

Industry's Perspectives on Enhancing the Reactor Oversight Process - Inspections

NRC Regulatory Information
Conference

March 12, 2019



Radiation Protection Inspections – IP 71124



03.01(c) Risk-Informed, Performance-Based Inspections:

*“The NRC inspection program covers only small samples of licensee activities in any particular area. The principle of “smart sampling” is employed by the inspector in selecting items to review in each area, as opposed to a statistically based random selection. Smart sampling uses risk information and insights (gained from the licensee’s quality assurance (QA) audits, independent evaluations, or operational experience) to focus on those aspects of plant operations and licensee activities that could pose the greatest risk to public health and safety. **Performance-based inspections evaluate licensee performance by focusing on the outcomes of licensee programs** (in terms of the risk of impacting the cornerstone objectives), **as opposed to drawing conclusions on whether the licensee is in compliance with a regulation or standard irrespective of the risk impact.**”*

Radiation Protection Inspections(Attachments) & Inspection Frequency:

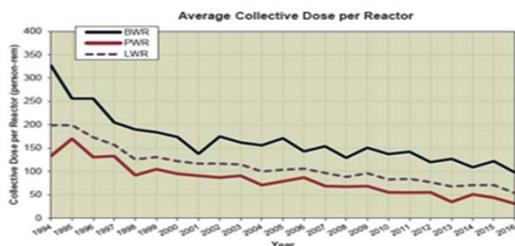
1. Radiological Hazard Assessment and Exposure Controls (A)
2. **Occupational ALARA Planning and Controls (B)**
3. In-Plant Airborne Radioactivity Control and Mitigation (B)
4. Occupational Dose Assessment (B)
5. **Radiation Monitoring Instrumentation (B)**
6. Radioactive Gaseous and Liquid Effluent Treatment (B)
7. **Radiological Environmental Monitoring Program (B)**
8. Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation (B)

Note: A refers to annual; B refers to biennial

Occupational ALARA Planning & Controls– IP 71124.02



- Continuing decline in collective dose per reactor NRC REIRS Report (NUREG-0713, Volume 38, 2016)



- Evaluation of licensee performance focusing on program outcomes:**

- NRC findings: May 2015 - May 2018
 - 6 very low safety significance (green) findings**

Radiation Protection Programs continue to demonstrate strong and effective ALARA performance and philosophies.

Radiation Monitoring Instrumentation – IP 71124.05



Inspection objective: *“To verify that the licensee is ensuring the **accuracy and operability of radiation monitoring instruments** that are used to monitor areas, materials, and workers **to ensure a radiologically safe work environment...**”*

- **Changes in instrument technology - new instrument designs:**

- have eliminated moving parts and other similar factors that were previously prone to failure, converting to digital components that are **rugged and reliable** and
- employ self-diagnostics software to **continuously assess instrument performance** and take appropriate actions to ensure measurement quality, including placing itself out of service.

- EPRI Report No. 3002010642 “Optimizing the Frequency of Portable Radiation Survey Instrument Performance Source Checks” **concludes a less than 1% (0.27%) failure rate of radiation survey instruments.**

- **Evaluation of licensee performance focusing on program outcomes :**

- NRC findings: May 2015 - May 2018
 - **6 very low safety significance (green) findings**

Industry has demonstrated sustained program excellence by accurately monitoring radiological work environments using mature procedures and new instrument technology with low failure rates.

Radiological Environmental Monitoring Program – IP 71124.07

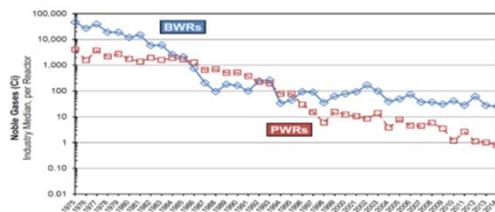


Figure 3.15 Long-Term Trend in Noble Gases in Gaseous Effluents

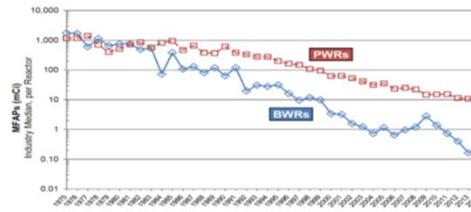


Figure 3.16 Long-Term Trend in MFAPs in Liquid Effluents

- From NUREG/CR-2907, Volume 20 (November 2018): “As a result of improved radioactive effluent control programs:
 - the amount of activity of radioactive effluents has **steadily decreased** over time;
 - in the last decade noble gas effluent radioactivity from PWRs has **decreased** by a factor of 10 and BWRs have decreased by a factor of 5;
 - in the last decade mixed fission and activation product radioactivity in effluents has also **decreased** nearly 10 times at BWRs and PWRs are half.”

■ Evaluation of licensee performance focusing on program outcomes :

- NRC findings: May 2015 - May 2018:
 - 4 very green safety significance (green) findings
 - 1 NCV for failing to notify NRC - spill

“Doses to the public due to effluents from NPPs are less than 0.1 percent (one-tenth of one percent) of what the average person receives each year from all sources of radiation.”

NUREG/CR-2907, Volume 20 (November 2018), page 11

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Inspection Math Using 3-Year Data

- Biennial inspection resources:
 - 60 (approx.) licensee sites
 - 90 inspections: 30 biennial inspections per year (per inspection area):(30 + 30 + 30)
 - 80h (average): Licensee time to **prepare** for each inspection
 - 50h (average): Licensee **support** NRC during each inspection
 - 130h (average): **Total** RP time per inspection
 - 130h (average): Assume same NRC preparation & inspection time
 - **260h**: Total licensee and NRC time **per inspection** (does not include NRC report-writing)
 - 260h X 90 inspections = **23,400h over 3 years**
 - **Results 2015-2018:**
 - ◆ ALARA & Instruments - 6 **green** findings each (3,900h/finding)
 - ◆ Effluents - 4 **green** findings (5,850h/finding)
- **Could these resources be more efficiently used for safety-significant issues?**

Conclusions

- As specified in NRC reports and **performance-based** inspections, **the outcomes of licensee programs** demonstrate exemplary industry performance in the following 3 areas:
 - **ALARA:** Radiation Protection Programs continue to demonstrate strong and effective ALARA performance and philosophies;
 - **Radiation Monitoring Instrumentation:** Industry has demonstrated sustained program excellence by accurately monitoring radiological work environments using mature procedures and new instrument technology with low failure rates; and
 - **Radiological Environmental Monitoring:** Doses to the public due to effluents from NPPs are less than 0.1 percent (one-tenth of one percent) of what the average person receives each year from all sources of radiation
- NRC & industry resources used to prepare and conduct/support biennial inspections in these areas are not being efficiently used and should be re-allocated to more safety-significant activities.

**Thank You For Your
Attention**

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