Dominion Energy Kewaunee, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

Dominion

March 10, 2008

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

Serial No. 06-140E
KPS/LIC/CDS: R6
Docket No. 50-305
License No. DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
RESPONSE TO NRC SUPPLEMENTAL QUESTIONS REGARDING LICENSE AMENDMENT REQUEST 215, "MODIFICATION OF INTERNAL FLOODING DESIGN BASIS"

Pursuant to 10 CFR 50.90, Dominion Energy Kewaunee, Inc. (DEK) submitted a request for approval of a proposed amendment to the Kewaunee Power Station (KPS) Updated Safety Analysis Report (USAR) (reference 1). The proposed amendment would clarify the KPS design criteria associated with internal flooding. The license amendment request was followed by several additional submittals which responded to NRC requests for additional information on this topic. The responses were provided in letters dated April 17, 2007 (reference 2), May 4, 2007 (reference 3), September 17, 2007 (reference 4), and February 1, 2008 (reference 5).

On February 6, 2008, a telephone conference was held between members of the NRC staff and DEK on this subject. During the telephone conference, the NRC staff requested that DEK provide additional clarification regarding two of the RAI responses submitted in reference 5. Subsequently, on February 29, 2008, two additional questions regarding this submittal were communicated to DEK. The specific questions and DEK responses are provided in Attachment 1 to this letter.

This response does not change the conclusions of the no significant hazards determination as submitted 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).

If you have any questions or require additional information, please contact Mr. Craig Sly at (804) 273-2784.

Very truly yours,

Gerald T. Bischof
Vice President - Nuclear Engineering

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Gerald T. Bischof, who is Vice President – Nuclear Engineering of Dominion Energy Kewaunee, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 10TH day of March, 2008.

My Commission Expires: May 31, 2010.

Vicki L. Hull
Notary Public

VICKI L. HULL
Notary Public
Commonwealth of Virginia
140542
My Commission Expires May 31, 2010

References:

1. Letter from Leslie Hartz (DEK) to Document Control Desk, "License Amendment Request 215 – Modification of Internal Flooding Design Basis," dated March 17, 2006 (ADAMS Accession Nos. ML060760589).
2. Letter from E. S. Grecheck (DEK) to Document Control Desk, "Response to NRC Request for Additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated April 17, 2007 (ADAMS Accession No. ML071080206).
3. Letter from G. T. Bischof (DEK) to Document Control Desk, "Correction of Response to NRC Request for additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated May 4, 2007.
4. Letter from G. T. Bischof (DEK) to Document Control Desk, "Response to Second NRC Request for Additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated September 17, 2007 (ADAMS Accession No. ML072640343).
5. Letter from G. T. Bischof (DEK) to Document Control Desk, "Response to Questions Regarding License Amendment Request 215, 'Modification of Internal Flooding Design Basis,' " dated February 1, 2008.

Attachments:

1. Response to NRC Supplemental Questions Regarding Kewaunee License Amendment Request 215, "Modification of Internal Flooding Design Basis."
2. Simplified Drawing of Service Water Piping in the Area of the Emergency Diesel Generator Rooms.
3. Proposed Revisions to Marked-up Kewaunee USAR Pages Included in LAR 215.

Commitments made by this letter:

1. DEK will ensure that all non-Class I/I* piping that is excluded as a potential flooding source is covered by a program that provides reasonable, documented, and periodic assurance that there is no significant corrosion. Internal monitoring has not been fully implemented at KPS. Implementation of this process will occur by the end of 2009.
2. DEK commits to perform appropriate record reviews and walkdowns to identify any additional cast iron valves that may be present in non-Class I/I* piping evaluated to maintain its pressure boundary during a DBE. These walkdowns and reviews will be completed by June 2, 2008.

cc: Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
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Mr. P. D. Milano
U.S. Nuclear Regulatory Commission
Mail Stop O 8 C2
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NRC Senior Resident Inspector
Kewaunee Power Station

Public Service Commission of Wisconsin
Electric Division
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Madison, WI 53707

ATTACHMENT 1

RESPONSE TO NRC SUPPLEMENTAL QUESTIONS REGARDING KEWAUNEE LICENSE AMENDMENT REQUEST 215 "MODIFICATION OF INTERNAL FLOODING DESIGN BASIS"

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

Response to NRC Questions Regarding Kewaunee License Amendment Request 215

Pursuant to 10 CFR 50.90, Dominion Energy Kewaunee, Inc. (DEK) submitted a request for approval of a proposed amendment to the Kewaunee Power Station (KPS) Updated Safety Analysis Report (USAR) (reference 1). The proposed amendment would clarify the KPS design criteria associated with internal flooding. The license amendment request was followed by several additional submittals which responded to NRC requests for additional information on this topic. The responses were provided in letters dated April 17, 2007 (reference 2), May 4, 2007 (reference 3) September 17, 2007 (reference 4), and February 1, 2008 (reference 5).

On February 6, 2008, a telephone conference was held between members of the NRC staff and DEK on this subject. During the telephone conference, the NRC staff requested that DEK provide additional clarification regarding two of the RAI responses submitted in reference 5. Specifically, clarification was requested regarding the DEK responses to questions 3 and 6 in reference 5. Subsequently, on February 29, 2007, two additional questions regarding this submittal were communicated to DEK. These questions were also related to the RAI responses in reference 5. Specifically, these two questions were related to question 7 in reference 5. The specific questions and DEK responses are provided below.

