FAQ 25-01 - Reporting PI for Dose Rate Alarm

Plant: Florida Power and Light – Turkey Point
Date of Event: 9/16/2023
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Performance Indicator: OR01, Occupational Safety Effectiveness Indicator
Site-Specific FAQ: Yes
FAQ requested to become effective: 1Q2025 PI data

Question Section
NEI 99-02 Guidance needing interpretation (include page and line citation):
Revision 7, page 64: (Note: Guidance in effect when event was originally reviewed)
Technical Specification High Radiation Area (>1 rem per hour) Occurrence - A nonconformance (or concurrent nonconformances) with technical specifications or comparable requirements in 10 CFR 20 applicable to technical specification high radiation areas (>1 rem per hour) that results in the loss of radiological control over access or work activities within the respective high-radiation area (>1 rem per hour).

Event or circumstances requiring guidance interpretation:
On 9/16/2023 at approximately 03:45, while performing the lineup in the Unit-4 Demin Valve Room (a Radiation Area) to rinse in a new resin bed in the 4E Demineralizer, the Operator received an unanticipated dose rate alarm due to changing radiological conditions upon opening a combined inlet valve, 4-245. The most probable cause for the increase in dose rate was an air void remaining in the demineralizer following the initial resin loading and fill with primary water. When the operator opened the combined demineralizer inlet valve, a different bed used for purification experienced backpressure from letdown, which moved resin up from that bed into the inlet line as the void in the 4E demineralizer collapsed. The Operator's dosimeter recorded a dose rate of 1,090 mRem/hour versus an alarm setpoint of 350 mRem/hour. The operator immediately left the area and contacted Radiation Protection (RP) for further guidance. The shift RP technician performed a survey of the immediate work area and reported dose rates of 2,690 mRem/hour on contact and 900 mRem/hour at 30cm. The RP technician ensured there were no other personnel in the area and then guarded the door while Supervision was notified, and additional RP resources were made available to lock and post the area as a LHRA. The dose to the operator for the entry was 4.0 mRem. A complete survey was conducted in the room on 9/16/2023 at 08:37 and noted dose rates of 10,000 mRem/hour at contact and 2,500 mRem/hour at 30cm.

Turkey Point reviewed this event against NRC Inspection Procedure (IP) 71151 "Performance Indicator Verification," section 03.09, "OR01: Occupational Exposure Control Effectiveness," technical specifications, and NEI 99-02 Rev. 7 "Regulatory Assessment Performance Indicator Guideline," "Occupational Exposure Control Effectiveness" section.
NEI 99-02 Rev. 7

Examples of occurrences that would be counted against this indicator include:

• Failure to post an area as required by technical specifications,

Conclusion: Does not apply. The area was posted as a Radiation Area, based on the most recent survey information when access was made. As soon as higher than anticipated dose rates were encountered the room was controlled and posted accordingly, as a LHRA.

• Failure to secure an area against unauthorized access,

Conclusion: Does not apply. As stated, Area was controlled as a Radiation area for access.

• Failure to provide a means of personnel dose monitoring or control required by technical specifications,

Conclusion: Does not apply. Individual had a dose monitoring device with an alarm function and was aware of the dose rates associated with the work area he was entering. The alarm function operated properly to warn the worker of higher than anticipated dose rates.

• *Failure to maintain administrative control over a key to a barrier lock as required by technical specifications,*

Conclusion: Does not apply. Area entered was controlled as a Radiation Area.

• *An occurrence involving unauthorized or unmonitored entry into an area, or*

• *Nonconformance with a requirement of an RWP (as specified in the licensee's technical specifications) that results in a loss of control of access to or work within a technical specification high radiation area.*

Conclusion: Does not apply. Access was authorized and properly monitored. The alarm function of the electronic dosimeter worked as expected to warn the worker of higher than anticipated dose rates when they occurred. The worker took appropriate steps to immediately exit the area minimizing his dose and called Radiation Protection to control the area, as stipulated in the Radiation Work Permit.

Examples of occurrences that are not counted include the following:

• *Occurrence associated with isolated equipment failures. This might include, for example, discovery of a burnt-out light, where flashing lights are used as a technical specification control for access, or a failure of a lock, hinge, or mounting bolts, when a barrier is checked or involving unauthorized or unmonitored entry into an area, or tested.*

Conclusion: Turkey Point has never encountered an excursion while rinsing-in a new Demin Bed over it's 50 years of two-unit operation. Therefore, the change in dose rates was not

preemptively identified or expected during pre-job planning, and should be considered an isolated occurrence.

