

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 71151

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### PERFORMANCE INDICATOR VERIFICATION

PROGRAM APPLICABILITY: 2515

CORNERSTONES: All

#### 71151-01 INSPECTION OBJECTIVE

01.01 To perform a periodic review of performance indicator (PI) data to determine its accuracy and completeness.

#### 71151-02 INSPECTION REQUIREMENTS

##### 02.01 Annual Inspections

Each performance indicator for every unit will be verified once a year. The performance indicator verifications will be planned inspections during which either the resident or regional inspector will review a sample of plant records and data against the reported performance indicators. In addition to the review of various plant records, the inspector may also, where applicable and as needed, observe the plant activity that generates a PI data input. These observations are performed as part of the various inspectable areas within the cornerstone inspection procedures.

Performance indicators for the Initiating Events, Mitigating Systems, and Barrier Integrity Cornerstones will be verified by the resident inspectors. The resident inspectors should verify 2 or 3 indicators per unit each calendar quarter, such that every indicator is reviewed annually. Review of licensee self assessments shall not be substituted for independent inspector verification of indicators.

Performance indicators for the Emergency Preparedness, Occupational Radiation Safety, Public Radiation Safety, and Physical Protection Cornerstones will be verified once annually, usually during a site visit by the regional specialist inspector, but may be any calendar quarter and will be planned during the annual planning meeting.

Verify PIs using the following instructions:

- a. Review data reported to the NRC since the last verification inspection was performed. Annual inspection intervals should not exceed 15 months.
- b. Select a sample of plant records and data to review and compare to the reported data. Use Table 1 as guidance on data sources for each PI.
- c. When conducting the first PI verification inspection at a site, for a new PI, using this procedure, the inspector shall verify the accuracy of all reported data that is used to calculate the value of each PI. Subsequent inspections only require verifying additional data reported since the last PI verification inspection was performed.
- d. Review the licensee's corrective action program records to determine if any problems with the collection of PI data have occurred and if resolution was satisfactory. Determine if PI data was corrected or updated as a result of any data collection problems.
- e. As necessary and when possible, observe the plant activity that generates the PI data input using the most applicable inspectable area procedure.
- f. When conducting PI verifications, be alert to situations whereby the licensee takes action to simply avoid a PI count.

#### 02.02 PI Verifications During Plant Tours

Resident inspectors, because they are required to be in the plant on a daily basis, will with minimum effort periodically verify certain aspects of the Occupational Exposure Control Effectiveness and the RETS/ODCM Radiological Effluent Occurrence indicators during their plant tours.

- a. During plant tours, resident inspectors should periodically determine if high radiation ( $>1\text{R/hr}$ ) areas are properly secured. Determine if any noted deficiencies with control of high radiation ( $>1\text{R/hr}$ ) areas provide an input to the Occupational Exposure Control Effectiveness performance indicator. Ensure the licensee enters any deficiencies into the corrective action program and appropriately documents the occurrence of a PI data input.
- b. During plant tours, note any potentially unmonitored release pathways. Determine if they affect the RETS/ODCM Radiological Effluent Occurrence performance indicator. Ensure the licensee enters any deficiencies into the corrective action program and appropriately documents the occurrence of a PI data input.
- c. Document any identified PI data inputs identified under 02.03a and 02.03b in the inspection report.

## 02.03 Inspection Results and Documentation

- a. If no discrepancies with the performance indicator are found, the inspector should document the PI verification inspection results in the inspection report. The inspector should include which PI was verified, the time period involved, the records reviewed, and state that no problems with the PI accuracy or completeness were found.
- b. If minor discrepancies with the performance indicator are found, the inspector should discuss the results with the licensee, verify that the licensee submits a correction to the reported PI data if necessary, and verify that the licensee enters the discrepancies into the corrective action program. When a discrepancy results in a difference in interpretation of the PI guidance, NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," between the licensee and the inspector, an ROP feedback form shall be filled out and sent to IIPB (e-mail-PIPBCAL). The occurrence should be documented in accordance with the guidelines of Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," only if it could potentially cause the PI to cross a threshold.
- c. If major discrepancies with the performance indicator are found, the inspector should verify that the PI has been updated and the problem has been entered into the corrective action program, and document the finding in the inspection report in accordance with IMC 0612. These findings should be discussed with the licensee.
- d. If no new performance indicator data have been collected since the last verification inspection (e.g., no new siren tests) the inspector should verify that none was required, and document the lack of new data in the inspection report.
- e. Examples of unintended consequences shall be documented on an ROP feedback form. It should also be captured in the inspection report using the guidelines of IMC 0612, only if the occurrence could cause a PI to cross a threshold.

