Regulatory Operating Experience Feedback Program for Nuclear Power Plants in Japan

Session 6: Operating Experience – Completing the Learning Cycle

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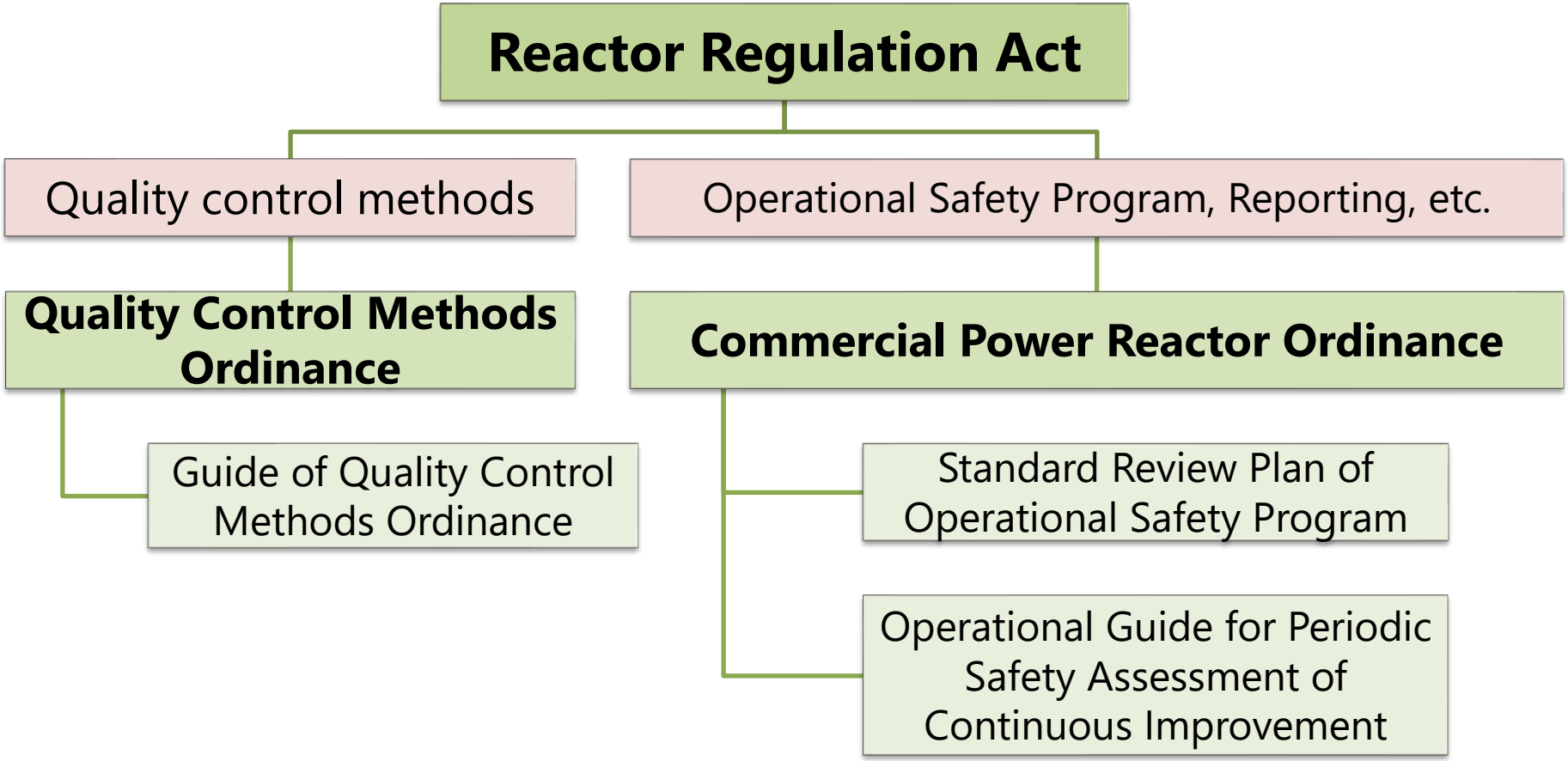
Regulatory Requirements for OE Feedback Overview



Quality Control Methods Ordinance (1/3)

- Preventive Measures
  - Article 53: A nuclear operator shall collect knowledge and operating experience from its own and other nuclear facilities. It shall take appropriate preventive measures in accordance with the following, depending on the significance of a possible nonconformity in its own organization.
    - (i) Investigate possible nonconformities and their causes.
    - (ii) Evaluate the need for corrective action.
    - (iii) Clarify and implement necessary corrective actions.
- Guide of Quality Control Methods Ordinance
  - Article 53 (Preventive measures)
    - The "possible nonconformity in one's own organization" includes issues identified as a result of the possibility analysis that a nonconformity at a nuclear or non-nuclear facility may occur at one's own facility.

