Plant: Turkey Point Unit 3

Date of Event: 9/22/23

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Performance Indicator: IE01, Unplanned Scrams per 7000 Critical Hours

Site-Specific FAQ (see Appendix D)? (X)Yes or ( ) No

FAQ requested to become effective (X) when approved or (other date) _____

Question Section

NEI 99-02 Guidance needing interpretation (include page and line citation):

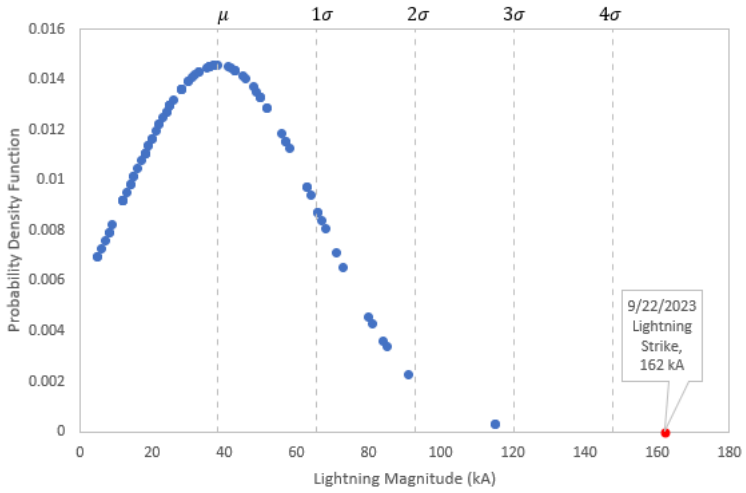
- NEI 99-02, Revision 7, Page 9, Lines 6-7
  Licensees can reduce the likelihood of a reactor accident by maintaining a low frequency of these initiating events.
- NEI 99-02, Revision 7, Pg 9 lines 21-22
  This indicator monitors the number of unplanned scrams. It measures the rate of scrams per year of operation at power and provides an indication of initiating event frequency.
- NEI 99-02, Revision 7, Page 9, Lines 25-26
  The number of unplanned scrams during the previous four quarters, both manual and automatic, while critical per 7,000 hours.
- NEI 99-02, Revision 7, Appendix D, Page D-1, Lines 14-16
  Then, if the licensee believes that there are unique circumstances sufficient to warrant an exception to the guidance as written, the licensee should submit a Frequently Asked Question to NEI for consideration at a public meeting with the NRC.
- NEI 99-02, Revision 7, Appendix E, Page E-1, Line 12, 18-19
  There are several reasons for submitting an FAQ: 3. To request an exemption from the guidance for plant-specific circumstances, such as design features, procedures, or unique conditions.

Event or circumstances requiring guidance interpretation:

On September 22, 2023 with Unit 3 at 100% power, a grid disturbance caused by a lightning strike in the switchyard, resulted in a generator lock out. The reactor protection system automatically actuated, and the unit tripped as designed. Subsequent analysis identified that due to the magnitude of the lightning strike, an induced voltage was created through the switchyard ground grid that arced across the relay contact that drives the string bus differential relay, resulting in a generator lockout.

To better understand the magnitude of the September 22, 2023, lightning strike, Florida Power and Light (FPL) used measurements provided by Vaisala weather services. Vaisala is a large weather services company with over 80 years of experience, currently operating in over 150 countries. The September 22, 2023, strike was of significantly greater magnitude than others historically observed in the area. The lightning strike that caused the scram was measured as 162,000 amperes (kA). The mean lightning strike magnitude was 37 kA. The magnitude of the September 22, 2023, lightning strike is illustrated below. Figure-1 is based on a data set of lightning strikes occurring within a half mile radius of the Turkey Point switchyard over the last ten years. As is shown, this lightning strike was greater than four standard deviations (99.85 percentile) above the mean making this lightning strike an extreme statistical outlier.