## 71151-03 INSPECTION GUIDANCE

### General Guidance

The general approach to PI verification is to confirm the accuracy and completeness of performance indicator data by comparison to confirmatory plant records and data available in plant operating logs, etc. Inspectors should refer to NEI 99-02 for more in-depth definitions and descriptions of PI inputs. Table 1 lists the data elements to be reported for each performance indicator and provides guidance to the inspector on possible sources of plant records and data to review.

Inspectors should use judgment regarding the selection of the data sample to review. PI verification is intended to be selective sampling in order to verify the accuracy and completeness of the reported data. Inspectors should not attempt to verify all indicator inputs.

For some performance indicators, it may be appropriate to observe the collection of performance indicator data during the inspection, to ensure that data collection techniques will produce accurate results and therefore accurate PI data. These observations are performed in conjunction with other inspectable area procedures. Listed below are several examples of using the inspectable area procedures in conjunction with the PI verification.

- During the planned verification inspection of the SSU - high pressure coolant injection system, the inspector may also use the maintenance work prioritization and control inspectable area to assess the hours that the system was unavailable during maintenance.
- During the planned verification inspection of RCS specific activity, the inspector may observe chemistry sampling and analysis using the surveillance testing inspectable area.
- During the planned verification inspection of ANS reliability, the inspector may observe siren testing under the alert and notification system availability inspectable area.

Additionally, resident inspectors will perform minimal effort, periodic PI verification inspections of the Occupational Exposure Control Effectiveness and the RETS/ODCM Radiological Effluent Occurrence indicators during Plant Status Reviews.

If the inspector finds that a performance indicator threshold has been exceeded, the inspector should notify regional management to determine if further action is required. Refer to guidance on the Plant Performance Assessment Process for possible actions to be taken if a performance indicator threshold is exceeded or if the performance indicator verification identifies major discrepancies with the reported indicator.

### Specific Guidance

03.01 Annual Inspections. Each indicator is listed below with a brief definition from NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," and guidance on the verification of the data. Additional clarification of the PI definitions and examples are provided in the NEI 99-02. Table 1 provides additional verification guidance by listing the reported elements of each PI and suggesting records for the inspector to review.

#### 1. Unplanned Scrams per 7000 Critical Hours

Definition: The number of unplanned scrams during the previous four quarters, both manual and automatic, while critical per 7000 hours of critical operation.

Verification: Review licensee event reports to determine the number of scrams that occurred. Compare the number of scrams reported in LERs to the number reported as a performance indicator. Use the Performance Indicator definitions provided in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline." As necessary, review monthly operating reports or operating logs to determine the accuracy of the number of critical hours if the accuracy could affect the indicator value with respect to a threshold.

Inspection of operator and equipment performance in response to a scram is covered by Event Follow-up and Nonroutine Plant Evolutions and is not covered by this procedure.

2. Scrams With Loss of Normal Heat Removal

Definition: The number of unplanned scrams while critical, both manual and automatic, during the previous 12 quarters that also involved the loss of the normal heat removal path through the main condenser.

Verification: Perform verification at the same time as the Unplanned Scrams per 7000 Critical Hours. Review licensee's basis for including or excluding each scram in the Scrams With Loss of Normal Heat Removal PI. Use the PI definition provided in NEI 99-02 to review the classification of any scram.

Inspection of operator and equipment performance in response to a scram is covered by Event Follow-up and Nonroutine Plant Evolutions and is not covered by this procedure.

3. Unplanned Transients per 7000 Critical Hours

Definition: The number of unplanned changes and fluctuations in reactor power of greater than 20 percent per 7000 hours of critical operation.

Verification: Review operating logs, corrective action program records, and monthly operating reports to determine the accuracy and completeness of reported transients.

4. Safety System Unavailability (SSU)

Definition: The average of the individual train unavailabilities in the system. Train unavailability is the ratio of the hours the train is unavailable to the number of hours the train is required to be able to perform its intended function.