Commercial Power Reactor Ordinance (2/3)

- Operational Safety Programs (OSP)
  - Article 92: Operational Safety Programs shall be established with respect to the following items.
    - (19) Items concerning the sharing with other installations of technical information on safety obtained from those who have performed maintenance and inspection.
    - (20) Items concerning the disclosure of nonconformity information if a nonconformity has occurred.
- Reporting of accidents, failures, etc.
  - Article 134: When any of the following events occurs, a licensee shall immediately report the situation and the measures/actions taken to NRA.
    - (2) Reactor trip or power reduction due to a failure
    - (3) Non-compliance with the Technical Standards Ordinance
    - (4) Failure of an important to safety due to fire
    - (5) Limiting Condition for Operation (LCO)
    - (6) – (9) Abnormal release of radioactive materials

Commercial Power Reactor Ordinance (3/3)

- Standard Review Plan of Operational Safety Programs (OSP)
  - Sharing technical information on safety
    - Measures shall be established to share technical information on safety obtained from plant manufacturers and other operators who have performed maintenance and inspections, using information sharing forums for operators such as the Japan BWR Owners' Group and the Japan PWR Owners Group, and to improve the safety of their own nuclear facilities.
  - Disclosure of nonconformity information
    - The criteria for disclosure of information in the event of nonconformity shall be established from the viewpoint of improving the safety of nuclear facilities.
    - The necessary items for registration in the Nuclear Information Archives (NUCIA) shall be stipulated regarding the release of information.

Commercial Power Reactor Ordinance

- Operational Guide for Periodic Safety Assessment of Continuous Improvement
  - The latest scientific and technical knowledge
    - Collect and document the latest scientific and technical knowledge obtained, both domestic and international, that is judged to contribute to improving safety, including the following. Also explain the basis for the judgment.
      - Safety-related research to further improve the safety of facilities that are important for ensuring the safety of nuclear facilities
      - Lessons learned from the operating experience at domestic and international nuclear facilities
      - Data needed to perform probabilistic risk assessment
      - National and international standards including IAEA safety standards
      - Information on international organizations and national and international academia

