

## **RADIATION PROTECTION AREA**

### **OVERVIEW**

The Reactor Oversight Process (ROP) enhancement initiative included two recommendations in the radiation protection thematic area. First, for recommendation 1A, industry requested that the staff conduct a review of the radiation safety inspection program to streamline the program and to consider the application of licensee self-assessments in oversight of licensee radiation protection programs. Second, for recommendation 3A.1, industry requested that the staff consider crediting licensee performance in other cornerstones when evaluating radiation-safety-related inspection findings through the significance determination process (SDP). Recommendation 3A.1 is considered closed. Partial resolution to recommendation 1A requires Commission approval, while the remaining part requires additional evaluation.

### **DISCUSSION**

The staff hosted three public meetings to discuss radiation-safety-related ROP enhancement efforts with external stakeholders.

On November 15, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18348B256), the staff introduced the radiation-safety-related aspects of ROP enhancement and established agreement with industry that the staff's analysis should focus attention on oversight of specific radiation protection program areas: (1) as low as is reasonably achievable (ALARA), (2) radiation protection instrumentation, (3) effluents, and (4) self-assessments. Based on these interactions, the staff closed with no further action Recommendation 3A.1, as it pertains to the radiation safety SDPs. Performance in the reactor safety cornerstones of the ROP is not indicative of performance in the radiation safety cornerstones, nor does good performance in the reactor safety cornerstones mitigate performance issues in the radiation safety cornerstones.

On December 14, 2018 (ADAMS Accession No. ML18355A510), the staff held a public meeting where industry representatives presented specific information for the staff to consider in its analysis of Recommendation 1A. The industry, using a presentation entitled, "Radiation Protection Reactor Oversight Process Enhancements: Industry Perspectives," (ADAMS Accession No. ML18352A984), provided perspectives on how self-assessments could be used to reduce inspection effort in the areas of ALARA, radiation monitoring instrumentation, and radioactive effluents. The industry made several other observations regarding industry-wide performance in the areas of ALARA, radiation monitoring instrumentation, and radioactive effluents based on sustained performance in reducing collective dose as illustrated in Figure 4.1 – "Average collective dose per reactor and average number of individuals with measurable dose per reactor 1994-2016," of NUREG-0713, Volume 38, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and other Facilities 2016." In general, the industry representatives recommended that the staff should consider reductions in inspection effort in the areas of ALARA, radiation monitoring instrumentation, and radioactive effluents based on industry performance, technological advances and completion of self-assessments.

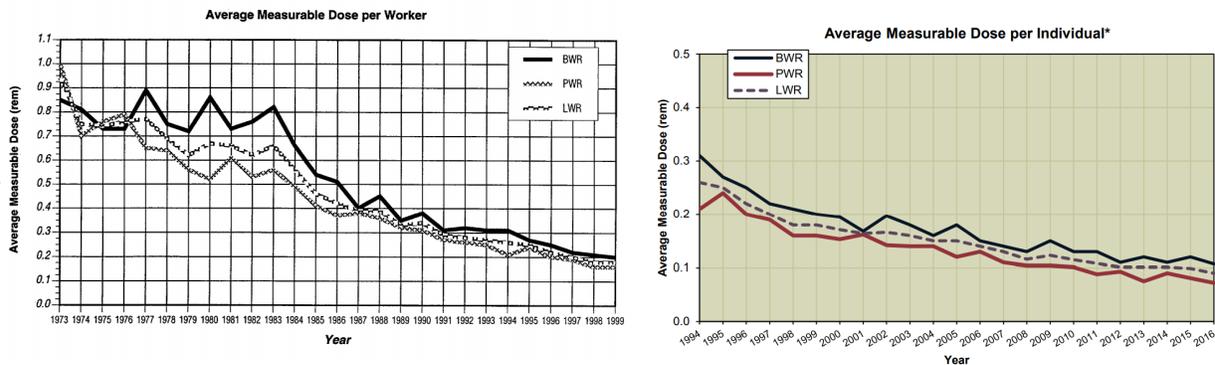
On February 28, 2019 (ADAMS Accession No. ML19060A128), the staff held a public meeting to discuss the preliminary conclusions of its analysis of the industry’s recommendations and to present the recommendations that the staff expected to propose to the Commission through this SECY.