This response does not change the conclusions of the no significant hazards determination as submitted in reference 1.

Issue 1 – Clarification of Response to Question 3, "*Emergency Diesel Generator Room*"

A response to the question above was submitted on February 1, 2008 (reference 5). Subsequently, during the telephone discussion on February 6, 2008, the NRC staff requested that additional information be provided regarding DEKs response to this question. The NRC staff requested that DEK discuss the effects of the SW leak currently discussed in KPS USAR Section 8.2.3.5 in more detail. Specifically, the NRC staff requested that DEK provide a discussion of what effect the postulated leak would have on equipment operability and how procedures direct operators to respond to such a leak.

It is important to note that the discussion in USAR section 8.2.3.5 emanates from an answer provided to a hypothetical question, beyond design basis consideration, that had been raised by the AEC Electrical Branch during original licensing of Kewaunee. The 1971 AEC question (reference 9) focused specifically on the effect of a rupture "on the emergency power systems." While beyond the scope of the original question, the present question and response will also address other safety related equipment that could be effected by the hypothetical leak.

DEK Response to Issue 1

Background

As discussed in reference 8, the Kewaunee licensing basis does not assume a rupture in the safety related service water line either running through or in the immediate vicinity of the Emergency Diesel Generator (EDG) rooms. The following question was forwarded to Kewaunee by the AEC on September 23, 1971 (reference 9):

> *"Figure 1.2-1 of the FSAR shows service water lines either running through or in the immediate vicinity of the emergency diesel generator rooms. Provide an analysis of the effect of a rupture of one of these service water lines on the emergency power systems."*

This question was focused specifically on the effect of the hypothetical rupture "on the emergency power systems." In late 1971, Kewaunee provided the following response (reference 10):

> *"The rupture of a service water line in an Emergency Diesel Generator Room could result in the loss of the generator or the safeguards bus in that room. Administrative operation from the Control Room of Type I Service Water valving would isolate the break and, if required, realign the Service Water supplies through the intact piping from the operating Service Water Pumps."*

This response also focused specifically on the effect of the hypothetical rupture "on the emergency power systems." This response is contained in section 8.2.3.5 of the KPS USAR, Revision 20. The following discussion assumes that the rupture is significant enough to necessitate service water isolation.

Equipment affected directly by the leak

The equipment affected directly by a hypothetical service water rupture in an EDG room includes the EDG and its associated safeguards bus in the EDG room. There is a possibility of a loss of offsite power depending on the size of the leak and the length of time it takes to respond to the leak. The supply breakers from the reserve auxiliary transformer (RAT), the tertiary auxiliary transformer (TAT), and the main auxiliary transformer (MAT) to the 4160 V emergency safeguard busses 1-5 (serves A train equipment) and 1-6 (serves B train equipment) are located in their corresponding EDG room. The primary disconnects from the RAT, TAT, and MAT could be shorted if the water level in the EDG room reached approximately 18 inches.

If the hypothetical rupture of a service water line in an EDG room caused loss of the EDG or safeguards bus in that room due to flooding or spray, the equipment in that room would become INOPERABLE along with the loads supplied by the bus in that room.

Equipment that is deprived of flow due to the leak and how this affects the operability of the equipment

As stated in the response from 1971 above, "Administrative operation from the control room of Type I Service Water valving would isolate the break..." This would be accomplished by closure of the appropriate Auxiliary Building service water header isolation valve (SW-10A or SW-10B) or the main service water header isolation valve (SW-3A or SW-3B) per procedure OP-KW-AOP-SW-001, "Abnormal Service Water System Operation." The service water lines to the EDG cooling water heat exchangers branch off upstream of SW-10A or SW-10B . Therefore, service water to the associated EDG would not be isolated if the hypothetical break occurred. Subsequent isolation of an Auxiliary Building service water header using SW-10A or SW-10B would render all equipment in the Auxiliary Building and safeguards alley for the train that relies on the isolated service water supply INOPERABLE.

With service water flow available to both EDGs, "the effect of a rupture of one of these service water lines on the emergency power systems" is limited to the direct effect discussed above. Closure of the SW-10A or SW-10B valve would isolate the auxiliary building service water supply to the respective train of equipment. Realignment of service water through intact piping by opening the service water main header isolation valves (SW-3A and SW-3B) could be accomplished if necessary.

In the A EDG room, there are A train service water lines of 24, 20, 16, 6, and 4 inches and a B train service water line of 16 inches. In the B EDG room there are B train service water lines of 20, 6, and 4 inches. In the case where a B service water line ruptured in the B EDG room or the A service water line ruptured in the A EDG room, splitting the main service water headers with valves SW-3A or SW-3B and turning off the service water pumps for the affected train would stop the leak and leave the unaffected service water train fully OPERABLE.

In the scenarios discussed above, one train of service water would be intact and available for plant cooling and shutdown. Emergency power would be available to the equipment in the intact train except for the scenario of the "B" service water line rupture in the "A" EDG room. In that case the "B" EDG would remain operable. However, no flow is available to the "B" service water train equipment downstream of the rupture. In addition, emergency power would not be available to the "A" train equipment. Therefore, equipment downstream of the rupture on the "B" service water train and equipment that relies on "A" train service water would both be considered

INOPERABLE. Service water would be available, however, through the intact "A" service water train with the "B" service water pumps running on power from the "B" EDG. In this scenario, a Technical Specification required shutdown sequence would be entered if a plant trip had not already occurred.

