



October 17, 2008

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 07-0288A
KPS/LIC/JF: R0
Docket No. 50-305
License No. DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING
LICENSE AMENDMENT REQUEST 224 - STEAM LINE ISOLATION FUNCTION
APPLICABILITY

Pursuant to 10 CFR 50.90, on April 14, 2008, Dominion Energy Kewaunee, Inc. (DEK) requested an amendment to Facility Operating License Number DPR-43 for Kewaunee Power Station (KPS) (reference 1). This proposed amendment (License Amendment Request (LAR) 224) would revise the Operating License by modifying the KPS Technical Specifications (TS) to add a new footnote to Kewaunee TS Table TS 3.5-4, "Instrument Operating Conditions for Isolation Functions." The new footnote would be applicable to KPS TS Table TS 3.5-4, Items 2a, 2b, 2c and 2d, which apply to the main steam line isolation (SLI) actuation circuitry.

On September 2, 2008, the NRC transmitted to DEK a request for additional information (RAI) (reference 2) regarding the proposed amendment. On September 16, 2008, during a conference call between DEK and the NRC staff to discuss the RAI, the NRC staff requested that DEK reply formally to the RAI questions. The RAI questions and associated DEK responses are provided in attachment 1 to this letter.

The attached responses and supplemental information do not change the conclusions of the no significant hazards determination provided in reference 1.

A complete copy of this submittal has been transmitted to the State of Wisconsin as required by 10 CFR 50.91(b)(1).

Attachment:

1. Response to NRC Request for Additional Information Regarding Kewaunee License Amendment Request 224

Commitments made in this letter: None

References:

1. Letter from G. T. Bischoff (Dominion) to Document Control Desk (NRC), "License Amendment Request – 224, Steam Line Isolation Function Applicability," dated April 14, 2008. [ADAMS Accession No. ML081060476]
2. Email from P. Tam (NRC) to G. Riste, C. Sly and J. Gadzala (DEK), "Kewaunee - Draft RAI re. proposed amendment on steam line isolation function applicability (TAC MD8544)," dated September 2, 2008. [ADAMS Accession No. ML082490148]

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ATTACHMENT 1

**RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING
KEWAUNEE LICENSE AMENDMENT REQUEST 224**

**KEWAUNEE POWER STATION
DOMINION ENERGY KEWAUNEE, INC.**

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Pursuant to 10 CFR 50.90, on April 14, 2008, Dominion Energy Kewaunee, Inc. (DEK) requested an amendment to Facility Operating License Number DPR-43 for Kewaunee Power Station (KPS) (reference 1). This proposed amendment (License Amendment Request (LAR) 224) would revise the Operating License by modifying the KPS Technical Specifications (TS) to add a new footnote to Kewaunee TS Table TS 3.5-4, "Instrument Operating Conditions for Isolation Functions." The new footnote would be applicable to KPS TS Table TS 3.5-4, Items 2a, 2b, 2c and 2d, which apply to the main steam line isolation (SLI) actuation circuitry.

On September 2, 2008, the NRC staff transmitted to DEK a draft request for additional information (RAI) (reference 2) regarding the proposed amendment. On September 16, 2008, during a conference call between DEK and the NRC staff to discuss the RAI, the NRC staff requested that DEK reply formally to the RAI questions.

The RAI questions and associated DEK responses are provided below.

NRC Question 1

Modes of Operation: Currently TS 3.5 does not specify for which modes the SLI functions are required to be operable. Therefore, the SLI functions are required to be operable in all modes. However, the first paragraph of page 4 of 10 of the application states: "The steam line isolation function (manual and automatic) currently must be operable in the OPERATING, HOT STANDBY, HOT SHUTDOWN and INTERMEDIATE SHUTDOWN modes."

- a. Since TS 3.5 does not specify the modes in which the SLI functions are required, discuss the basis for the request to limit the modes of operability.*
- b. Describe how TS 3.5 is currently being applied.*
- c. Explain the basis for the applicability of NUREG 1431 (STS), Table 3.3.2-1 in lieu of the requirements of TS 3.5.*
- d. Explain the apparent discrepancy between the TS 3.5 requirement for operability in all modes and the first paragraph of page 4 of 10 of the LAR.*

Response:

DEK has not yet converted[#] the KPS custom TS (CTS) to the improved standard TS (STS) found in NUREG-1431 (reference 3). The current KPS CTS format and terminology is different from the STS format and terminology. This difference explains the questions regarding modes of applicability for the steam line isolation instrumentation.