The guideline reviews and counts against three items:

1. Technical Specifications (TS) for High Radiation Areas (commonly referred to as Locked (HRAs)
2. Very High Radiation Areas (VHRAs)
3. Unintended Exposure Occurrences

TS for HRAs addresses two specific components: Limiting/Controlling access to areas in which radiation levels from radiation sources external to the body are in excess of 1 rem per hour at 30 centimeters from any surface the radiation penetrates. Secondly, it also governs events that result in the loss of radiological control over work activities in the respective area.

Access for this event was properly controlled under Radiation Area controls. There were no dose rates meeting the definition of a HRA upon access. This is based on the most recent surveys completed for the area prior to access and no increase in dose rates were expected based on the history of this work activity.

Regarding a loss of radiological control over work activities: The individual received an alarm from his electronic dosimeter and immediately exited the area and contacted RP as per the guidance in the Radiation Work Permit for his work. The area was physically controlled by RP until it was surveyed and reposted as a LHRA. There was no loss of radiological control associated with this event.

TS for VHRAs or unintended exposure do not apply to this event. The event does not meet the guideline for an unintended exposure occurrence. The dose for the Operator and RP Technician (4.0 mRem) did not meet the threshold of NEI 99-02 Table 3.

This position is consistent with NEI 99-02 FAQ 98 which describes radiation levels in an area increasing after workers entered the area.

If licensee and NRC resident/region do not agree on the facts and circumstances, explain:

The NRC Inspectors contest [sic] that the failure to implement adequate procedures for CVCS, including letdown purification, as required under Improved Technical Specification (ITS) 5.4, “Procedures” and ITS 5.5, “Programs and Manuals,” was a performance deficiency (PD) and was reasonably within the licensee’s ability to foresee and correct. The probable cause of the collapse of an air void in the 4E demineralizer did not constitute an equipment failure. In addition, the NRC evaluates radiation monitoring equipment alarms (e.g. electronic dosimeter alarms) to determine if their actuation is the result of a PD. The NRC determined that there was a PD with the issuance of Green NCV 05000251/2023004-06. Refer to Unresolved Item (URI) 05000251/2024004-02 for further information.

The NRC Inspectors further contest [sic] that (ITS) 5.7 guidelines for High Radiation Area access control were violated, in that any area, accessible to individuals, in which radiation levels from radiation sources external to the body are in excess of 1.0 rem (10 mSv) per 1 hour at 30 centimeters from the radiation source were not properly posted when occupied by personnel. They also cite non-conformance applicable to ITS 5.7 for HRA's that result in a loss of radiological control over work activities in the respective area.

Potentially relevant existing FAQ numbers
NEI 99-02 FAQ 98, which describes radiation levels in an area increasing after workers entered the area.

Response Section
Proposed Resolution of FAQ:
Based on these facts, Turkey Point does not believe that this event should be counted against the OR01 Occupational Safety Effectiveness Performance Indicator as a Technical Specification High Radiation Area Occurrence.

PRA Update required to implement the FAQ?
No

MSPI Basis Document update required to implement this FAQ?
No

NRC Response

During its evaluation of this FAQ, the staff reviewed the information provided by the licensee in FAQ 25-01 (ML25084A047); the issue as described in the Turkey Point Units 3 & 4 - Integrated Inspection Report (IR) 05000250/2023004 and 05000251/2023004 (ML24043A263); and the staff consulted relevant guidance in NEI 99-02, Revision 7 (ML23010A157), the active revision of the guidance at the time of the event.

The purpose of the OR01, "Occupational Exposure Control Effectiveness," Performance Indicator (PI), as stated in NEI 99-02, Revision 7, is to:

> "address the first objective of the occupational radiation safety cornerstone. The indicator monitors the control of access to and work activities within radiologically-significant areas of the plant and occurrences involving degradation or failure of radiation safety barriers that result in readily-identifiable unintended dose."

The review of this FAQ focuses on if the facts and circumstances—as they are described in IR 05000250/2023004 and 05000251/2023004—meet the description of a loss of "radiological control over access to technical specification high radiation areas," or a loss of "radiological control over work activities," in technical specification high radiation areas, as defined below, and thus if the event is reportable as an occurrence for the OR01 PI.

The definition of Technical Specification High Radiation Area is provided in NEI 99-02, Revision 7, Page 64, lines 15-38.