The "B" charging pump, turbine driven auxiliary feedwater (TDAFW) pump, power operated relief valves (PORVs), and "B" battery charger, among other equipment, would be operable for cooldown. The "B" AFW pump would be available until the condensate storage tank (CST) emptied and a "mixed" train of component cooling using the "B" pump and "A" component cooling heat exchanger would be available.

Automatic and operator actions necessary to mitigate the event

The Control Room operators would be made aware of the event by loss of operating equipment, safeguards alley flood level indication and/or turbine building sump level indication. Procedure OP-KW-AOP-SW-001, "Abnormal Service Water System Operation," would be entered based on these indications.

This procedure has steps that would direct operators to:

- Locally check the service water system for leaks.
- Check system operation and pressure.
- Locally isolate leaks if possible.
- Isolate the Auxiliary Building service water header isolation valve (SW-10A or SW-10B) for the train in question, if necessary.
- Realignment of the service water supplies through the opposite train piping.

Realignment of the service water supplies through the opposite train piping can be accomplished by opening service water header isolation valves, SW-3A and SW-3B. (Note: SW-3A and SW-3B are normally open, but isolate on low service water pressure to separate the service water system into two independent trains.) In the event of a catastrophic failure of a service water line in an EDG room, SW-3A and SW-3B would automatically close, isolating train A and train B portions of the main service water header from each other. The flood water would cause the safeguards bus in the associated EDG room to trip.

In the event of a loss of offsite power, Procedure E-0, "Reactor Trip or Safety Injection," would be entered and, at step 4, a transition to ES-0.1, "Reactor Trip Response," would occur. At step 4 of ES-0.1, charging flow would be established per procedure OP-KW-NOP-CVC-002, "Charging and Volume Control." Assuming a loss of emergency safeguards bus 1-5, OP-KW-NOP-CVC-002 contains a precaution and limitation to verify availability of a charging pump suction flow path prior to starting a charging pump.

The precaution also specifies that automatic switching of the charging pump suction is not available.

Although the service water pipes discussed above are safety related and deterministically not assumed to rupture or leak, from a risk perspective there is some probability that a random break or leak might occur. The potential for a random rupture or leak in a service water line in the EDG rooms is modeled in the current PRA analysis for the plant. The model indicates that a large rupture of this piping is a very unlikely event and that the dominant risk posed to the plant by these service water lines is the potential for a smaller leak that causes spray and subsequent loss of emergency switchgear in the associated EDG room. As a result of this recent PRA modeling, a modification has been installed to reduce the risk associated with spray from the more likely smaller leaks. This results in a significant reduction in the overall risk posed by a leak in a service water line in an EDG room.

Issue 2 – Clarification of Response to Question 6, "*Safe Shutdown*"

Question 6 of the RAI response (reference 5) reads as follows:

"Safe Shutdown:

The licensee has stated that KPS is a Hot Shutdown Plant. The KPS Technical Specifications (TSs) define Hot Shutdown as ~0% fission power with a core operating limits report (COLR)-specified shutdown margin and an average reactor coolant system temperature of ≥ 540 ° F. The Standard Technical Specifications, and the TSs for other similar age units, define hot shutdown as K_{eff} < 0.99 and average reactor coolant system temperature between, but not including, 200° F and 350° F. On this basis, provide the following:

a. A flooding safe shutdown equipment list in the USAR. If not, discuss why not necessary.

b. A description about why the licensee believes KPS is a hot shutdown plant. Address the basis for limiting the scope of protected safety-related equipment to that required for hot shutdown, considering that the NRC letter from R. C. DeYoung, NRC, to E. W. James, WPSC, dated September 26, 1972, requested review of non-Category I equipment failures that could adversely affect the performance of safety-related equipment either required for safe-shutdown of the facility or to limit the consequences of an accident. The response from Wisconsin Public Service Corporation dated October 31, 1972, similarly addresses safety-related equipment either required for safe-shutdown of the facility or to limit the consequences of an accident.

c. *For flooding events, a justification as to why the safe shutdown condition after a flooding event should not be defined as an average reactor coolant system temperature of < 350 °F.*

d. *A time limit for achieving cold shutdown conditions following a flooding event."*

A response to the question above was submitted on February 1, 2008 (reference 5). Subsequently, during the telephone discussion on February 6, 2008, the NRC staff requested that additional information be provided regarding DEKs response to this question.

The NRC staff requested that DEK provide additional discussion for limiting the scope of equipment that needs to be protected from flooding (RAI 6.b above). Specifically, the NRC staff requested DEK's basis for limiting the scope of equipment required to be protected from flooding to safe shutdown equipment while not including other Class I equipment needed to "limit the consequences of an accident."

DEK Response to Issue 2

On September 26, 1972 the AEC sent Kewaunee a request to determine whether the failure of any non-Category I (seismic) equipment, particularly in the circulating water system and fire protection system, could result in a condition, such as flooding or the release of chemicals, that might potentially adversely affect the performance of safety-related equipment required for safe shutdown of the facility or to limit the consequences of an accident (reference 6). Recent research of internal correspondence associated with the original Kewaunee review and response to the 1972 letter indicates that potential flooding of the internal containment spray system and the safety injection system were included in the review of equipment that needed protection. These systems are not required for safe shutdown, but are used to limit the consequences of an accident. The safety injection system is, however, on DEK's flooding Safe Shutdown Equipment List and is protected as an alternate boration path.