Unlike NUREG-1431, Table 3.3.2-1, KPS TS 3.5 does not specifically state the modes in which the Steam Line Isolation (SLI) function must be operable. However, LAR 224 (reference 1) does not propose to change the current modes in which the SLI function must be operable. LAR 224 does discuss the correlation between the KPS CTS and STS in order to show the similarity of the proposed change to the KPS CTS and the current STS. The proposed change to the KPS CTS (adding Note 3) does not modify the currently approved modes of applicability of the SLI instrumentation.

LAR 224 provides the following statement (reference 1, Attachment 1, page 4 of 10):

“The steam line isolation function (manual and automatic) currently must be operable in the OPERATING, HOT STANDBY, HOT SHUTDOWN and INTERMEDIATE SHUTDOWN modes.”

This statement is based on usage of the KPS CTS as described in TS 3.5.c. The instrument functions described in KPS TS Table 3.5-4 must be operable above the mode (end-state) identified in Column 6 of the table. If the function does not meet the minimum number of operable channels (Column 3), or does not meet the minimum degree of redundancy (Column 4), then the plant must be placed in the mode specified in Column 6 (in the case of SLI, HOT SHUTDOWN). When the end-state of the required operator actions (Table TS 3.5-4, Column 6) has been reached, no additional action is required even if the function is still inoperable. However, in the case of the SLI function, the end state in Column 6 is modified by Note 1. Note 1 states that if the minimum conditions are not met within 24 hours, steps shall be taken to place the plant in a COLD SHUTDOWN condition.

Therefore, the SLI function is not required to be operable in all modes. Neither the KPS TS nor the KPS TS Bases require the SLI function to be operable in all modes. If the SLI function was required to be operable in all modes, the mode specified in Column 6 (HOT SHUTDOWN) would not be an acceptable end-state for inoperable SLI instrumentation. The statement in LAR 224 provided above was intended to demonstrate that the intent of STS Table 3.3.2-1 is met when the final end-state in the KPS CTS is reached. Specifically, when the final end-state in the KPS CTS is reached, the SLI instrumentation is no longer required to be operable.

[#] KPS is currently engaged in a project to convert to STS.

- a. LAR 224 proposes no change to the modes of applicability (operability) for the SLI function. LAR 224 proposes the addition of a new Note, which would permit the SLI function to be inoperable when both Main Steam Isolation Valves (MSIVs) are closed and deactivated.
- b. KPS TS 3.5, Table TS 3.5-4, Item No. 2, "Steam Line Isolation," requires that prior to exceeding COLD SHUTDOWN conditions (i.e., exceed 200°F) the Minimum Operable Channels (Column 3) condition must be met. In addition, when the reactor coolant temperature is greater than 200°F, and the "Minimum Operable Channel" requirement of Column 3 is not met, the action described in Column 6 is required to be performed, including the Note 1 action.

For example, if the reactor is in the HOT STANDBY mode (e.g., RCS average temperature at normal operating temperature of approximately 570°F and Fission Power < 2%), and the Minimum Operable Channels (Column 3) condition, cannot be met, then the reactor must be placed in HOT SHUTDOWN as soon as practicable (in accordance with TS Table TS 3.5-4, Column 6 and KPS TS 3.5.c). Furthermore, if the Minimum Operable Channels (Column 3) condition is still not met within 24 hours of discovery, then (in accordance with Table TS 3.5-4, Item 2, Note 1), steps must be taken to place the reactor in COLD SHUTDOWN.

- c. The basis for the SLI circuit as discussed in NUREG 1431, Section B 3.3.2, (reference 3) is provided below (note that KPS does not have a P-12 permissive).

"This Function must be OPERABLE in MODES 1 and 2, and in MODE 3, when above the P-12 setpoint, when a secondary side break or stuck open valve could result in rapid depressurization of the steam lines. Below P-12, this Function is not required to be OPERABLE because the High High Steam Flow coincident with SI Function provides the required protection. The Steam Line Isolation Function is required to be OPERABLE in MODES 2 and 3 unless all MSIVs are closed and [de-activated]. This Function is not required to be OPERABLE in MODES 4, 5, and 6 because there is insufficient energy in the secondary side of the unit to have an accident."

The basis for when the SLI function is required to be operable at KPS is similar to STS; that is, the SLI function is required to be operable when a secondary side break or stuck open valve could result in a rapid depressurization of the steam lines.