> Definition of Terms
>
> Technical Specification High Radiation Area (>1 rem per hour) Occurrence - A nonconformance (or concurrent nonconformances) with technical specifications or comparable requirements in 10 CFR 20 applicable to technical specification high radiation areas (>1 rem per hour) that results in the loss of radiological control over access or work activities within the respective high-radiation area (>1 rem per hour). For high radiation areas (>1 rem per hour), this PI does not include nonconformance with licensee-initiated controls that are beyond what is required by technical specifications and the comparable provisions in 10 CFR Part 20.
>
> Technical specification high radiation areas, commonly referred to as locked high radiation areas, include any area, accessible to individuals, in which radiation levels from radiation sources external to the body are in excess of 1 rem (10 mSv) per 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates, and excludes very high radiation areas. Technical specification high radiation areas, in which radiation levels from radiation sources external to the body are less than or equal to 1 rem (10 mSv) per 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates, are excluded from this performance indicator.

- “Radiological control over access to technical specification high radiation areas” refers to measures that provide assurance that inadvertent entry into the technical specification high radiation areas by unauthorized personnel will be prevented.
- “Radiological control over work activities” refers to measures that provide assurance that dose to workers performing tasks in the area is monitored and controlled.

NEI 99-02, Revision 7, Page 65, lines 1-10 provide examples of occurrences that would be counted against this indicator.

- Failure to post an area as required by technical specifications,
- Failure to secure an area against unauthorized access,
- Failure to provide a means of personnel dose monitoring or control required by technical specifications,
- Failure to maintain administrative control over a key to a barrier lock as required by technical specifications,
- An occurrence involving unauthorized or unmonitored entry into an area, or
- Nonconformance with a requirement of an RWP (as specified in the licensee’s technical specifications) that results in a loss of control of access to or work within a technical specification high radiation area.

NEI 99-02, Revision 7, Page 65 lines 13-21 provide examples of occurrences that are not counted as Technical Specification High Radiation Area (>1 rem per hour) occurrences.

- Situations involving areas in which dose rates are less than or equal to 1 rem per hour,
- Occurrences associated with isolated equipment failures. This might include, for example, discovery of a burnt-out light, where flashing lights are used as a technical specification control for access, or a failure of a lock, hinge, or mounting bolts, when a barrier is checked or tested.
- Nonconformance with an RWP requirement that does not result in a loss of control of access to or work within a technical specification high radiation area (e.g., signing in on the wrong RWP, but having received the pre-job brief and implemented all of the access work control requirements of the correct RWP).

These exceptions can be summarized as situations where a licensee has conservatively posted an area but the actual radiological conditions when a noncompliance occurs do not meet the criteria of Technical Specification High Radiation Area (>1 rem per hour) or noncompliances that do not result in loss of control of access to, or work within, a technical specification high radiation area because they are either administrative in nature or isolated in their effect such that control over the radiological hazard is minimally impacted.

Turkey Point Units 3 & 4 - Integrated Inspection Report (IR) 05000250/2023004 and 05000251/2023004 (ML24043A263), provides a description of the self-revealed non-cited violation associated with this FAQ.

> On September 16, 2023, [The] Operations [organization of Turkey Point Unit 4] was performing an evolution to re-introduce primary water flow through [the] Unit 4 CVCS [chemistry and volume control system] demineralizer 4E, which had just been loaded with fresh resin. Shortly after the evolution began, dose rates in the Unit 4 demineralizer

valve gallery, initially posted as a radiation area, rose significantly, which resulted in an auxiliary operator in the demineralizer valve gallery receiving an unexpected dose rate alarm of 1090 mrem/hr with a setpoint of 300 mrem/hr.

Dose rates in the area, which were initially less than 100 mrem/hr general area, had increased to greater than 1,000 mrem/hr general area. A follow-up radiological survey indicated dose rates up to 2500 mrem/hr at 30cm. Upon receiving the dose rate alarm, the operator exited the area and reported to radiation protection (RP). RP technicians subsequently secured the area, which included posting it as a locked high radiation area (LHRA).

The licensee determined that the most probable cause was the collapse of an air void in the 4E demineralizer, which had just been filled with fresh resin, causing a migration of radioactive resin from the 4B demineralizer into the letdown line. This caused an unexpected increase in dose rates in the Unit 4 demineralizer valve gallery. The inspectors noted that the licensee had a demineralizer system that was unique from other Westinghouse designs, and that the potential off-normal operating scenarios were not well understood. A contributing factor was that licensee procedure 4-OP-047.3 did not include a requirement to isolate the demineralizers containing radioactive resin from the demineralizer being filled, which would have prevented the event.