Figure-1



On September 22, 2023, the lightning arrestor system was fully operational. Grounding grid integrity testing is performed every six years in accordance with Station Area Operations Instructions. The latest testing results from 2022 showed no signs of degradation of the equipment that could have contributed to the event. Additionally, the switchyard and lightning arrestor system was in full compliance with design standards; namely, IEEE 998, *IEEE Guide for Direct Lightning Stroke Shielding of Substations* and IEEE 80, *IEEE Guide for Safety in AC Substation Grounding*. As expected, the substation lightning protection system absorbed and diverted the lightning strike to the substation grounding system, preventing it from reaching the primary conductors. This was evident by no faults on the primary conductors. As the lightning strike was being dissipated into the earth ground, the ground grid voltage in the station rose with respect to remote earth. The switchyard ground grid functioned as designed allowing all the equipment in the switchyard to rise at the same relative rate and voltage.

The direct cause of the scram was the unprecedented magnitude of the lightning strike which created an induced voltage through the switchyard ground grid that arced across the string bus differential relay contact, resulting in a generator lockout. As the lightning strike itself was an extreme statistical outlier, this scram was caused by unique circumstances beyond FPL's ability to foresee or control and there is sufficient basis to warrant exception to the guidance as written in accordance with NEI 99-02, Revision 7, Appendix D, Page D-1.

According to SECY 99-007, *Recommendations for Reactor Oversight Process Improvements*, an independent regulatory oversight process is one in which the agency's decisions are based on unbiased assessments of licensee performance. The ROP indicators are designed to provide the NRC with a framework to identify declining performance. NRC Inspection Manual Chapter 0305, Page 1, states that the "Operating Reactor Assessment Program collects information from inspections and performance indicators (PIs) to enable NRC to develop objective conclusions about a licensee's safety performance."

FPL recognizes that Performance Indicator IE01, *Unplanned Scrams per 7000 Critical Hours* does not generally differentiate scrams which should or should not be counted based on the cause of the scram. However, FPL seeks clarification of whether counting the September 22, 2023, scram would align with the purpose of the indicator. In general, IMC 308 and SECY-99-007 provide a framework for establishing NRC indicators that are risk informed and performance based. IMC 308 states, "The concept for setting performance thresholds includes consideration of risk and regulatory response to different levels of licensee performance." SECY-99-007, Appendix H, provides the basis for the establishment of risk-informed performance indicator thresholds. In these basis documents, consideration was given to limiting false positives which would unnecessarily trigger increased regulatory oversight. As described in SECY-99-007, Section H.2, "When establishing the thresholds, it was taken as guiding principles that they should not result in a large number of false positives (resource concern), and that thresholds should be set to capture meaningful changes." Counting the September 22, 2023, lightning strike scram would bring Turkey Point one step closer to increased regulatory oversight and the associated resource burden without a corresponding nexus to safety.

According to NEI 99-02, Revision 7, Page 9, the frequency of initiating events is an indication of the licensee's ability to minimize plant vulnerability. Page 9 also states the purpose of the Unplanned Scrams per 7000 Hours indicator is to provide an indication of initiating events frequency. The only similar event to this one is from a potential lightning induced scram in 1985. The Licensee Event Report (LER) for the 1985 scram (ML20134G691) does not state a lightning strike was the definitive cause of the scram, only that heavy electrical and rain storms were in progress and that lightning was the "most probable" cause. Prior to September 22, 2023, a lightning strike in the switchyard inducing a spurious scram such as this has not occurred at Turkey Point. Therefore, this scram is not an indication of Turkey Point Nuclear Plant's ability to minimize plant vulnerability. Additionally, as the lightning strike itself was an extreme statistical outlier, nor does it provide an indication of Turkey Point's performance. As such, the September 22, 2023, scram is a unique condition caused by plant-specific circumstances as described by NEI 99-02, Revision 7, Appendix E, Page E-1 and FPL believes counting this scram against the Unplanned Scrams per 7000 Critical Hours indicator would not align with the indicator's purpose.