The response to NRC Question 2 below provides for a comparison of KPS TS modes with STS modes. The KPS TS require the reactor to be placed in at least the HOT SHUTDOWN mode as soon as practicable after discovery of an inoperable SLI function. In addition, if the minimum conditions of Table TS 3.5-4, Column 3 are not met within 24 hours of discovery of the inoperable SLI function, the reactor must be placed in the COLD SHUTDOWN mode. With the unit in COLD SHUTDOWN (RCS average coolant temperature \leq 200°F) or below, there is insufficient energy in the

secondary side of the plant to have an accident. Note that the KPS TS required end-state for inoperable SLI instrumentation (COLD SHUTDOWN, reactor temperature $\leq 200^{\circ}\text{F}$) is a more conservative (less energy) condition than the STS required end-state (STS Mode 3, reactor temperature $\leq 350^{\circ}\text{F}$). The KPS TS are also more restrictive than STS 3.3.2 conditions D, F and G, with respect to SLI instrumentation. STS 3.3.2, conditions D, F and G require the reactor be placed in Mode 4 – Hot Shutdown. However, the KPS TS require the reactor to be placed in the COLD SHUTDOWN mode, which corresponds to STS Mode 5 - Cold Shutdown.

The STS basis for SLI applicability in modes 2 and 3 is a simple statement only; no justification is provided. The KPS basis for SLI applicability in the comparable modes is that with the MSIVs closed and deactivated, the MSIVs are performing their safety function and the MSIVs' isolation actuation circuit is not required to be operable. This is the same basis as for the KPS OPERATING mode (STS mode 1); with the MSIVs closed and deactivated, the isolation function is completed.

- d. As discussed in the response to question 1.c above, there is no discrepancy between TS 3.5 requirements and the modes of applicability described in the first paragraph of page 4 of 10 of the LAR.

NRC Question 2

TS 3.5 Relationship with the STS: The application proposes that the SLI functions be operable in the OPERATING, HOT STANDBY, HOT SHUTDOWN, and INTERMEDIATE SHUTDOWN modes, unless both MSIVs are closed and de-activated. The STS requires the SLI functions to be operable during POWER OPERATION (Mode 1), STARTUP (Mode 2) and HOT STANDBY (Mode 3). Describe how the modes in the Kewaunee TS relate to the modes in the STS.

Response:

KPS modes are as follows from KPS TS 1.0.j* (reference 4):

MODE	REACTIVITY $\Delta k/k$	COOLANT TEMP T_{avg} °F	FISSION POWER %
OPERATING	< 0.25%	$\sim T_{oper}$	≥ 2
HOT STANDBY	< 0.25%	$\sim T_{oper}$	< 2
HOT SHUTDOWN	(1)	≥ 540	~ 0
INTERMEDIATE SHUTDOWN	(1)	$> 200 < 540$	~ 0
COLD SHUTDOWN	$\leq -1\%$	≤ 200	~ 0
REFUELING	$\leq -5\%$	≤ 140	~ 0
LOW POWER PHYSICS TESTING	(To be specified by specific tests)		
(1) Refer to the required SHUTDOWN MARGIN as specified in the Core Operating Limits Report.			

STS modes are as follows from STS Table 1.1-1 (reference 3):

MODE	TITLE	REACTIVITY CONDITION (k_{eff})	% RATED THERMAL POWER ^(a)	AVERAGE REACTOR COOLANT TEMPERATURE (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	$\geq [350]$
4	Hot Shutdown ^(b)	< 0.99	NA	$[350] > T_{avg} > [200]$
5	Cold Shutdown ^(b)	< 0.99	NA	$\leq [200]$
6	Refueling ^(c)	NA	NA	NA

(a) Excluding decay heat.

(b) All reactor vessel head closure bolts fully tensioned.

(c) One or more reactor vessel head closure bolts less than fully tensioned.

* The listing of modes OPERATING through REFUELING have been reversed from their presentation in KPS TS 1.0.j to facilitate comparison with STS modes.

Generally, the following comparisons can be made (STS – KPS TS):

STS Mode	Corresponding KPS TS Mode	Notable Differences
1 – Power Operation	OPERATING	Power level: STS > 5% vs. KPS TS ≥ 2%
2 – Startup	HOT STANDBY	Power level: STS ≤ 5% vs. KPS TS < 2%
3 – Hot Standby	HOT SHUTDOWN	Minimum Temperature: STS ≥ 350 °F vs. KPS TS ≥ 540 °F
4 – Hot Shutdown	INTERMEDIATE SHUTDOWN	Maximum Temperature: STS < 350 °F vs. KPS TS < 540 °F
5 – Cold Shutdown	COLD SHUTDOWN	None
6 - Refueling	REFUELING	Maximum Temperature: STS undefined vs. KPS TS ≤ 140 °F

As shown above, it can be confusing to compare STS with KPS TS when discussing modes of applicability. In KPS TS, the HOT SHUTDOWN mode corresponds to STS Hot Standby mode, whereas the STS Hot Shutdown mode corresponds to KPS TS INTERMEDIATE SHUTDOWN mode.