IR 05000250/2023004 and 05000251/2023004 also describes the licensee's performance deficiency, to which the self-revealed non-cited violation described above was attributed: "The failure to implement adequate procedures for CVCS, including letdown and purification, as required by the Quality Assurance Topical Report under TS 6.8, "Procedures and Programs," was a performance deficiency and was reasonably within the licensee's ability to foresee and correct." The NRC concluded that the performance deficiency resulted in an area where dose rates of up to 2500 mrem/hr at 30 cm and in excess of 1000 mrem/hr general area were accessible and not controlled per the licensee's technical specifications.

In its evaluation of "Occurrence associated with isolated equipment failures," provided above, the licensee asserts that this event should be considered an isolated occurrence because "Turkey Point has never encountered an excursion while rinsing-in a new Demin Bed over its 50 years of two-unit operation." This conclusion is inconsistent with the description of an "Occurrence associated with isolated failures," in that the examples listed in this exception are kinds of isolated failures that can occur in the multiple physical barriers that are used to control access to the high radiation area (e.g., burnt out light or a failure of a lock, hinge, or mounting bolts). In general, the exceptions to reporting a PI occurrence involve cases where the actual radiological conditions necessitating control as a technical specification high radiation area are not present (i.e., conservatively posted area), or the issue was administrative in nature or isolated in its effect such that control over the radiological hazard is minimally impacted but not lost. The exception associated with isolated equipment failures should not be interpreted as an exception to reporting occurrences where a single failure of a piece of plant equipment, or a deficient licensee procedure results in an uncontrolled high radiation area. Additionally, the licensee's assertion differs from the NRC's conclusion, as stated in the IR, that the performance deficiency that led to the non-compliant high radiation area was within the licensee's ability to foresee and correct. The IR provides information pertinent to contesting violations or the

significance or severity of the violations documented within the IR. When this FAQ was presented to the NRC during a public meeting on March 26, 2025 (ML25084A207), NRC staff inquired of Turkey Point representatives if they contested the violation or if they intended to do so. Turkey Point staff stated that they did not contest the violation, and they had no intentions of doing so. Therefore, the NRC staff based its conclusion on this FAQ on the facts and circumstances, as explained in the applicable IR.

The identified performance deficiency resulted in the presence of an area meeting the definition of a Technical Specification High Radiation Area (>1 rem per hour) that was inadequately controlled because the licensee did not exercise radiological control over access or work activities within the area as described in the licensee's technical specifications. For example, in areas with dose rates greater than 1.0 rem/hour at 30 cm from the radiation source, but not meeting the criteria for a very high radiation area per 10 CFR 20.1602, the licensee technical specifications states that the entryway should be posted as a high radiation area and locked or guarded to prevent unauthorized entry; that keys should be placed under administrative control; access to and activities in such areas shall be controlled by means of a radiation work permit that includes specification of radiation doses in the immediate work area, stay time and other appropriate radiation protection equipment and measures and personnel accessing such areas shall be made knowledgeable of dose rates and be provided with a pre-job briefing that applies to the radiological conditions to which individuals will be exposed. As described above, the licensee provided radiological controls commensurate with a radiation area when conditions called for controls commensurate with Technical Specification High Radiation Area (>1 rem per hour). It was only after the auxiliary operator received the unexpected dose rate alarm of 1090 mrem/hr that the licensee took action to secure the area and apply the appropriate radiological controls, resulting in a finite amount of time when the area was inadequately controlled. However, the OR01 PI does not specify exceptions for temporary situations where Technical Specification High Radiation Area (>1 rem per hour) can exist without adequate controls, instead it records all occurrences of these events. Therefore, the NRC staff concludes that this event was reportable as an OR01 occurrence.

The event occurred on September 16, 2023; therefore, this event should have been reported as an OR01 occurrence starting in the last quarter of 2023 and would have remained as a reportable occurrence for the three subsequent quarters for a total of four quarters (i.e., through the third quarter of 2024). As described in page 3 of NEI 99-07, Revision 7, previously submitted indicator data are amended only to the extent necessary to calculate the indicator(s) for the current reporting period correctly. Since, at the time of submitting this FAQ, the reporting period for this occurrence had already expired, the licensee is not required to amend the previously submitted indicator data for the OR01 PI. Additionally, the counting of this occurrence during its active reporting period would not have resulted in the OR01 PI crossing the Green/White threshold. Therefore, other than whatever corrective action is determined necessary by the licensee to ensure that future occurrences of this type are properly reported, no other action is required by the licensee as far as this performance indicator occurrence is concerned.