The Kewaunee response to the AEC was submitted on October 31, 1972 (reference 7). The response indicated that the scope of the review included analysis of the effects of failure of non-Category I (seismic) failures on the performance of safety related equipment required for safe shutdown or to limit the consequence of an accident. In summary, the review actually conducted matched the requested scope of the review and included the effects of failure of non-Category I (seismic) failures on the performance of safety related equipment required for both safe shutdown and to limit the consequence of an accident.

Based on the above, and in order to ensure an appropriately conservative approach for internal flooding consistent with current regulatory guidance associated with other design basis threats (e.g. external flooding, seismic, tornado missiles), DEK modifies its position that only safe shutdown equipment needs to be protected from the effects of internal flooding. DEK proposes instead to substitute the position that equipment to be protected from the effects of flooding includes, "Category I equipment needed for safe shutdown of the reactor or to limit the consequences of an accident."

Consistent with the original licensing basis of Kewaunee, the term "accident" is meant to consider only the Design Basis Accidents (DBAs) identified in Chapter 14 of the USAR. It includes the credited safety equipment identified in Chapter 14 and the necessary support equipment to keep the credited safety equipment functional. Subsequent to issuance of the original license, design basis events such as station blackout (SBO) and Anticipated Transient Without Scram (ATWS) have been introduced into the licensing basis of the plant over the years. Each have come with their own specific regulatory requirements, including safe shutdown criteria, and will not be added to the list of credited DBA safety equipment unless they have been incorporated into the Chapter 14 DBAs in the USAR.

Also, as stated in our October 31, 1972 response regarding potential internal flooding caused by a line failure in the vicinity of engineered safety equipment, "...because of safety equipment redundancy and design arrangement, the functional purpose of the safety equipment would not be jeopardized in the event of failure of any of these lines." This was Kewaunee's position in 1972 and is considered as part of the current licensing basis today. This basis is supported by the proposed correction to USAR Section B.5 that has been made part of this amendment request via the response to question number 5 of the third RAI response set (reference 5). This expands the consideration of redundancy as it relates to safe shutdown equipment to include the functional purpose of equipment used to limit the consequences of an accident. This does not supersede the assumption of additional single failures used in accident analyses; however, it is considered as an acceptable approach for the determination of protection requirements with regard to an internal flooding event.

A copy of the proposed USAR changes associated with this position is provided in Attachment 3.

<u>Issue 3 – Clarification of Response to Question 7, "*Non-Seismic Class I/I* Piping,*" Item c, "*Cast Iron Valves*"</u>

Question 7.c of the RAI response (reference 5) reads as follows:

c. Cast Iron valves:

i. For non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, identify the number of cast iron valves, their associated system, and location. Additionally, describe the importance of these cast iron valves as a potential flooding source.*

ii. For non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, describe how primary and secondary stresses were combined in the evaluation of the stresses in cast iron valves.*

iii. For non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, describe why the method of combining primary and secondary stresses is acceptable in cast iron valves.*

iv. For non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, describe the acceptance criteria for stress levels in the cast iron valves as compared to the valve's ultimate tensile stress (UTS).*

v. For non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, provide a justification for the allowed stress levels for cast iron valves.*

A response to the question above was submitted on February 1, 2008 (reference 5). Subsequently, on February 29, 2008, the NRC staff requested that additional information be provided regarding DEKs response to this question.

Specifically, the NRC noted that DEK indicated that it would replace any identified cast iron valves that would be potential flooding sources. However, DEK did not commit to look for these valves. The NRC would like a DEK commitment to look for these valves.

<u>DEK Response to Issue 3</u>

DEK commits to perform appropriate record reviews and walkdowns to identify any additional cast iron valves that may be present in non-Class I/I* piping evaluated to maintain its pressure boundary during a DBE. These walkdowns and reviews will be completed by June 2, 2008.

Issue 4 - Clarification of Response to Question 7, "*Non-Seismic Class I/I* Piping,*" Item a, "*Corrosion*"

Question 7.a of the RAI response (reference 5) reads as follows:

a. Corrosion

i. For non-Class I/I piping that has been evaluated to maintain its pressure boundary during a design basis earthquake (DBE), describe any programs, inspections, evaluations, or other investigations into corrosion to ensure that the assumed/required integrity remains valid.*

ii. For the non-Class I/I piping evaluated to maintain its pressure boundary during a DBE, describe any future actions planned to evaluate or assess corrosion.*

A response to the question above was submitted on February 1, 2008 (reference 5). Subsequently, on February 29, 2008, the NRC staff requested that additional information be provided regarding DEKs response to this question.

The NRC noted that DEK identified several programs that monitor corrosion in systems that are potential flooding sources. However, it does not appear that these programs cover all systems that are potential flooding sources. The NRC requested clarification from DEK that all piping that is a potential flooding source has been covered by a program that provides assurance there is no significant corrosion.

DEK Response to Issue 4

In order to be considered as a potential flood source, non-Class I/I* piping must be normally wetted and located in or have flow paths to areas of the plant that contain equipment required for the safe shutdown of the plant or to limit the consequences of a DBA. In order for piping to be excluded as a potential flood source, it must be demonstrated that the piping would withstand the effects of a seismic event while maintaining its pressure boundary integrity.

