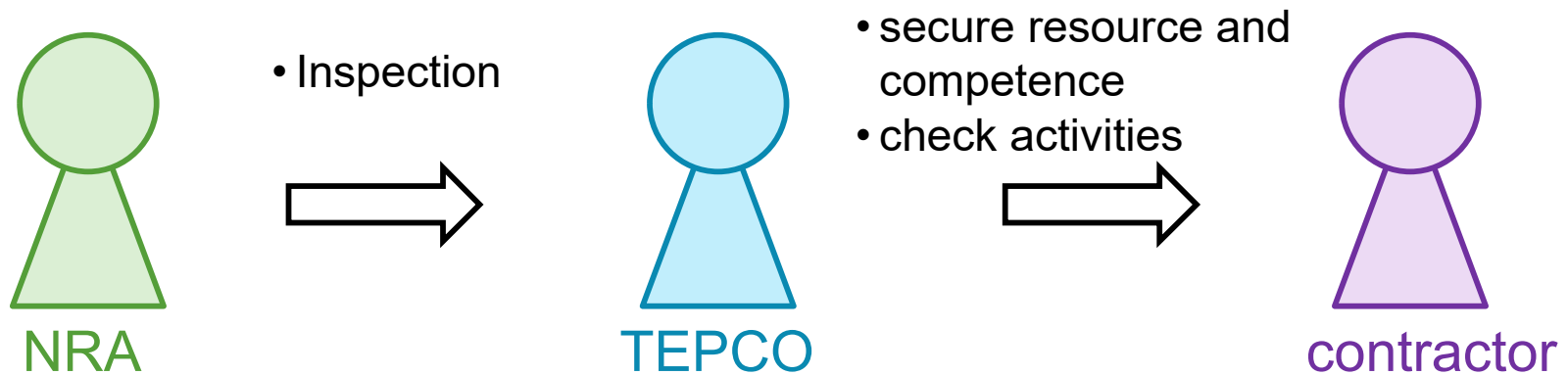
- Confirmation of accuracy by using reference source material in preprocessing process
- Comparing the result data with institution below;

Organization	Accreditation	Accreditation obtained (17025)
KAKEN	ISO/IEC17025	Cs-134,Cs-137 I-131 Sr-90 H-3
Japan Chemical Analysis Center	ISO/IEC17025 ISO9001	Gamma-emitting nuclides H-3 Radioactive strontium Plutonium, etc.
Tohoku Ryokka Kankyohozen	ISO/IEC17025 ISO9001	Cs-134,Cs-137 I-131 H-3



2. NRA's verifications by regulatory inspections

- NRA will ensure the quality of monitoring by checking the record in regulatory inspections.



- NRA will also verify the TEPCO's source monitoring through NRA's own periodical analysis on major nuclides in ALPS treated water.



3. Analysis of nuclides in ALPS treated water conducted by the NRA independently

The NRA explain nuclides characterization activities in ALPS treated water conducted by the NRA in other section.

- Section C
- Topic 3 "Verification/acceptability of source term characterization"



Reference Materials

GSR Part3

3.37. . . . The regulatory body shall be responsible for review and approval of the monitoring and measurement programmes of registrants and licensees.

Requirement 32: Monitoring and reporting

The regulatory body and relevant parties shall ensure that programmes for Source monitoring and environmental monitoring are in place and that the Results from the monitoring are recorded and are made available.

3.135. The regulatory body shall be responsible, as appropriate, for:
(c) Making provision for an independent monitoring programme.

RS-G-1.8

Monitoring in the operational stage

Source monitoring

5.17. The design of the source monitoring programme should be such as to enable the verification of compliance with the authorized limits on discharges and the criteria for discharges specified by the regulatory body. The monitoring of radioactive discharges may entail measurements for specific radionuclides or gross activity measurements, as appropriate.

Measurements should normally be carried out before dilution occurs or at the point of discharge (e.g. at the stack for atmospheric discharges or the discharge pipeline for a liquid discharge). In the case of batch discharges, the material for discharge is adequately characterized by the volume of the batch and the radionuclide composition of a sample taken at the reservoir from the homogenized batch prior to discharge.



TEPCO's Quality Management System in the Implementation Plan

The Implementation Plan

Ⅲ Operational Safety of the Specified Nuclear Facility

Volume No.3 Operational Safety pertaining Unit 1, 2,3 & 4

Chapter2 Quality Assurance

Article3 Quality Assurance Plan

TEPCO establish a quality assurance plan as below in the implementation of quality assurance activities for operational safety activities.

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7.4.2 Requirements for Procurement

- a) products, workflow and its process, and approval of facilities
- b) Competence of staffs
- c) Quality management system
- d) Non-conforming report and response