Inspection Guide for Quality Management System Implementation

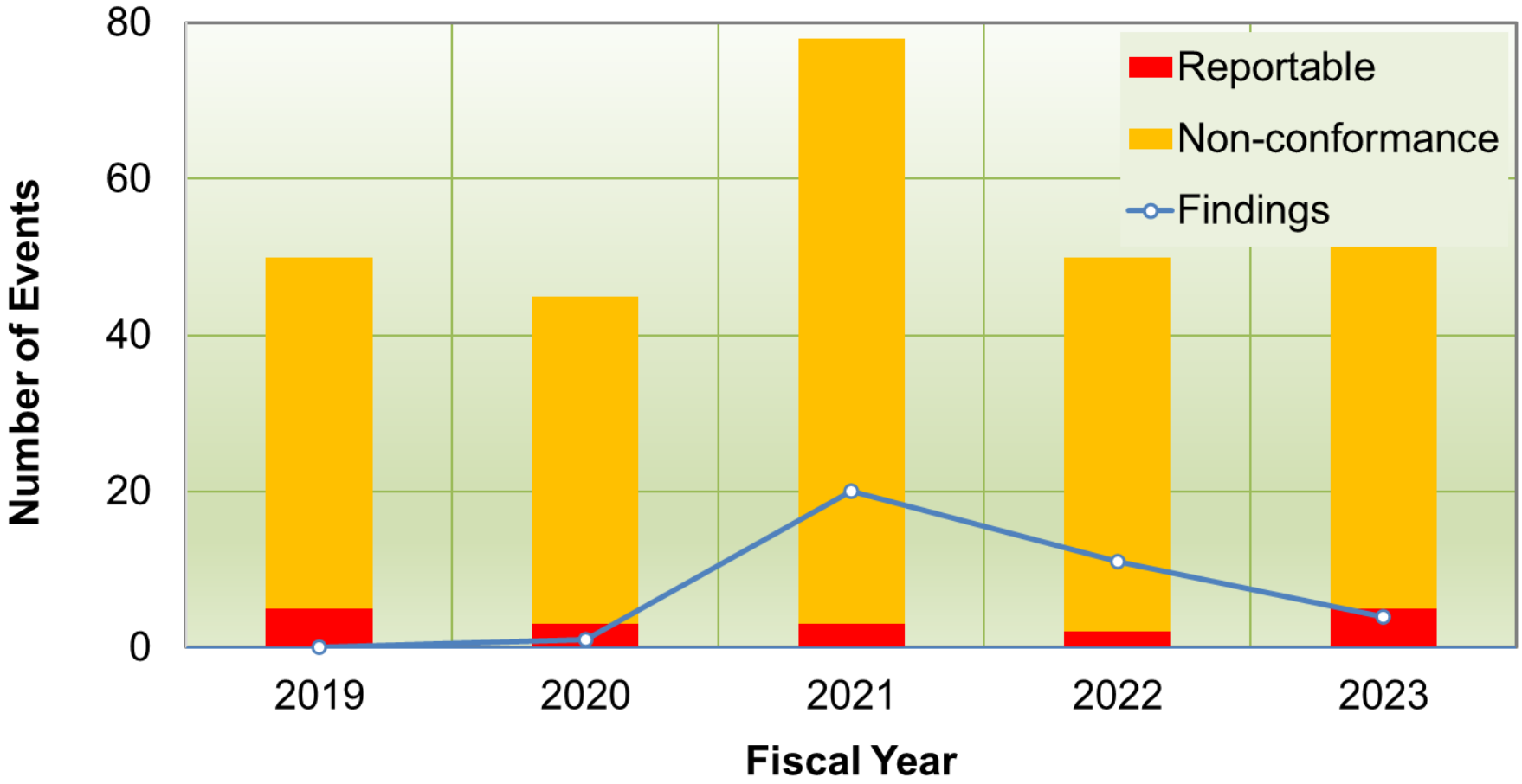
- Objective/Problem Identification and Resolution (PI&R)
  - To assess whether the licensee can effectively identify problems and prevent problematic events from occurring.
  - To assess whether the organization can perform the necessary tasks for improvement, such as correcting nonconformities and then implementing corrective actions to prevent the reoccurrence of such nonconformities.
- Specifically, to verify
  - Whether the licensee collects information such as NRA notices and findings, national and international operating experience, and NUCIA information.
  - Whether the licensee implements corrective actions that are appropriate to the degree of the problems that may occur in its own organization.

Inspection Guide for Maintenance Effectiveness

- Objective
  - To confirm the status of activities related to the evaluation of the effectiveness of maintenance in the nuclear facility management.
- Points of Attention
  - (10) Whether the technical evaluation is performed by appropriately combining information obtained from the maintenance activities, including the following:
    - a. Performance indicators compared to their target values,
    - b. Trends in maintenance data and long-term trends in equipment aging,
    - c. Operating experience, including troubleshooting,
    - d. Technical evaluation of extended aging and Periodical Safety Reviews,
    - e. Trouble and aging trend information from other nuclear facilities,
    - f. Risk information and the latest scientific findings.

Reporting and Inspection Findings
Trend in Safety Related Events and Inspection Findings

As of 2024-03-08



Sources (in Japanese): https://www.nsr.go.jp/activity/bousai/trouble/houkoku/index.html
http://www.nucia.jp/nucia/kn/KnTroubleSearch.do?reSearchFlg=1