This interpretation is consistent with NRC guidance regarding Performance Indicator IE03, Unplanned Power Changes per 7,000 Critical Hours. Indicator IE03 provides an exception for unique environmental conditions, stating:

> Unique environmental conditions which have not been previously experienced and could not have been anticipated and mitigated by procedure or plant modification, may not count, even if they are reactive.

This exception was incorporated into NEI 99-02 Revision 7 even though there is similar language in SECY-99-007 regarding the counting of unplanned power changes and scrams. In the case of both unplanned scrams and power changes SECY-99-007 Appendix A states the measure is a count of the number of events. SECY-99-007 regards both indicators as a rate and is not concerned with the cause of either scrams or power changes.

The September 22, 2023, scram is not indicative of Turkey Point's performance and counting it would not align with the purpose of the Unplanned Scrams Per 7000 Critical Hours indicator. FPL requests NRC guidance on whether this scram should be counted.

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

N/A

Potentially relevant FAQs:

FAQ 20-06: The licensee proposed counting two scrams as a single scram because the scrams had a related cause. In this case the NRC found the scrams in question had sufficiently different causes such that they should count as separate scrams. The NRC cited IMC 308 and SECY-99-007 indicating the IE01 performance indicator is a count of the number of unplanned scrams, manual or automatic, that have occurred regardless of cause. FPL understands and agrees performance indicator IE01 does not generally differentiate scrams which should or should not be counted based on the cause of the scram. However, FPL believes there are cases when the cause of a scram should be considered when determining whether or not to count a scram. For example, scrams that are not performance based, beyond the licensee's ability to foresee and control, and represent outlier events, should not be counted. FPL believes this exception is in alignment with the guidance contained in NEI 99-02, the purpose of the IE01 performance indicator, and the bases for the indicator described in IMC 308 and SECY-99-007.

Response Section

Proposed Resolution of FAQ:

The NRC staff completed their evaluation of this FAQ by reviewing the details of the event provided, LER 05000250/2023-03, information in Inspection Manual Chapter (IMC) 0308, Attachment 1, "Technical Basis for Performance Indicators," and guidance provided in NEI 99-02, Revision 7.

The purpose of the IE01, "Unplanned Scrams per 7,000 Critical Hours," performance indicator, as stated in NEI 99-02, Revision 7, and IMC 0308, Attachment 1, is to monitor "the number of unplanned scrams. It measures the rate of scrams per year of operation at power and provides an indication of initiating event frequency.

The review of this FAQ will focus on if granting an exemption for the September 22. 2023 scram counting against IE01, "Unplanned Scrams per 7,000 Hours" is warranted.

Guidance for this review is contained in NEI 99-02, Rev. 7 in the following areas:

- Page 9 - 11
- Appendix C, Background Information and Cornerstone Development, Lines 10-33

NEI 99-02, Revision 7, Page 9, lines 11-14

> ***Unplanned scram*** *means that the scram was not an intentional part of a planned evolution or test as directed by a normal operating or test procedure. This includes scrams that occurred during the execution of procedures or evolutions in which there was a high chance of a scram occurring but the scram was neither planned nor intended.*

NEI 99-02, Revision 7, Page 10, lines 36-41 and Page 11, lines 1-18

Examples of the types of scrams that are included:

- *Scrams that resulted from unplanned transients, equipment failures, spurious signals, human error, or those directed by abnormal, emergency, or annunciator response procedures.*
- *A scram that is initiated to avoid exceeding a technical specification action statement time limit.*
- *A scram that occurs during the execution of a procedure or evolution in which there is a high likelihood of a scram occurring but the scram was neither planned nor intended.*

Examples of scrams that are not included:

- *Scrams that are planned to occur as part of a test (e.g., a reactor protection system actuation test), or scrams that are part of a normal planned operation or evolution.*
- *Reactor protection system actuation signals or operator actions to trip the reactor that occur while the reactor is sub-critical.*
- *Scrams that are initiated at less than or equal to 35% reactor power in accordance with normal operating procedures (i.e., not an abnormal or emergency operating procedure) to complete a planned shutdown and scram signals that occur while the reactor is shut down.*
- *Plant shutdown to comply with technical specification Limiting Condition for Operation (LCO), if conducted in accordance with normal shutdown procedures which include a manual scram to complete the shutdown*