The PI is calculated separately for each of the following four systems for each reactor type:

Pressurized Water Reactors

- high pressure safety injection system
- auxiliary feedwater system
- emergency AC power system
- residual heat removal system

Boiling Water Reactors

- high pressure coolant injection systems ( high pressure coolant injection, high pressure core spray, feedwater coolant injection)
- heat removal system (reactor core isolation cooling, isolation condenser)

- emergency AC power system
- residual heat removal system

Verification: Twice per year, select 2 SSU systems for review. Review out-of-service logs, operating logs, maintenance rule database to determine the accuracy and completeness of the reported unavailability data. In addition to review of records, the inspector should, in conjunction with inspections in other inspectable areas, verify planned, unplanned, or fault exposure unavailable hours for the system under review. Related inspectable areas under which inspectors can review unavailability determinations include equipment alignment, emergent work, maintenance rule implementation, and maintenance work prioritization and control.

Difficulties have been encountered with this indicator when the time of the failure is unknown (resulting in an estimate - T/2- being used for fault exposure hours). As a result, the guidance in Revision 2 to NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines," was modified to exclude T/2 fault exposure hours in which the time of failure is not known. These hours should not be included in the calculation of the safety system unavailability PI. The issues associated with these hours shall be evaluated and dispositioned in accordance with the threshold for documented guidance in Appendix B of IMC 0612, "Power Reactor Inspection Reports." For those infrequent instances not being treated as an inspection finding iaw IMC 0612, inspectors shall use the guidance in Inspection Procedure 71153, "Event Follow-Up," to evaluate the significance of the event and determine if an AIT is warranted.

Inspection Procedure 71153 contains guidance to follow, which uses T/2 to assess the degraded condition exposure time. This exposure time is then used to calculate conditional core damage probability as an input for determining the appropriate level of NRC event response.

##### 5. Safety System Functional Failures (SSFF)

Definition: The number of events or conditions in the previous four quarters that have been reported in licensee event reports, maintenance rule records, and maintenance work orders that prevented, or could have prevented, the fulfillment of a safety function. The following functions are monitored:

Reactor and Primary Coolant Integrity  
 Emergency Core Cooling  
 High Pressure Heat Removal  
 Residual Heat Removal  
 Emergency Boration  
 Primary System Safety and Relief  
 Main Steam Isolation  
 Containment Integrity  
 Reactor Protection  
 Accident Monitoring  
 Emergency AC and DC Power  
 Equipment Cooling

Essential Compressed Gas  
Control Room Emergency Ventilation  
Spent Fuel

Verification: Review licensee event reports and determine if any SSFFs occurred. Compare to number of SSFFs reported in that period by the performance indicator.

6. RCS Specific Activity

Definition: The maximum RCS activity in microCuries per gram dose equivalent iodine-131 per the technical specifications, and expressed as a percentage of the technical specification limit.

Verification: Review RCS chemistry sample analyses for maximum dose equivalent Iodine-131 and verify that the percent of TS limit is the same or lower than the maximum value reported by the licensee for the applicable month. In addition to record reviews, in accordance with the surveillance testing inspectable area, observe a chemistry technician obtain and analyze an RCS sample.

7. RCS Leak Rate

Definition: The maximum RCS identified leakage in gallons per minute each month per the technical specifications and expressed as a percentage of the technical specification limit.

Verification: Review operating logs or other licensee records of daily measurements of RCS identified leakage and compare to the data reported by the performance indicator. In addition to record reviews, observe the surveillance activity that determines RCS identified leakage rate in conjunction with the Surveillance Testing inspectable area.

8. Emergency Response Organization Drill/Exercise Performance (DEP)

Definition: The percentage of all drill and exercise opportunities that were performed timely and accurately during the previous 8 quarters.

Verification: Review the reported PI data. Review actual emergency plan implementation events and evaluated exercise scenarios and a sample of drill and training evolution scenarios to verify the number of opportunities to classify, notify and develop protective action recommendations (PARs). Review licensee critiques for identification of failure to classify, notify or develop PARs in a timely and accurate manner. Review a sample of documentation forms for classification, notification, and PAR activities to verify accuracy. If the sample verifies accuracy accept critique findings for the bulk of the PI data. It may be noted that, the resident and regional inspectors will periodically observe exercises, drills, and training evolutions under the Drill and Exercise inspectable area to verify licensee identification of timely and accurate performance. Inspection reports documenting these observations should also discuss the PI verification aspects of the inspection

9. Emergency Response Organization Readiness (ERO)

Definition: The percentage of key ERO members that have participated in a drill, exercise, or actual event during the previous eight quarters, as measured on the last calendar day of the quarter.

Verification: Review the reported PI data. Verify that all members of the ERO in the key positions identified have been counted. Determine the licensee basis for reporting the percent of members who have participated. Review drill attendance records and verify a sampling of those reported as participating.