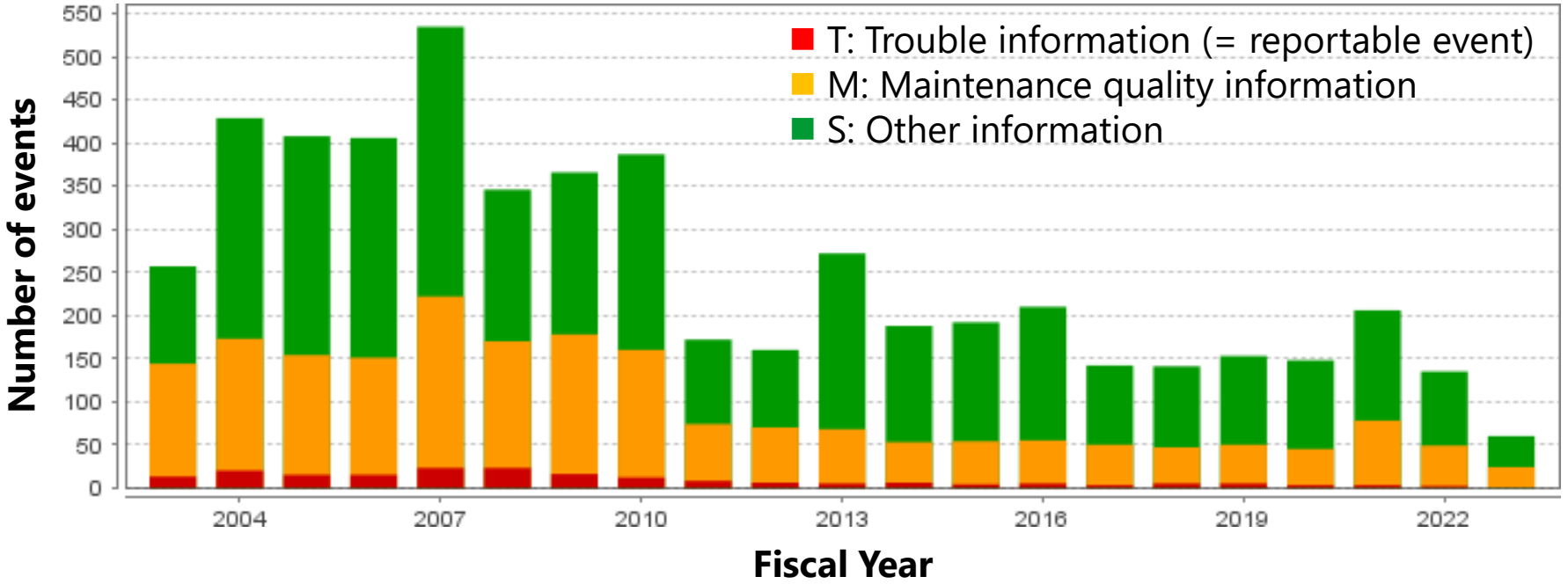
NRA, Japan
Nuclear Regulation Authority

Reportable Events in the Last 3 Years

Date	Event name	Unit (Type)	INES	IRS
2024-02-07	Leakage of water containing radioactive materials into the controlled area during cleaning of the cesium adsorption tower	Fukushima Daiichi site	TBD	TBD
2024-01-24	Controlled power reduction due to steam leakage from feedwater booster pump inlet piping	Takahama-1 (PWR)	TBD	TBD
2024-01-22	Damage to heat transfer tubes in steam generators	Takahama-4 (PWR)	TBD	TBD
2024-01-04	Partial loss of offsite power due to major earthquake at a nuclear power station	Shika-1/2 (BWR)	TBD	TBD
2023-10-17	Damage to heat transfer tubes in steam generators	Takahama-3 (PWR)	TBD	TBD
2023-01-30	Automatic reactor trip due to negative neutron flux rate in power range	Takahama-4 (PWR)	0	in progress
2022-07-08	Recurrence of heat transfer tube wear thinning of steam generators at twin units	Takahama-4 (PWR)	0	9175
2022-03-30		Takahama-3 (PWR)	0	
2021-08-04	Manual power reduction due to sea water leakage from a circulating water pump discharge line	Oi-3 (PWR)	0	9081
2021-07-19	Overflow of water containing radioactive materials from the top of temporary notch tanks for rubble	Fukushima Daiichi site	NA	TBD

Nuclear Information Archives (NUCIA)

- The database contains OE information from 1966 and are shared also by the public.
  - http://www.nucia.jp/index.html - (in Japanese)
  - Operators manages NUCIA cooperating with Japan Nuclear Safety Institute (JANSI), which drives initiatives for voluntary safety improvement as the self-regulatory organization in nuclear industry.



