

**NEI 99-02 FAQ 14-09 (Final)  
ANO Scram April 27, 2014**

**Plant:** Arkansas Nuclear One Unit 2 (ANO-2)  
**Date of Event:** April 27, 2014  
**Submittal Date:** July 29, 2014  
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**Performance Indicator:**

IE01 - Unplanned Scrams Per 7,000 Critical Hours

**Site-Specific FAQ (see Appendix D)?** No

**FAQ to become effective:** April 27, 2014

**Question Section**

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

Pg 10 Lines 11, 12, 13, 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.

Pg 10 Lines 33, 34

Anticipatory plant shutdowns intended to reduce the impact of external events, such as tornadoes or range fires threatening offsite power transmission lines, are excluded.

Pg 11 Lines 12, 13, 14

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.

**Event or circumstances requiring guidance interpretation:**

On 4/27/14 the grid operator declared a grid emergency and requested that both units at ANO be immediately taken off line. Operators in the control room of ANO-2 commenced a rapid power reduction, following station procedures, in preparation for removing the generator from the grid, as requested by the grid operator. During the rapid power reduction a severe Axial Shape Index (ASI) transient developed. Severe ASI (Axial Shape Index – a measure of the neutron flux location in the core) transients are unavoidable when performing rapid plant shutdowns near the end of core life, as was the case for ANO-2.

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The severity of these ASI transients presents a significant challenge to plant operators and an increased probability of a reactor trip. The only way to avoid severe ASI transients at this time in core life is to perform very slow power descents, which would not support the grid operator request in this event. During the rapid power reduction to take the ANO-2 unit offline, ASI rapidly approached operating limits and a manual scram was ordered. However, before the manual scram could be performed, the unit automatically tripped due to exceeding the ASI operating limit. Because the ASI transient was a direct result of a rapid shutdown excluded under the Anticipatory plant shutdown clause, Entergy believes the intent of the exclusion is met regardless of the method of reactor trip, which accomplished the same objective. Since plant shutdowns which are intended to reduce the impact of external events, in this case, tornadoes threatening offsite power transmission lines, are excluded from IE01, the ASI trip resulting from the rapid shutdown was not counted in the indicator value for ANO-2.

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

With respect to the example in the Unplanned Scrams Per 7,000 Critical Hours, Entergy has determined the shutdown on 4/27/14 to meet the "anticipatory" exclusion. The NRC Resident inspector has questioned whether the subject shutdown can be excluded as "anticipatory" since the ASI trip occurred at ~50% prior to the power level of 20% when the procedure for rapid shutdown would have directed a manual scram.

**Potentially relevant FAQs:**

FAQ 469

**Response Section**

**Proposed Resolution of FAQ:**

Due to the reduction of available offsite power transmission lines that provided power to Little Rock after the Mayflower power transmission substation was damaged from the 4/27/14 tornado, the subsequent ANO-2 shutdown should be considered "anticipatory". This anticipatory shutdown was necessary to protect the three remaining 500 kV transmission lines going into Little Rock from sustained overload conditions, over 120%.

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

None

**PRA update required to implement this FAQ? No**

**MSPI Basis Document update required to implement this FAQ? No**

**NRC Response**

This FAQ discusses a reactor trip event at ANO Unit 2 that occurred on April 27, 2014, after an Axial Shape Index (ASI) transient developed while performing a rapid shutdown. The licensee indicated that the grid operator requested both ANO units to be taken out off line immediately and it had to perform a

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rapid shutdown to fulfill such request. The licensee also indicated that ANO Unit 2 was near the end of core life and an ASI transient was unavoidable. The licensee proposed that this event should be considered an “anticipatory” shutdown that was necessary to protect power transmission lines and it should not count as an unplanned scram.

The NRC staff reviewed the information provided by the licensee in this FAQ and the Licensee Event Report (LER) for this event. The staff understands that the grid operator requested to take both ANO Units off line as soon as possible and that the cause for the ASI trip was an ineffective application of the reactivity management plan while performing the rapid shutdown.

The NRC staff also reviewed the following sections of NEI 999-02 as applicable to this FAQ.

Pg 12, Ln 1, 2

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.

The guidance in NEI 99-02 acknowledges that there are plant evolutions with high likelihood to result in a scram (as in the case of this FAQ) and that such scrams should be counted as unplanned if these were not planned or intended. In this event, the licensee understood that this evolution was likely to result in a scram, but did not plan or intend for a scram to occur automatically as a result of an ASI trip.

Pg 12, Ln 12, 13, 14

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.

The automatic ASI trip occurred at about 50% power level. According to the FAQ, the rapid shutdown process would prompt the operator to manually scram the plant at 20% power. However, the plant had an automatic scram above 35% power and the manual scram as intended by the rapid shutdown procedure could not be performed.

The staff concluded that this event should count as an unplanned scram. While this shutdown was performed in response to a grid request, the licensee was aware that this evolution presented a high likelihood of a scram and failed to successfully complete the rapid shutdown procedure.