10. Alert and Notification System Reliability (ANS)

Definition: The percentage of ANS sirens that are capable of performing their function, as measured by periodic siren testing in the previous 12 months.

Verification: Review siren test records for the previous reporting period. Review the number of failures documented against the reported PI value. Observe siren testing in accordance with the Alert and Notification System Reliability inspectable area.

11. Occupational Exposure Control Effectiveness

Definition: The performance indicator is the sum of the following occurrences during the previous 4 quarters:

Technical specification high radiation area occurrences  
Very high radiation area occurrences  
Unintended exposure occurrences

Verification: Review corrective action program records for high radiation area, very high radiation area, and unplanned exposure occurrences for the past 4 quarters. Ensure  $\geq 1$  R/hr HRA Technical Specification or 10CFR20 non-conformances were properly classified as PIs. During plant status reviews, verify that locked and very high radiation areas are maintained locked.

Review radiologically controlled area (RCA) exit transactions with exposures greater than 100 mrem and investigate a sample (10 or more) to determine whether they were within RWP. Verify that those greater than 100 mrem unplanned exposure were entered in the corrective action program and listed as a PI.

12. RETS/ODCM Radiological Effluent Occurrences

Definition: Radiological effluent release occurrences per reactor unit that exceed the values listed below. The total number of process effluent radiological occurrences in the previous 4 quarters.



Liquid Effluents	Whole Body	1.5 mrem/qtr
	Organ	5.0 mrem/qtr
Gaseous Effluents	Gamma Dose	5.0 mrads/qtr
	Beta Dose	10.0 mrads/qtr
	Organ Doses	7.5 mrads/qtr

Verification: Review licensee's corrective action program records for liquid or gaseous effluent releases that were reported to the NRC. Licensee Event Reports and annual release reports may also be used. For the past four quarters, ensure that all were counted as PIs. During plant status reviews, screen plant incidents involving leaking pipes involving radioactive liquids or gases that are not bounded by plant collection systems and could be a potential unmonitored release path. Inspections in the gaseous and liquid effluent treatment systems inspectable area will be used to observe the calibration of equipment used in this program.

#### 13. Protected Area Security Equipment Performance Index

Definition: Protected area equipment performance is measured by an index that compares the amount of the time CCTVs and IDS are unavailable, as measured by compensatory hours, to the total hours in the period. A normalization factor is used to take into account site variability in the size and complexity of the systems.

Verification: Review security logs and maintenance records to verify the protected area security equipment performance.

#### 14. Personnel Screening Program Performance

Definition: The number of reportable failures to properly implement the regulatory requirements. The screening program performance indicator is used to verify that unescorted access authorization program has been implemented pursuant to 10CFR 73.56 and 73.57.

Verification: Review the number of failures in the personnel screening and fitness for duty (FFD) programs against security logs and event reports.

#### 15. Fitness-For-Duty/Personnel Reliability Program Performance

Definition: The number of reportable failures to properly implement the regulatory requirements. The program performance indicator is used to verify that the fitness-for-duty and personnel reliability program has been implemented pursuant to 10 CFR Part 26 and 10 CFR 73.56.

Verification: Review the number of failures in the fitness-for-duty and behavior observation requirements against security logs, event reports, and six month FFD performance reports.

- a. NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," instructs licensee's that data or reporting errors need only be corrected if the errors affect the current computed value of any reported indicator.
- b. It is expected that licensees will make reasonable, good faith efforts to comply with the guidance in NEI 99-02. This includes taking appropriate and timely action to identify and report performance issues captured by the indicators. It may be necessary for inspectors to exercise some judgement on the adequacy of licensee actions to make a reasonable, good faith effort to comply with the guidance.
- c. No guidance.
- d. No guidance.
- e. No guidance.
- f. Be alert to instances whereby the licensee changes normal or routine practices or behavior in an effort to avoid a PI count. An example is when the licensee delays performing a power reduction for 72 hours, the period between discovery of an off-normal condition and the corresponding change in power level, to avoid the count against the unplanned power change per 7,000 critical hours PI.

#### 03.02 PI Verification During Plant Tours

- a. No guidance.
- b. No guidance.
- c. No guidance.

#### 03.03 Inspection Results and Documentation

- a. No guidance.
- b. Minor discrepancies are problems with accuracy or completeness that would have affected the reported PI data but would not have resulted in increased agency attention (i.e., correction does not result in the indicator crossing a threshold). Minor discrepancies should not be documented; however, if not corrected, the cumulative effect of these discrepancies could potentially lead to crossing a threshold - it should be documented.
- c. Major discrepancies are problems with accuracy or completeness that may have affected agency response because a performance indicator threshold would have been exceeded. NRC will take actions in accordance with IMC 0305, "Operating Reactor Assessment Program" and the NRC Action Matrix.
- d. No guidance.
- e. No guidance.