In Question 7.a of reference 5, the NRC staff requested DEK to "...describe any programs, inspections, evaluations, or other investigations into corrosion to ensure that the assumed/required integrity remains valid." There is no single program that specifically addresses corrosion in all excluded flood source pipe segments. The programs identified in the DEK response to Question 7.a addressed some, but not all, of the currently excluded non-Class I/I* flood source pipe segments. However, corrosion in the remaining excluded pipe segments (and any future piping which may be excluded as a flooding source) will be addressed by full implementation of plant programs related to license renewal. Corrosion in these piping segments will be monitored and addressed by a combination of walkdowns, maintenance driven inspection activities, and the KPS corrective action program. These programs and their association with corrosion monitoring are as follows:

Monitoring of Internal Surfaces

Internal corrosion of piping systems will be broadly addressed at Kewaunee by full implementation of the work management process. Nuclear Fleet Administrative Procedure WM-AA-100, "Work Management," establishes the Dominion nuclear fleet expectations for how work is identified, selected, planned, scheduled, executed, closed out, and critiqued. The work order process is implemented by surveillance procedures, preventive and corrective maintenance procedures, or other routinely scheduled tasks to ensure the detection of aging effects prior to the loss of component intended function. The requirements in WM-AA-100 incorporate license renewal commitments for Surry, North Anna, and Millstone Power Stations.

WM-AA-100 contains expectations for conducting visual inspections of mechanical components during work activities in order to identify and manage aging effects. The personnel performing these inspections at KPS will be trained and qualified to perform these activities in accordance with the governing procedures. WM-AA-100 also provides expectations for when to perform and how to document the inspections of equipment during work activities. This includes the requirements for documenting maintenance performed on plant equipment and is applicable to all corrective maintenance, troubleshooting, and preventive maintenance, testing, and modification installation activities.

Under the process, corrosion monitoring is accomplished by a broad sampling process versus a detailed line-by-line inspection program. Due to the comprehensive scope of the work order process, the process provides the opportunity to visually inspect the internal surfaces of many components constructed of typical system materials and exposed to typical system environments, including stagnant locations, during preventive and corrective maintenance activities on an ongoing basis. The combination of piping material and water systems which comprise the potential flood sources at Kewaunee are typical and are bounded by the scope of the work control process.

The work order process also includes a post-job critique to document as-found equipment conditions and to provide trending of aging. The governing procedures have established acceptance criteria. A Condition Report is initiated when the established acceptance criteria are not met.

The processes described above were implemented to meet commitments associated with license renewal for other plants in the Dominion nuclear fleet. Currently, KPS does not fully implement the processes discussed above. KPS has not yet submitted an application for license renewal, but plans to submit by the end of the 3rd quarter of 2008. KPS will implement these processes by the end of 2009.

Monitoring of External Surfaces

External corrosion of piping systems is broadly addressed at Kewaunee by the use of general walkdowns and inspections performed by the Nuclear Auxiliary Operators (NAOs) per General Nuclear Procedure GNP-03.30.02, "Conduct of Operations." GNP-03.30.02 provides a list of the general inspections to be performed during operator rounds, and includes specific inspection details related to monitoring excessive corrosion.

System Engineers perform visual inspections during walkdowns of plant systems and components during both normal operation and refueling outages. Dominion Nuclear Fleet Guidance and Reference Document ER-AA-SYS-1002, "System Engineering Walkdowns," provides guidance for System Engineer walkdowns and a checklist of attributes to be observed, including inspection criteria related to system aging and degradation. Indications of degradation identified during these walkdowns are documented in the corrective action program in accordance with Fleet Administrative Procedure PI-KW-200, "Corrective Action."

Conclusion

DEK will ensure that all non-Class I/I* piping that is excluded as a potential flooding source is covered by a program that provides reasonable, documented, and periodic assurance there is no significant corrosion.

The methods for internal and external corrosion monitoring discussed above address plant areas containing equipment required for safe shutdown or to limit the consequences of a DBA. The methods are general enough to identify significant corrosion of any component within the scope of these inspections, walkdowns, and maintenance activities. In addition, existing procedures set expectations to identify and document any observation of an abnormal or degraded plant condition during these activities. Internal monitoring has not been fully implemented at KPS. Full implementation of this process will occur by the end of 2009. Accordingly, it is unlikely that significant corrosion of excluded flood sources will go undetected.

Based on the above, DEK believes piping segments that have been excluded as potential flooding sources are covered or will be covered in the future by programs that provide reasonable, documented, and periodic assurance that there is no significant corrosion.

