

Long-Term Operations "Meeting the Moment",

U. S. Nuclear Regulatory Commission 36th Annual Regulatory Information Conference

Outline of the NRA regulatory requirements and recent topics related to Long Term Operation

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Policy Discussion 2022/2023

Background

The Japanese government decided the <u>"Basic Policy for the</u> <u>Realization GX"</u> in December 2022, which included "New system regarding the operation period".



New framework regarding the operation period

- In addition to the current regulation system (the operating period is <u>40 years in principle</u> and <u>can be extended only once for up to 20</u> <u>years</u>), additional extensions will be allowed only for <u>a suspension</u> <u>period</u>.
- The suspension period is the period of the conformity review to new regulatory requirements established after the Fukushima Daiichi accidents.



Recent regulation revision related to LTO





Operating Experience related to materials (1/4)

SG tube (TT600 alloy) cracking (Takahama Unit 3) 2000~2023

(1) PWSCC

- 2000,2001 21 tubes ⇒ Shot peening for residual stress relaxation
- 2012~2022 4 tubes
- 2023 1 tube ⇒ Although compressive stress was given to 0.2 mm depth by shot peening, it was estimated that SCC, which had reached deeper than 0.2mm, had propagated.
- (2) Thinning
 - 2018, 2020 Thinning due to repeated contact of foreign objects and tubes
 - 2022 Erosion by scale^{*1} ⇒ Clean up of tubes by high-pressure cleaning device and maintain high pH of the water supply
 - 2023 Erosion by scale (Thickness reduction rate 63%)

KEPCO plans to replace of SG.

*1 Collected and generated material when iron ions and particles contained in secondary piping, etc. flow into the SG through the water supply.

Operating Experience related to materials (2/4)

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 IGSCC in PWR Primary Stainless Steel Piping (Ohi unit 3) 2020
During the in-service inspection, significant indications were found in the weld joint of the primary coolant nozzles and the pressurizer spray line pipe (elbows).



It is considered that crack occurred due to the effect of excessive welding heat input and the rigidity of the pipe nozzle-elbow, and the effect of idiosyncratic hardening and stress near the surface layer.

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Operating Experience related to materials (3/4)

Reactor shutdown due to rapid decrease of PR neutron flux (Takahama Unit 4) 2023

- The reactor shut down due to the PR neutron flux rapid decrease trip.
- The cables of the coil side were on the cables of the penetration outlet side, and tensile stress was given to the cable connection inside the CV penetration.
- Soldering peeled off, causing poor conduction, resulting in a drop in current value and reaching the flux rapid decrease trip setting value.
- The connection will be investigated.





Transformer damage by Noto peninsula earthquake in 2024

- On Jan 1st, an earthquake with an intensity of 7 (magnitude 7.6, epicenter depth 16 km) occurred in the Noto region of Ishikawa Prefecture. The earthquake intensity was 5+, 399.3 gal, on the second basement floor of the reactor building of the Shica Nuclear Power Plant Unit 1.
- Approx. 3,600 liters (estimated) of insulating oil leaked from the Unit 1 startup transformer, and approx. 19,800 liters (estimated) leaked from the Unit 2 main transformer.
- Hokuriku Electric Power Company is investigating the cause of the oil leak.



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Provided by Hokuriku Electric Power Company



Regulatory implementation related to Operating Experience

- Upon receiving event reports from licensees, the Inspectors of the NRA conduct interviews with operators, on-site investigations, etc.
- Regulatory implementation plan is approved by the NRA.
- Additional investigation will be conducted when technical issues are involved. The results of the additional investigation will be reported to the NRA committee meeting, the Technical Information Review Meeting, etc., and regulatory action is discussed.
- As necessary, opinions will be heard from licensees, the Atomic Energy Association (ATENA), the Central Research Institute of Electric Power Industry, etc.



Personal perspective related to Operating Experience

- Better method to collect important information to safety
 - We collect information internationally from other country's regulatory bodies and distribute weekly bulletin to all staffs.
 - However, some important operating experiences such as SCC in France were not found from the information but provided from CODAP meeting.
 - Information dissemination for easy use
 - The NRA emphasizes transparency and openness, and licensees disclose a lot of information.
 - However, most of the materials are written in Japanese, making them difficult to search.
- Review of traditional understanding
 - Recently SCCs were found on PWR's TT600 alloy SG tubes where residual stress has been improved by shot peening and also on stainless steel piping
 - Conventionally, these were thought to be less likely to cause SCC.