ALARA Activities at Shika Nuclear Power Station, Hokuriku EPC



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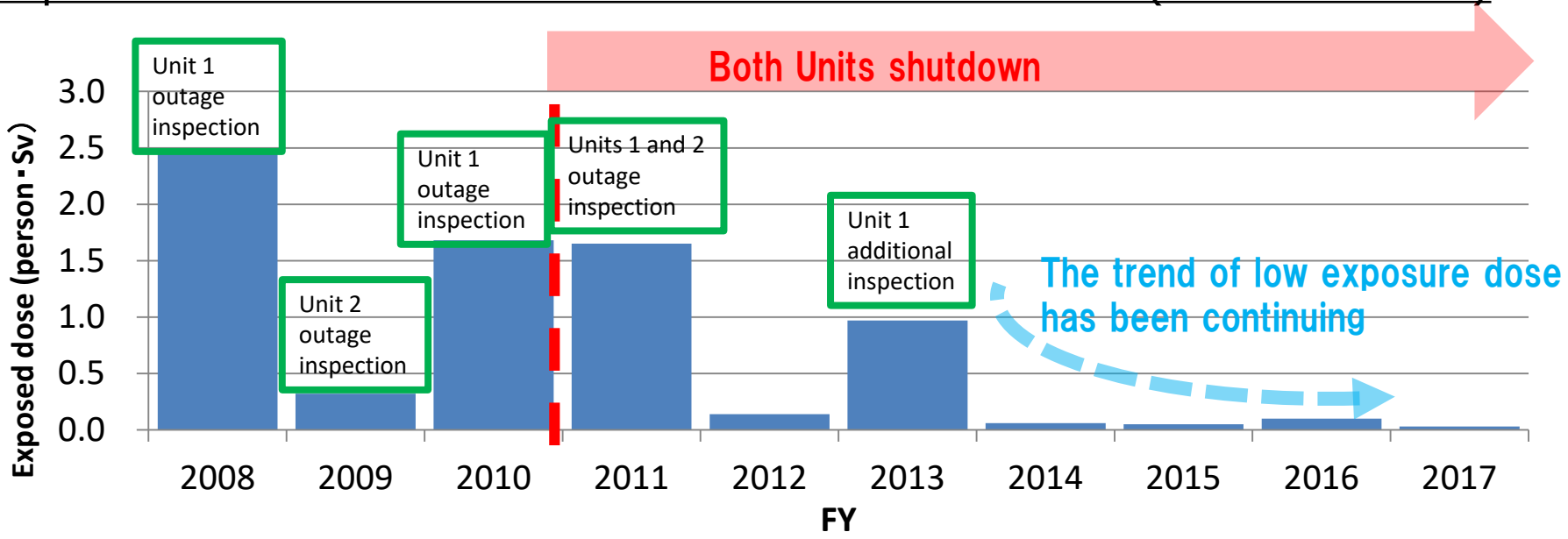
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1. State of Exposure at Shika Nuclear Power Station

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Exposure dose at the Shika Nuclear Power Station (Units 1 and 2)



- Units 1 and 2 have been **shutdown** since March 2011

【Background for the long-term shutdown】

・To respond to the changes in law following the Fukushima Daiichi Accident (Large-scale addition and modification of equipment, and responding to the government's conformity review)

- Control area work in recent years have **mostly been severe accident response work in low dose areas**

⇒ Contamination clearance, high dose environment work has continually been rare.

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Challenges

Reduction of the radiation environment work due to long-term plant shutdown

Decrease in the worker's awareness/sensitivity to exposure reduction is a concern

- The utility and partner companies need to work together as one to maintain and improve exposure reduction awareness
- Younger utility supervisors who have not experienced plant operation need to be educated and trained in radiation control

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➢ Radiation accident prediction sheet



Insert a diagram or picture of a dangerous situation during radiation work

⇒ Extract risks, have workers think of countermeasures

・Extract radiation protection risks by work Gr and debate countermeasures

・Create illustrative cases on external exposure, internal exposure and body contamination

・Have **contractors** as well as utility participate.

【Anticipated results】

◎ **Build a common awareness** on radiation protection by work Gr.

◎ Gain **new realizations** from listening to other people's opinions

◎ Can conduct discussions on high risk work even when high risk work is not planned. (**maintaining exposure reduction awareness**)

【Assessment and challenges for the future】

◎Confirm that each section and company are working proactively on the challenges.

▲The results of the initiatives are hard to perceive.
(⇒ assessment methods need to be reviewed)

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➢ Issuing the “Radiation Control Newsletter”


放射線管理ニュース (No2502)

放射線安全課
放射線管理部会

管理区域内作業における汚染管理について

（1）B装備，C装備防護着脱時の注意点

◆装備の着脱は，これから立入る区域区分に適した装備を，定められた手順に従って行ってください。

セルフチェック・同一作業者によるダブルチェックで装備の確認を！

◆C装備を着用する際は，必ずS／B着衣エリアにて防護下着を着用してください。

C装備着用時は防護下着の着用をお忘れなく！！

◆C装備の脱衣時には，C装備表面に触れないように脱いでください。

裏返しに包みこむように脱衣！

（2）汚染区域区画用フェンスについて

◆汚染区域（B_2区域，C区域）境界の区画用フェンスは右図のようなテープが貼付けられており，汚染している可能性があります。

◆フェンスに触れると，装備に汚染が付着し，身体へ汚染が伝播する可能性があります。そのため，汚染区域境界のフェンスには触れないでください。

汚染区域境界のフェンスには触れない！！

- Introduce to workers the latest nonconformances related to radiation control and points to note when conducting work
- Post the newsletter in the station and in contractor administrative offices where it is likely to be viewed by workers
- Use illustrations and pictures to make the concepts easily understood visually

【Anticipated results】

◎ Provide information necessary for radiation protection in **a timely** manner

⇒ Raise awareness of radiation risk as an immediate risk

【Assessment and challenges for the future】

◎Provide appropriate articles based on the work schedule and nonconformance issuance status.