References:

1. Letter from Leslie Hartz (DEK) to Document Control Desk, "License Amendment Request 215 – Modification of Internal Flooding Design Basis," dated March 17, 2006. (ADAMS Accession Nos. ML060760589).
2. Letter from E. S. Grecheck (DEK) to Document Control Desk, "Response to NRC Request for Additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated April 17, 2007. (ADAMS Accession No. ML071080206).
3. Letter from G. T. Bischof (DEK) to Document Control Desk, "Correction of Response to NRC Request for additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated May 4, 2007.
4. Letter form G. T. Bischof (DEK) to Document Control Desk, "Response to Second NRC Request for Additional Information Regarding License Amendment Request 215, Modification of Internal Flooding Design Basis," dated September 17, 2007. (ADAMS Accession No. ML072640343).
5. Letter from G. T. Bischof (DEK) to Document Control Desk, "Response to Questions Regarding License Amendment Request 215, 'Modification of Internal Flooding Design Basis,' " dated February 1, 2008.
6. Letter for R. C. DeYoung (AEC) to E. W. James (WPSC), dated September 26, 1972.
7. Letter from E. W. James (WPSC) to R. C. DeYoung (AEC), WPS Review of Non-Category I (Seismic) Equipment.
8. Amendment No. 4 to the Kewaunee Power Station Facility Description and Safety Analysis Report (FDSAR) was submitted in a letter from G. F. Hrubesky of WPS to Dr. Peter A Morris of the AEC Division of Reactor Licensing on April 1, 1968.
9. FSAR question (Q8.16) was forwarded to Kewaunee by the AEC on September 23, 1971.
10. December 15, 1971, Kewaunee provided the following response as part of Amendment No. 13 to the FSAR.

ATTACHMENT 2

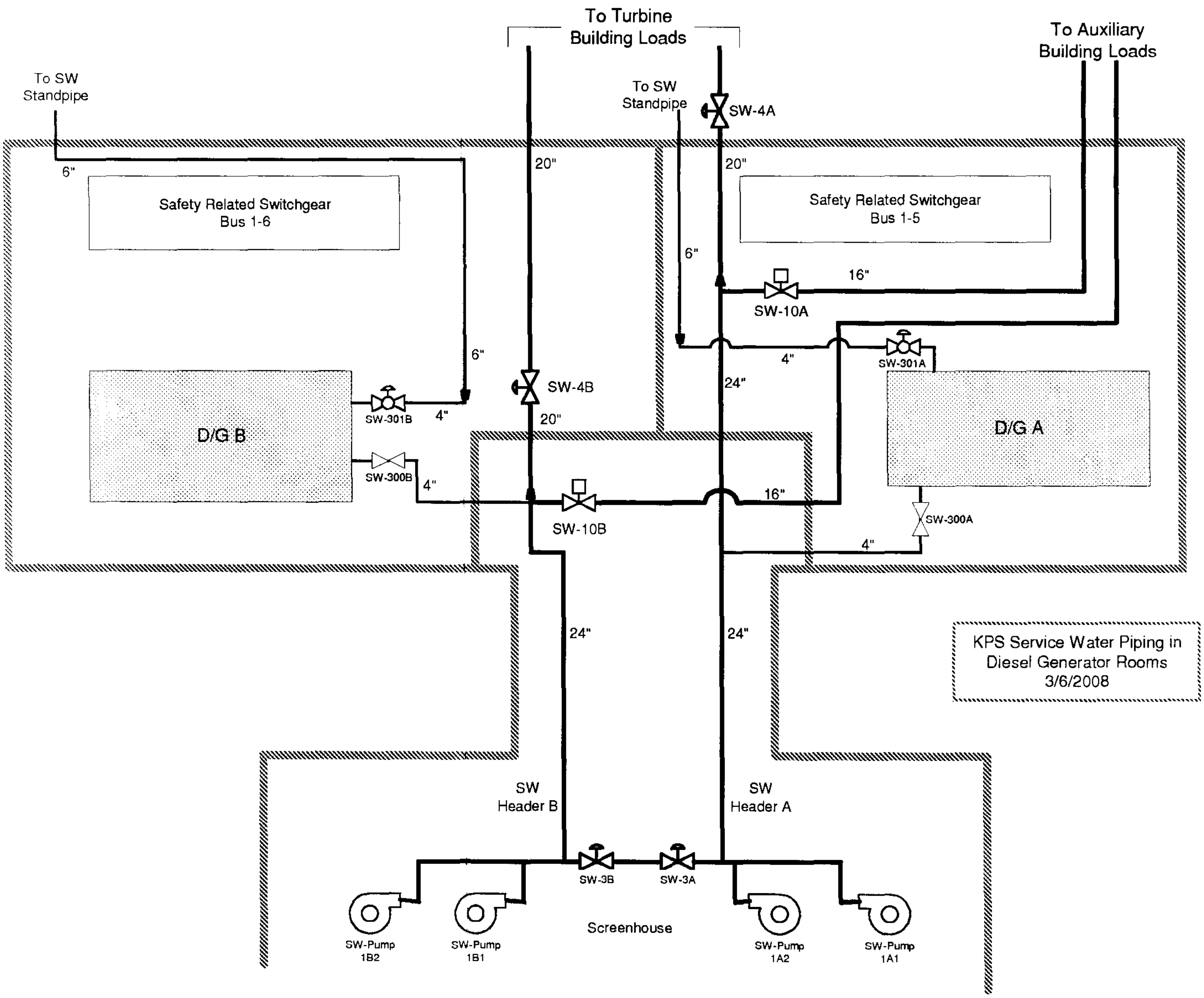
RESPONSE TO NRC SUPPLEMENTAL QUESTIONS REGARDING KEWAUNEE LICENSE AMENDMENT REQUEST 215 "MODIFICATION OF INTERNAL FLOODING DESIGN BASIS"

SIMPLIFIED DRAWING OF SERVICE WATER PIPING IN THE AREA OF THE EMERGENCY DIESEL GENERATOR ROOMS

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

SIMPLIFIED DRAWING OF SERVICE WATER PIPING IN THE AREA OF THE EMERGENCY DIESEL GENERATOR ROOMS



ATTACHMENT 3

RESPONSE TO NRC SUPPLEMENTAL QUESTIONS REGARDING KEWAUNEE LICENSE AMENDMENT REQUEST 215 "MODIFICATION OF INTERNAL FLOODING DESIGN BASIS"

PROPOSED REVISIONS TO MARKED-UP KEWAUNEE USAR PAGES INCLUDED IN LAR 215

KEWAUNEE POWER STATION

DOMINION ENERGY KEWAUNEE, INC.