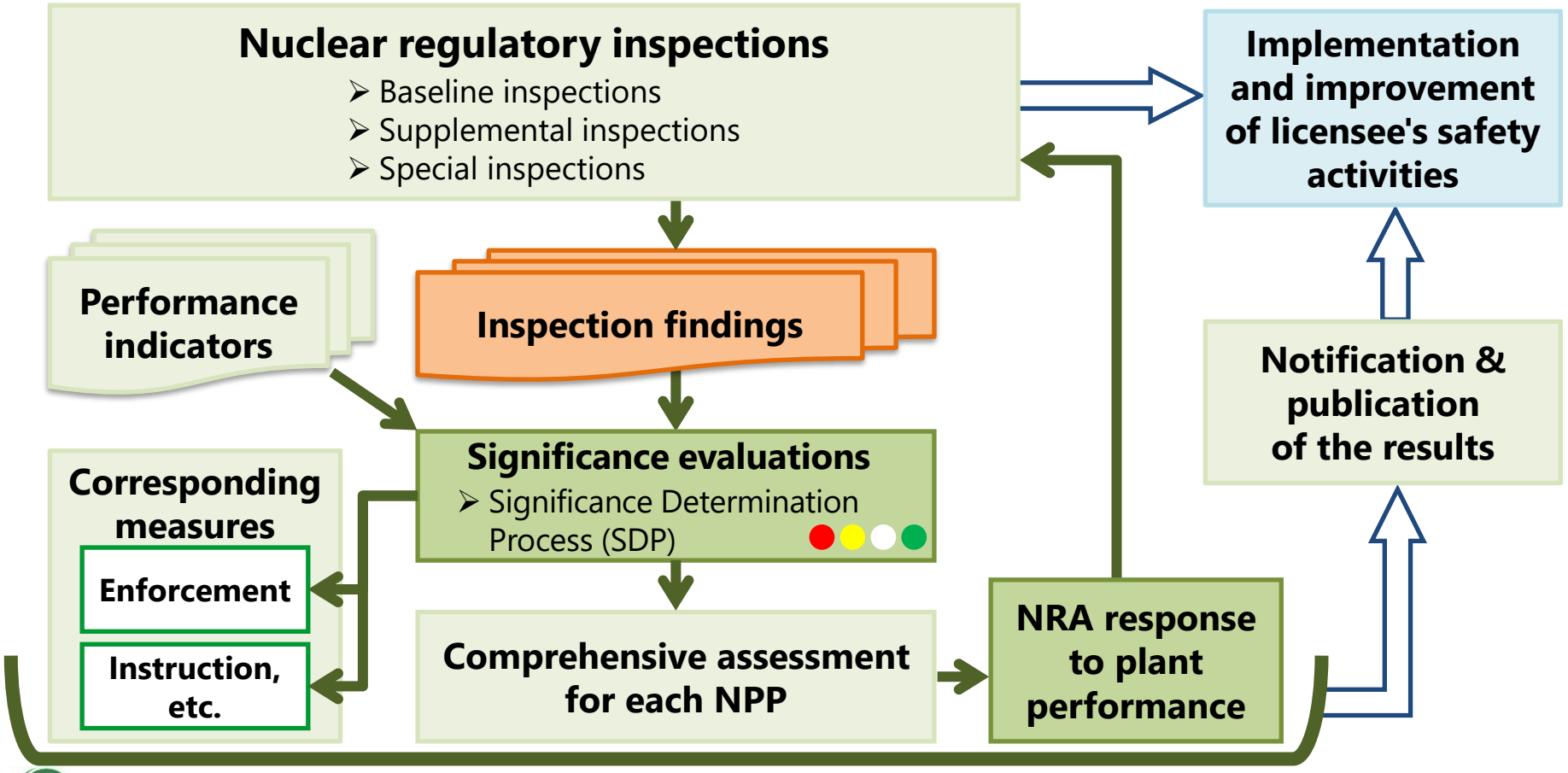
Sources (in Japanese): http://www.nucia.jp/nucia/kn/KnTroubleGraph.do