## RECOMMENDATIONS REQUIRING ADDITIONAL EVALUATION

### Nuclear Energy Institute Recommendation 1A

The staff evaluation for recommendation 1A, described above, resulted in a staff recommendation to eliminate inspection procedure (IP) 71124.02, “Occupational ALARA Planning and Controls,” and reassign necessary required inspection samples to other inspection procedures, as described in the main body of this paper.

During the initial development of the ROP, the NRC established “ALARA Planning and Controls” as an inspectable area under the Occupational Radiation Safety Cornerstone. Since ROP inception, there have only been two White inspection findings, and these findings were identified during the first year of implementation. Since then, there have been no inspection findings in ALARA that were determined to be greater-than-Green. This is in large part the result of the Occupational Radiation Safety SDP crediting overall licensee performance in maintaining consistently low collective doses as a mitigating factor in the significance of inspection findings. Specifically, if a licensee maintains the three-year average of its collective dose below thresholds identified in Inspection Manual Chapter 0609, Appendix C, then the U.S. Nuclear Regulatory Commission (NRC) would not disposition an inspection finding in the ALARA area as greater than very low safety significance (Green). The NRC implemented this methodology as a means to risk-inform ALARA oversight based on the assumption that the radiation protection programs at plants with persistently high collective doses contend with the greatest challenges in maintaining doses ALARA. This approach allows only the most risk significant ALARA-related inspection findings to trigger additional supplemental inspections through the ROP’s assessment process.



**Figure 1 – Average Measurable Dose per Monitored Individual from NUREG-0713 Vol. 21 (left) and Vol. 38 (right)**

As illustrated in Figure 1, the U.S. nuclear industry’s performance as it relates to collective dose predates the NRC’s incorporation of ALARA as a regulatory requirement for occupational exposures. In 1991, the Commission observed that, “due to the practice of maintaining radiation exposures ALARA the average radiation dose to occupationally exposure individuals is well below the previous or amended part 20 and also below the limits recommended by the

[International Commission on Radiological Protection] ICRP (56 FR 23363).” As an example, in 1987, when the current Title 10 of *Code of Regulations* Part 20 rule was being drafted, 97 percent of workers in nuclear power plants, industrial radiography, reactor fuel fabrication and radioisotope manufacturing—four of the industries having the highest potential for occupational exposures—received annual doses of less than 2 rem. Industry performance has continued to improve since then.

There are multiple drivers for improved dose performance from an industry perspective. For example, reductions in radiological source terms stemming from improvements in fuel performance and removal of materials prone to activation from reactor coolant system components contributed significantly to reduced occupational dose. Additionally, improvements in work planning and worker practices and continued emphasis on dose reduction from licensee management organizations have resulted in further reduction of occupational dose.

### Staff Response

The staff concluded that extensive dedicated oversight in ALARA Planning and Controls provided by IP 71124.02 is no longer needed. The staff will eliminate IP 71124.02 and transfer some inspection activities to other inspection procedures involving in-plant observations and work control assessment. The three transferred activities will focus on (1) in-plant observations to verify licensees are adequately enforcing ALARA plans and techniques pertaining to worker performance, (2) verification of adequate ALARA planning and controls for work packages for significant radiological work, and (3) assessment of licensee evaluations of inconsistent or incongruent results from a licensee’s intended radiological outcomes. The staff estimates that the transferred activities will take approximately 13 biennial inspection hours to complete based on a survey of inspection staff.

IP 71124	Biennial Hours Per Site
Current	284
Revised	251
Transferred	13

### Basis for Recommendation:

The staff believes that these drivers will endure despite the proposed reductions in oversight in ALARA planning and controls.

### **STAKEHOLDER VIEWS**

There were no additional stakeholder views noted.