B.11 INTERNAL FLOODING

B.11.1 GENERAL DISCUSSION

Internal flooding can occur as a result a rupture of a pipe or tank in a system containing or connected to a large volume of water. This section does not address flooding from other liquids such as chemicals or diesel fuel that are stored in tanks. In these cases, cubicles or dikes contain liquids due to failure of non-seismic components or spillage occurs remote from any safety-related equipment.

Internal flooding resulting from sources outside containment (other than natural phenomenon) was addressed in the original licensing process for Kewaunee. Amendment 17 to the FSAR addressed internal flooding from a postulated rupture in a service water line in the vicinity of the diesel generator rooms. Section 8.2.3.5 discusses the impact of this postulated rupture. The postulated rupture of a high-energy line (HELB) that also includes flooding consequences was addressed by FSAR Amendment Nos. 24, 27, and 28 that added Appendix 10A to the FSAR. Appendix 10A provided detailed design criteria and assessments of potential HELB events. Although the rupture of a service water pipe was addressed in the FSAR, the general criteria for the evaluation of internal flooding from a rupture of a pipe or tank was not captured in the FSAR.

In 2005, re-constitution of the design criteria for internal flooding was initiated in support of several internal flood protection modifications. When the operating license for Kewaunee was issued, the AEC was pursuing the issue of internal flooding for previously licensed plants. The AEC developed a set of guidelines for internal flooding protection. These guidelines were not sent to Kewaunee for consideration; however, the guidelines have been considered in the re-constitution of the internal flooding design criteria.

This section applies only to internal flooding resulting from the failure of a non-class 1 component that is below the criteria for high-energy systems. The HELB design criteria is addressed specifically in Section 10A.

B.11.2 FLOODING DESIGN CRITERIA

The plant must withstand the consequences of an internal flooding event in such a manner that it retains the capability to achieve and maintain the reactor in a safe shutdown condition and to limit the consequences of a design basis accident. Toward this end, the design criteria for internal flooding evaluations are:

(a) Only non-Class I/I* pipe or tanks are considered to fail unless specifically evaluated to withstand the Design Basis Earthquake (DBE).

(b) Only failures in piping and branch runs exceeding 1 inch are considered.

(c) Pipe and tank failures assume the single most limiting failure in an area as determined by maximum flood level calculated in an area.

(d) Operator actions and design features are considered, but an additional single failure is not.

(e) Flooding is assumed coincident with the loss of offsite power if it increases the consequences of a flood.

(f) The effects of water spraying, dripping, or splashing on sensitive equipment are to be considered in the assessment of available equipment.

Kewaunee was licensed as a hot shutdown plant, therefore, safe shutdown following an internal flood is hot shutdown. There is no specific time requirement for the reactor to achieve cold shutdown. However, sufficient equipment must be protected to begin the cooldown process and reduce RCS temperature to or below 350°F within 72 hours following an internal flooding event. The Safe Shutdown Equipment List for internal flooding is documented in Attachment 1 of Reference 34.

Some non-Class I/I* pipes have been excluded from consideration as a flood source based on evaluations to verify that the pipes have reasonable assurance to sustain the combined effects of a design basis earthquake and both pressure and deadweight loading without a loss of pressure boundary function. This assurance is obtained from experience based evaluations and/or by bounding evaluations. The criteria from ASME Section III Code for evaluation for level D loading or from ASME Section III Appendix F are used to establish reasonable assurance against leakage from a pressure boundary.

The failure of a pipe or tank is assumed as a result of DBE seismic loads. Only one pipe or tank component is assumed to fail. The failure is conservatively assumed to be the worst case (complete double-ended rupture) with respect to flooding potential in each area evaluated. The consequences of lesser breaks resulting in dripping or spray are also considered. Multiple pipe or tank failures are not considered in the analysis for a pipe or tank rupture because the potential interactions, such as pipe whip or jet impingement, are not applicable for lines that are not defined as high-energy lines. As discussed in Section 10A, high-energy lines would consider additional failures as a consequence of the initial rupture, if warranted. Multiple failures resulting from seismic loadings are also not considered as credible because of the robust design of non-Class I/I* piping. Specific evaluations of non-Class I/I* piping in the Class I portion of the Turbine Building basement (Safeguards Alley) and portions of the Auxiliary Building have demonstrated that the Class II and Class III piping in these areas are capable of withstanding the effects of a DBE without failure. The piping in these areas was installed to the same standards used throughout the station for Class II, III, and III* piping.

Operator actions and design features are considered in the evaluation of internal flooding consequences. The design features include level sensing devices to alert operators to take action, check valves to prevent backflow through pipes, barriers to protect safety-related equipment (including existing walls, doors, dikes, etc.), and circulating water pump trips to minimize flood sources. Operator actions in response to control room indications are the primary means of identification and termination of flooding sources.