NUCIA
Reporting Exercise at JANSI's Annual OE Seminar

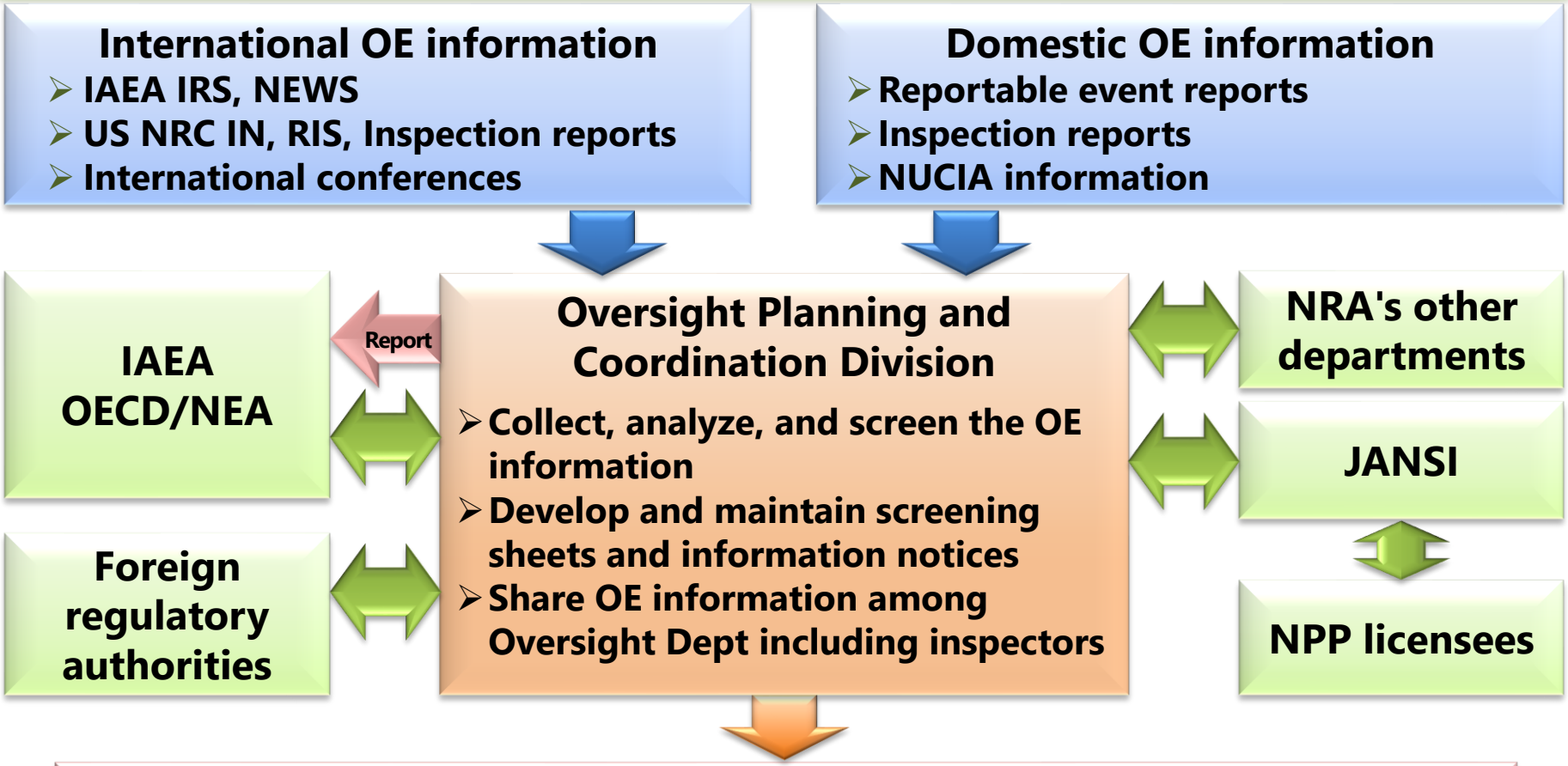
- Objective
  - To provide operators with the know-how to develop easy-to-understand NUCIA reports that contain sufficient information for other operators to evaluate the need for preventive action at their facility.
- Importance
  - High quality information must be shared to implement high quality preventive actions.
  - The importance of information sharing through NUCIA as a starting point for OE activities should be reaffirmed.
- Know-how
  - The logical structure from the event summary to the countermeasures section should be easy to understand.
  - The 5 W's and H should be clearly readable in the event summary.
  - Causes and countermeasures should be well paired.
  - Do not omit too much of the text.
  - Information that can be disclosed should be added as much as possible.
  - Existing procedures, rules and practices related to the event should be described.
  - The inclusion of drawings, diagrams, etc. is encouraged.