▲Methods to assess the level of awareness and satisfaction regarding the articles
(⇒ to be confirmed through questionnaires and the like.)

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➢ Awarding “good practices” concerning exposure reduction

Award work groups who did good work on reducing exposure



Awards ceremony

【Examples of commendation】

- **Creative designing of the field dose equivalent rate map**
  (used pictures and equipment stickers to make it easier to see)
- **Hosted creative radiation experience training**
  (drills on taking off protective gear splashed with fluorescent paint mimicking contamination)
- **Creatively designed and installed contaminated materials storage boxes**
  (posted a photo of the contents so that necessary items can be taken out while minimizing the time opening the box.)

【Anticipated results】

◎Increase motivation for exposure reduction activities

【Assessment and challenges for the future】

◎Workers look to other Gr’s good practices to incorporate them into their own work.

➢ Have the radiation control department manager give speeches to the workers

・The radiation control department manager **participates in contractor meetings.**
⇒Gives speeches on radiation protection

・ Ensure that speeches are given in an effective manner such as right before high dose work and contamination clearance



Anticipated results

◎Raise exposure reduction awareness and build face-to-face relationships by directly communicating the utility radiation control department manager's **thoughts to the workers**

【Assessment and challenges for the future】

◎ Evaluated as extremely effective as there are not many chances for utility radiation control department managers to talk directly to workers. Planned to be continued.

➢ Field patrols by radiation control department personnel

・Utility radiation control department personnel conduct patrols during work where high dose and high contamination is expected.

・Personnel reside in the field for an extended period to observe worker and contractor radiation supervisor behavior during work.

・Personnel wear a **vest** with points to note in radiation protection depending on the work content to raise awareness.



Exposure reduction!
Secure distance from high dose equipment
Radiation control patrols

Anticipated results

◎Build face-to-face relationships between utility radiation control department personnel and workers.
◎Raise worker awareness of exposure reduction by having utility radiation control department personnel **directly instruct and give advice on the field.**

【Assessment and challenges for the future】

◎ Communication between utility radiation control department personnel and radiation control workers have become smoother, and instruction and advice are being provided as appropriate.
▲ Review check items for more effective patrols

➢ Visualization of the radiation source using dose equivalent rate maps

Measures to make dangerous areas such as hotspots easily perceivable to workers entering the work area





✓ Post **dose equivalent rate maps** at the entrances of all rooms which have a high dose source（＞0.1mSv/h)

✓ Use pictures to illustrate a 3D reference of high dose equipment that are difficult to show in a plan view.

✓ Set rules so that **contractor radiation control workers** can update the maps freely.
⇒ Work to post the latest radiation environment

【Anticipated results】

◎ Increase sensitivity to radiation protection by having workers understand dangerous areas before starting work

【Assessment and challenges for the future】

◎Confirm during patrols that workers are using the maps effectively.

▲Methods to make the recognition of dangerous areas easier need to be devised, incorporating worker opinions.

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➢ Clarify dangerous areas by indicating hotspots

Measures to make it easier for workers to recognize hotspots and stop workers from approaching them needlessly



Important points

- ✓ Use signs with size and design easily perceivable by the worker
- ✓ Specify in the rules to place signs **closely and specifically** to each hotspot as possible
- ✓ Have contractor radiation control workers use the same signs and standardize signs across the station.

【Anticipated results】

・Clarify hotspots

⇒ Increase worker sensitivity to the risks of high dose areas and prevent unnecessary exposure

・Use the same signs as contractor radiation control workers

⇒ Prevent signs from becoming confusing

【Assessment and challenges for the future】

◎Reception among workers have been favorable, with many saying that hotspots have become more recognizable in the field

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➢ Study meetings for utility employees who have not experienced plant operation

Plant in long term shutdown

⇒Host **study meetings** for utility employees who have not experienced a high dose environment during plant operation and a high contamination environment in outages.

Contents of the study meeting (example)

- Internal rules related to radiation control
- How to use the radiation meter [drill]
- Wearing and removing radiation protection equipment [drill] and others



Use fluorescent paint mimicking contamination to demonstrate how to remove protective clothing without getting the contamination on the body

Anticipated results

◎Improve basic knowledge of radiation protection and increase sensitivity to radiation risk for younger employees and transferees

【Assessment and challenges for the future】

◎ According to the questionnaire conducted on participants, many felt it was worthwhile. Planned to be continued.

▲ Study meeting content needs to be improved in accordance with the observation results of utility employee behavior on the field and the latest nonconformances.

4. Summary/Challenges for the Future

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Decrease in worker awareness/sensitivity toward exposure reduction is a concern

- Various exposure reduction awareness raising activities are being implemented

  ⇒Some of the activities are hard to measure in numbers and appropriate assessment methods need to be considered.

- Implementing activities to increase utility employees' understanding of radiation protection

  ⇒Check the level of understanding based on observations of utility employees' behavior on the field and nonconformances, and continue to conduct appropriate understanding enhancement activities.

Continue to raise awareness so that work can be conducted safely and smoothly in a high dose/high contamination environment when the plant is in operation.



Thank you for your time.