Flooding evaluations assume a 30 minute period for identification and isolation of flooding sources with the exception of a break in the Circulating Water expansion joints and the rupture of a 20" Service Water header in the Turbine Building. An expansion joint failure would be alarmed almost immediately in the

Control Room. Low pressure in the SW header would cause alarms and valve re-alignment indications in the Control Room. If indications of excessive water in the Turbine Building are received, the Control Room operators are instructed by procedure to verify that the Circulating Water pumps have tripped and, if necessary, manually trip the pumps thus terminating an expansion joint failure flooding event. The Circulating Water pump trip would occur with either scenario. For abnormal Service Water indications in the Control Room, operators are instructed by procedure to dispatch personnel to identify the flood source and to close valves isolating Service Water in the Turbine Building. The CW pump trip circuitry is not credited in the evaluation of internal flooding resulting from an expansion joint failure or the Service Water header failure in the Turbine Building.

The two scenarios above have critical operator response times of less than 30 minutes. The operator response times for these manual actions have been validated in the plant control room simulator.

For flooding sources in the Turbine Building (other than the Circulating Water expansion joint or the 20" Service Water header) and sources in the Auxiliary Building, specific sump alarms would direct Control Room operators by procedure to dispatch operations personnel to identify and isolate any flooding sources. The significant, high-volume flood sources identified by plant walkdowns were evaluated by tabletop discussion and isolation of the source was judged to be achievable within the 30-minute period assumed in the flooding evaluations. The tabletop validations were based on information available in the control room to assist the deployment of operations personnel into the plant to identify flood sources. The validation effort did not consider the use of random searches to locate flooding sources.

Loss of offsite power (LOOP) is assumed unless the LOOP results in less limiting consequence. Design features that rely on electric power to operate (such as sump pumps) are only credited for flood protection if they are powered by site emergency power sources.

B.11.3 CLASS I EQUIPMENT PROTECTION

The criteria for Class I equipment protection is stated in Section B.5.a. It states that Class I items are protected against damage from the rupture of a pipe or tank resulting in serious flooding to the extent that the Class I function is impaired. ~~Consistent with the AEC itemized flooding guidelines, t~~The Class I functions required following the rupture of a pipe or tank which results in internal flooding are those functions necessary to achieve and maintain safe shutdown of the reactor and to limit the consequences of a design basis accident. For internal flooding, safe shutdown is defined as the ability to bring the reactor to hot shutdown, cooldown to 350°F within 72 hours and, ultimately, achieve cold shutdown. Consistent with the original licensing basis of Kewaunee, the term "design basis accident" is meant to consider only the Design Basis Accidents (DBAs) identified in Chapter 14 of the USAR. It includes the credited safety equipment identified in Chapter 14 and the necessary support equipment to keep the credited safety equipment functional. The ability to achieve and maintain safe shutdown and to limit the consequences of a design basis accident demonstrates the effectiveness of the plant design and flood protection measures to protect necessary Class I equipment. The installed flood protection measures include drain line check valves, flooding barriers, level alarms, and a circulating water pump trip. These measures provide additional protection to the original plant design against flood damage. The criteria for protection of Class I equipment has not changed, however, the means by which to comply with the criteria has become more effective.

The following criteria specify the design considerations for the protection of necessary Class I equipment from internal flooding events:

- Separation for Redundancy: A single failure of any postulated internal flooding source, as defined in B.11.2, shall not result in loss of a function important to the safe shutdown of the plant. Redundant equipment credited for maintaining a safe shutdown function shall be separated or protected to assure safe shutdown capability in the event of an internal flooding event.

- Access Doors and Alarms: Watertight barriers credited for protection from flooding of equipment important to the safe shutdown of the plant shall have all access doors or hatches fitted with reliable switches and circuits that provide an alarm in the Control Room when the access is open.

- Sealed Water Passages: Passages or piping and other penetrations through walls of a flood zone containing equipment requiring protection to assure to the safe shutdown of the plant shall be sealed against water leakage from any postulated internal flooding source, as defined in B.11.2. Credited seals shall maintain their integrity during a Design Basis Earthquake.

- Class I Watertight Structures: Walls, doors, panels, or other compartment closures credited to protect equipment important to the safe shutdown of the plant from damage due to flooding from any postulated internal flooding source, as defined in B.11.2, will maintain their integrity during a Design Basis Earthquake.

- Water Level Alarms and Trips: Plant areas containing a postulated internal flooding source, as defined in B.11.2 whose rupture could result in flood damage to equipment important to the safe shutdown of the plant shall have level alarms and pump trips (where necessary) that alarm in the Control Room. Redundancy of switches is required. Critical pump (i.e., high volume flow, such as condenser circulating water pumps) trip circuits should meet the IEEE 279 criteria to the extent practical.

These flooding criteria do not specify that flood protection equipment is to be safety related. Flood protection equipment is not intended to mitigate any aspect of a design basis accident. Therefore, consistent with the Kewaunee quality classification criteria, such equipment does not meet the criteria to be classified as safety related.

B.11.4 CONCLUSION

The ability to cope with internal flooding from the rupture of a pipe or tank is determined per the criteria provided in sections B.11.2 and B.11.3 above. Equipment required for the safe shutdown of the reactor and to limit the consequences of a design basis accident must be protected from the flood consequences consistent with Section B.5.a.

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