Inspection Findings

- NRA performs oversight on the licensee's safety activities through Nuclear Regulatory Inspection. If there are concerns in the activities, NRA identifies them as inspection findings, and conducts supplemental inspections based on their safety significance and severity level.



Screening, Regulatory Actions, and Sharing NRA Program Overview



Screening Results

As of 2024-03-08

Name	Screening out						In	N/S
	①	②	③	④	⑤	⑥		
NRC RIS	9	35	2	10	0	3	6	30
NRC GL	0	0	0	1	0	0	2	1
NRC BL	0	0	0	0	0	0	1	0
NRC IN	4	18	13	54	1	8	27	15
IRS	13	264	167	322	51	1	20	160
IRSRR	0	29	11	11	28	0	0	15
FINAS	2	32	12	17	4	0	1	73
Domestic	27	79	0	43	164	86	13	98
NEWS	1	9	4	3	11	0	1	4
Others	0	16	5	6	3	2	12	23
Total	56	482	214	469	262	100	83	419

Screening out criteria	
①	If the information is not related to nuclear facilities or nuclear safety.
②	If the failure is due to human performance, even if lessons learned are incorporated, they are limited to the scope of the operator's efforts.
③	If the event is caused by the SSCs and their design or operating conditions are different from those in Japan.
④	If the event was caused by the SSCs and action has already been taken in Japan, either by the regulator or the operator.
⑤	If the event is considered minor in the country, or if there is no significant information on causes or lessons learned.
⑥	If the information has already been addressed by other parties within the NRA.

Recent Actions Taken from OE Information

- Regulation revision and follow-up
  - NRC Bulletin 2012-01: Design vulnerability in electric power system
  - Domestic event, etc.: High Energy Arc Fault (HEAF)
- Issuance of generic letter requiring written response from licensees
  - Notice from French regulator: Carbon content anomalies in large forged components
- Hearing on licensee's response via public meeting
  - NRC Information Notice 2010-11: Potential for steam voiding causing residual heat removal system inoperability
- Issuance of NRA Information Notice (NIN)
  - US OE related to postfire safe shutdown performance at NPPs
  - OECD/NEA WG report and IRS8468 on capacity degradation of safety related batteries for stationary application

Recent Examples of OE Information Sharing (1/2)

- Quarterly Inspector Meeting (Q4: 2024-03-14)
  - EDG failures and nonconformance
    - IR317/2023050: White finding on Calvert Cliff 1 EDG failure
    - IR348/2023091: White finding on Farley 1 EDG failure
    - IR395/2023091: FSD of White on VC Summer EDG failure
    - IRS9146: Report on qualification of EDG lube oil storage
    - Domestic OE (NUCIA13663S): Automatic EDG trip due to mis-operation of a digital panel during a surveillance test run
  - Reoccurrence of a minor event
    - IN2021-01S1: Lessons learned from US NRC inspections of design-basis capability of POVs at NPPs
    - Domestic OE: Failure of SFP monitoring camera system
      - 5 times at 4 NPPs
    - Domestic OE: Minor oil leak from a large-capacity feedwater truck
      - 7 events related to on-board equipment

Recent Examples of OE Information Sharing (2/2)

- Quarterly OE Information Exchange with JANSI
  - Example of the latest JANSI screening result (2024Q4)
    - IN2023-04: OE related to fire events at decommissioning NPPs in the US
    - IRS9178: Report on flow induced erosion in the feedwater valve
- Technical Meeting for National Coordinators of the IRS for OE on Recent Events in NPPs organized by the IAEA and the OECD/NEA
  - Recent presentation example from Japan (Oct. 2023)
    - Sinking of the passenger ship "KAZU I"
- Meeting of the CNRA EGOE
  - Recent presentation example from Japan (Mar. 2024)
    - Preliminary Report on Partial LOOP due to Major Earthquake at Shika NPS

Closing Comment

- Recognizing the importance of scientific and technical expertise to safety, NRA collects, analyzes, and screens the latest information on regulatory activities and OEs to feedback the findings into its activities, including nuclear inspections.
- NRA continues to share OE information internally, nationally, and internationally to be used to prevent or minimize the risk of future events at nuclear power plants around the world by learning from the OE information.

Those who cannot remember the past are condemned to repeat it. -George Santayana