#### 71151-04     RESOURCE ESTIMATE

The level of effort to complete all annual PI verifications is estimated to be, on average, in the range of 35 to 50 hours per year for single unit sites, 50 to 70 hours per year for dual unit sites, and 60 to 70 hours per year for triple unit sites.

END

Table 1

## Performance Indicator Verification Inspection Guidance

PERFORMANCE INDICATOR	DATA ELEMENTS TO BE VERIFIED	RECORDS TO REVIEW/ RELATED INSPECTIONS
Unplanned scrams/7000 critical hours  Scrams With Loss of Normal Heat Removal	number of scrams  number of scrams with loss of normal heat removal  number of critical hours	licensee event reports monthly operating reports operating logs inspection reports
Transients/7000 critical hours	number of transients  number of critical hours	monthly operating reports operating logs corrective action program documents, maintenance rule records, inspection reports
Safety System Unavailability (SSU)	planned unavailable hours  unplanned unavailable hours  fault exposure unavailable hours  hours system required to be available  number of trains	operating logs, corrective action program documents, maintenance rule records, maintenance work orders, inspection reports  Inspections in the following IAs: equipment alignment emergent work maintenance rule implementation maintenance work prioritization and control post-maintenance testing
Safety System Functional Failures (SSFF)	number of SSFFs	licensee event reports, maintenance rule records, maintenance work orders

PERFORMANCE INDICATOR	DATA ELEMENTS TO BE VERIFIED	RECORDS TO REVIEW/ RELATED INSPECTIONS
Reactor Coolant System Specific (RCS) Activity	maximum monthly I-131 RCS specific activity  TS limiting value	chemistry sample record TS requirements  Inspection in the surveillance test inspectable area
Reactor Coolant System (RCS) Leakage	maximum monthly RCS identified leakage  TS limiting values	surveillance records plant instruments TS requirements  Inspection in the surveillance testing inspectable area
Alert and Notification System (ANS) Reliability	number of siren tests  number of successful siren tests	periodic test records, data sheet summing, individual tests, maintenance work orders  Inspection in the Alert and Notification System Availability inspectable area
Drill/Exercise Performance (DEP)	number of opportunities for classification, notification, and PAR development  number of opportunities performed in a timely and accurate manner	formal assessments of actual events, evaluated exercises, and drills and simulator training evolutions Exercise Evaluation and Drill Evaluation Inspection inspectable areas

PERFORMANCE INDICATOR	DATA ELEMENTS TO BE VERIFIED	RECORDS TO REVIEW/ RELATED INSPECTIONS
Emergency Response Organization (ERO) Drill Participation	<p>number of key ERO members</p> <p>number of key ERO members who have participated in a drill/exercise in last 8 quarters</p>	<p>drill attendance records</p> <p>drill, exercise, training evolution scenarios</p> <p>emergency response organization rosters</p>
Occupational Radiological Occurrences	<p>high radiation area non-conformances</p> <p>very high radiation (&gt;1R/hr) area non-conformances</p> <p>unintended exposure occurrences</p>	<p>high radiation area radiological occurrences</p> <p>radiologically controlled area exit transactions greater than 100 mrem ,</p> <p>Plant status review of locked high radiation area doors.</p> <p>Inspection in the Gaseous and Liquid Effluent Treatment Systems inspectable area</p>
RETS/ODCM Radiological Effluent Occurrences	<p>number of process effluent radiological occurrences in the previous 4 quarters</p>	<p>corrective action program records</p> <p>licensee event reports</p> <p>annual release report</p> <p>Plant status review of potential unmonitored release pathways</p>
Protected Area Security Equipment Performance Index	<p>number of compensatory hours for CCTVs and IDS</p> <p>CCTV and IDS normalization factors</p>	<p>security logs, maintenance work orders</p>

PERFORMANCE INDICATOR	DATA ELEMENTS TO BE VERIFIED	RECORDS TO REVIEW/ RELATED INSPECTIONS
Personnel Screening Program Performance	number of reportable failures to properly implement the regulatory requirements	security logs event reports
FFD/Personnel Reliability Program Performance	number of reportable failures to properly implement the regulatory requirements	security logs event reports FFD performance reports