During the September 22, 2023, Turkey Point Unit 3 scram, from 100% power; a lightning strike caused a grid disturbance which resulted in a generator lock out. The reactor protection system automatically actuated, and the unit tripped. The NRC staff acknowledges the licensee's assertion that the magnitude of the lightning strike was more significant than what has historically been experienced in the area, however, due to the scram being unintentional and not part of a planned evolution or test, this scram would be considered unplanned under NEI 99-02, Revision 7. The NEI 99-02, Revision 7, list of examples that would not count as an unplanned scram are all related to planned evolutions that would result in a scram.

NEI 99-02 Revision 7, Appendix C, lines 10-33

INITIATING EVENTS CORNERSTONE

GENERAL DESCRIPTION

The objective of this cornerstone is to limit the frequency of those events that upset plant stability and challenge critical safety functions, during shutdown as well as power operations. When such an event occurs in conjunction with equipment and human failures, a reactor accident may occur. Licensees can therefore reduce the likelihood of a reactor accident by maintaining a low frequency of these initiating events. Such events include reactor trips due to turbine trip, loss of feedwater, loss of offsite power, and other reactor transients. There are a few key attributes of licensee performance that determine the frequency of initiating events at a plant.

PERFORMANCE INDICATORS

PRAs have shown that risk is often determined by initiating events of low frequency, rather than those that occur with a relatively higher frequency. Such low-frequency, high-risk events have been considered in

selecting the PIs for this cornerstone. All of the PIs used in this cornerstone are counts of either initiating events, or transients that could lead to initiating events (see Table in the main body of NEI 99-02). They have face validity for their intended use because they are quantifiable, have a logical relationship to safety performance expectations, are meaningful, and the data are readily available. The PIs by themselves are not necessarily related to risk. They are however, the first step in a sequence which could, in conjunction with equipment failures, human errors, and off-normal plant configurations, result in a nuclear reactor accident. They also provide indication of problems that, if uncorrected, increase the risk of an accident. In most cases, where PIs are suitable for identifying problems, they are sufficient as well, since problems that are not severe enough to cause an initiating event (and therefore result in a PI count) are of low risk significance. In those cases, no baseline inspection is required (the exception is shutdown configuration control, for which supplemental baseline inspections is necessary).

NEI 99-02, Appendix C discusses initiating events cornerstone performance indicators and states that risk is often determined by initiating events of low frequency, rather than those that occur with a relatively higher frequency and that low-frequency, high-risk events have been considered in selecting the performance indicators for the cornerstone. For the scram on September 22, 2023, the lightning strike was a low frequency initiating event that resulted in a reactor scram. The objective of the Initiating Events cornerstone, as described in NEI 99-02 Revision 7, is to limit the frequency of those events that upset plant stability and challenge critical safety functions during power operations.

Appendix C also states that the PIs used in this cornerstone are counts of either initiating events, or transients that could lead to initiating events. They have face validity for their intended use because they are quantifiable, have a logical relationship to safety performance expectations, are meaningful, and the data are readily available. The performance indicators by themselves are not necessarily related to risk. They are however, the first step in a sequence which could, in conjunction with equipment failures, human errors, and off-normal plant configurations, result in a nuclear reactor accident. For the Turkey Point scram, the lighting strike was an external event that caused an unplanned scram as defined in NEI 99-02, Revision 7. The counting of this event has face validity given it is quantifiable, had a logical relationship to the safety performance of the plant, is meaningful, and the data is readily available. Exemption from this event counting against IE01 “Unplanned Scrams per 7,000 Critical Hours” is not granted since scrams are a first step in a sequence that places reliance on equipment and human performance as responding mitigating systems, increasing the risk of nuclear accidents.

If appropriate, provide proposed rewording of guidance for inclusion in next revision:

N/A

PRA update required to implement this FAQ?

No

MSPI Basis Document update required to implement this FAQ?

No