NRC Question 3

OPERATING Mode: The application proposes that if both MSIVs are closed and deactivated, the SLI function is not required for the OPERATING mode. The STS footnote is only applicable in HOT STANDBY (Mode 3) for the Steam Line Pressure Negative Rate - High function and in STARTUP and HOT STANDBY modes (Modes 2 and 3) for the other SLI functions. The STS footnote is not applicable for the POWER OPERATION mode (Mode 1). Discuss the basis for proposing that the OPERATING mode be included in the proposed change.

Response:

See the response to NRC Question 2 for background information relative to this answer. Per STS Table 3.3.2.1, the SLI function is required to be operable in modes 1, 2 and 3, with the exception of the Steam Line Pressure Negative Rate - High function, which is only required to be operable in mode 3. KPS does not have the Steam Line Pressure Negative Rate - High function, so this function is not applicable to the proposed change.

As stated in LAR 224 (reference 1, Attachment 1, page 4 of 10):

“When the MSIVs are closed and de-activated, they are in their safe configuration and are providing the required safety related function to mitigate a potential SLB event. With the MSIVs closed and de-activated, any steam generated by the SGs can be diverted to the atmosphere.”

Therefore, with both steam lines isolated in the OPERATING mode, the SLI function is already accomplished. Consequently, with the MSIVs closed and deactivated, it is not necessary to have the SLI instrumentation operable, because there is no further function for the instrumentation to perform. For this reason KPS has requested that the proposed new Note apply to the KPS OPERATING mode.

In addition, the STS Power Operation mode applies beginning at > 5% Rated Thermal Power, whereas, KPS OPERATING mode applies at \geq 2% Fission Power. With the lower power definition of OPERATING mode for KPS, the unit can be at \geq 2% power and still have the MSIVs closed. This is acceptable because the KPS plant design, as described in the KPS Updated Safety Analysis Report (reference 5), includes five main steam safety valves (MSSV) and one power operated relief valve (PORV) on each main steam line.

The MSSVs are located outside reactor containment and upstream of the MSIVs. At full power, these valves combined (ten total) are designed to relieve steam at a rate of 7,660,380 lbm/hr at 1181 psig. This flow ensures that the main steam system pressure does not exceed 110% of the steam generator shell-side design pressure for the worst-case loss-of-heat-sink event. Two MSSVs per steam generator provide sufficient heat removal capacity when the plant is in the HOT SHUTDOWN mode of operation.

The PORVs are also located outside reactor containment and upstream of the MSIVs. These valves are automatically controlled by pressure or may be manually operated from the main control board in the control room. Each PORV is capable of discharging steam at a rate of 372,500 lbm/hr at 1050 psig.

NRC Question 4

HOT SHUTDOWN Mode: The application proposes that the SLI functions be operable in the HOT SHUTDOWN mode, unless both MSIVs are closed and de-activated. The STS does not require the SLI to be operable in HOT SHUTDOWN (Mode 4), regardless of MSIV position. Discuss the basis for proposing that the HOT SHUTDOWN mode be included in the proposed change.

Response:

See the response to NRC Question 2 above for background information relating to this answer. As described in the response to NRC Question 2, the KPS HOT SHUTDOWN mode generally corresponds to STS Mode 3 – Hot Standby (with temperature differences). The STS requires the SLI function to be operable in Mode 3. Therefore, it is correct to require the SLI function to be operable in the KPS HOT SHUTDOWN mode.

References

1. Letter from G. T. Bischoff (Dominion) to Document Control Desk (NRC), "License Amendment Request – 224, Steam Line Isolation Function Applicability," dated April 14, 2008. [ADAMS Accession No. ML081060476]
2. Email from P. Tam (NRC) to G. Riste, C. Sly and J. Gadzala (DEK), "Kewaunee - Draft RAI re. proposed amendment on steam line isolation function applicability (TAC MD8544)," dated September 2, 2008. [ADAMS Accession No. ML082490148]
3. NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 3.1, dated December 1, 2005.
4. Kewaunee Power Station, Operating License and Technical Specifications, through amendment 198, dated August 22, 2008.
5. Kewaunee Power Station, Updated Safety Analysis Report, Revision 20 – Version 2, dated 07/09/2008.