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DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
REPORT IN RESPONSE TO MARCH 12, 2012 INFORMATION REQUEST
REGARDING FLOODING ASPECTS OF RECOMMENDATION 2.3

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued, "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," to all power reactor licensees and holders of construction permits in active or deferred status. Flooding Recommendation 2.3 requires licensees to perform flood protection walkdowns to identify and address plant-specific degraded, non-conforming, or unanalyzed conditions and verify the adequacy of monitoring and maintenance for protection features.

For Flooding Recommendation 2.3, Enclosure 4 of the letter states that within 180 days of the NRC's endorsement of the walkdown process, each licensee will submit its final response for the requested information. The response should include a list of any areas that are unable to be inspected due to inaccessibility and a list of any areas deemed "Restricted Access" during the site walkdowns, along with a schedule for when the walkdowns will be completed. It should also include an evaluation and justification of reasonable assurance that the inaccessible features are available and will perform the external flood protection or mitigation function for the full duration of the flood condition.

In a letter dated May 31, 2012, the NRC endorsed NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," which Dominion Energy Kewaunee, Inc. (DEK) used to conduct its flooding walkdowns for Kewaunee Power Station (KPS). Attachment 1 provides the walkdown report as DEK's response to Flooding Recommendation 2.3 for KPS.

Walkdowns were performed for the flood protection features identified for KPS. No areas were designated as "Inaccessible" and no areas were designated as "Restricted Access" during the site walkdowns. Therefore, no subsequent walkdowns are scheduled.

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ATTACHMENT 1

**FLOODING WALKDOWNS RESULTS REPORT FOR RESOLUTION OF
FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATION 2.3:
FLOODING**

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

Dominion Energy Kewaunee, Inc.

Kewaunee Power Station

**Flooding Walkdowns Results Report for
Resolution of Fukushima Near-Term Task Force
Recommendation 2.3: Flooding**

November 2012

**Kewaunee Power Station
Flooding Walkdowns Results Report for
Resolution of Recommendation 2.3: Flooding**

Table of Contents

<u>SECTION</u>	<u>PAGE</u>
I. Introduction	3
II. Flooding Walkdowns Summary.....	5
A. Design Basis Flood Hazard Level(s)	5
B. Protection and Mitigation Features Considered in the Licensing Basis	9
C. Warning Systems to Detect the Presence of Water	10
D. Effectiveness of Flood Protection Features.....	11
E. Implementation of the Walkdown Process	14
F. Results of the Flood Protection Feature Walkdowns.....	16
G. Cliff-edge Effects and Available Physical Margin	17
H. Other Planned and/or Newly Installed Flood Protection Features or Measures.....	18
III. Conclusions	20
IV. References.....	21

I. Introduction

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the U.S. Nuclear Regulatory Commission (NRC) established the Near Term Task Force (NTTF) in response to Commission direction. The NTTF was tasked with conducting a review of NRC regulations and processes and determining if the NRC should make additional improvements to its regulatory system.

A set of recommendations made by the task force was included in a report provided to the Commission. Although the NRC concluded that continued plant operation did not pose an imminent risk to public health and safety, the Commission directed the Staff (in the Staff Requirements Memorandum (SRM) to SECY-11-0093) to determine those recommendations that should be implemented without unnecessary delay. In SECY-11-0124 the NRC suggested the recommendations that should be implemented without delay, including the development of three information requests to be made under 10 CFR 50.54(f).

The NRC issued its request for information pursuant to 10 CFR 50.54(f) on March 12, 2012 (Reference 1), requesting information related to the following NRC NTTF Recommendations:

- Recommendation 2.1: Seismic
- Recommendation 2.1: Flooding
- Recommendation 2.3: Seismic
- Recommendation 2.3: Flooding
- Recommendation 9.3: Emergency Preparedness

Enclosure 4 to the NRC 50.54(f) letter, addressed gathering information related to NTTF Recommendation 2.3: Flooding, as amended by the SRM associated with SECY-11-0124 and SECY-11-0137, and requested that licensees:

1. Perform flood protection walkdowns using an NRC-endorsed walkdown methodology,
2. Identify and address plant-specific degraded, nonconforming, or unanalyzed conditions, as well as, cliff-edge effects through the corrective action program, and consider these findings in the Recommendation 2.1 hazard evaluations, as appropriate,
3. Identify any other actions taken or planned to further enhance the site flood protection,
4. Verify the adequacy of programs, monitoring and maintenance for protection features, and

5. Report to the NRC the results of the walkdowns and corrective actions taken or planned.

As noted above, the NRC's 50.54(f) letter states that licensees are to report "cliff-edge effects" in response to the NRC's request for information. However, the Nuclear Energy Institute (NEI) document NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features* (Reference 2), provides clarification regarding reporting of "cliff-edge effects." NEI 12-07 states that "cliff-edge effects" were defined by the NRC NTTF Report, which noted that "the safety consequences" of a flooding event may increase sharply with a small increase in the flooding level. While the NRC used the same term as the NTTF Report in its 50.54(f) information request related to Flooding Recommendation 2.3, the information that the NRC expects utilities to obtain during the Recommendation 2.3 walkdowns is different. The NRC is now differentiating between cliff-edge effects (which are dealt with in Recommendation 2.1) and a new term, Available Physical Margin (APM). Therefore, as clarified in NEI 12-07, APM information was collected during the flooding walkdowns, but is not reported in this response to the 50.54(f) information request.

As stated in Dominion letter to the NRC dated June 11, 2012 (Reference 3), Dominion confirmed that it will use the NRC-endorsed guidance in NEI 12-07 as the basis for performing the flooding walkdowns at Kewaunee Power Station (KPS). Consistent with this commitment, Appendix D of NEI 12-07 was used as the basis for developing the responses to the questions in the NRC 50.54(f) letter. The NRC acknowledged its endorsement of the NEI 12-07 walkdown guidance in letters to NEI dated May 31, 2012 (Reference 4) and June 14, 2012 (Reference 5). This report is formatted to be aligned with the questions posed in NRC 50.54(f) letter and outlined in NEI 12-07.

II. Flooding Walkdowns Summary

The information presented in this report is a summary of the flooding walkdown packages and results reports providing documentation of the required inspections. The sections of the report below, A through H, respond to the NRC 50.54(f) information request and are consistent with the outline provided by NEI 12-07, Appendix D. NEI 12-07, Appendix D, provided additional clarification on the specific information requested in Enclosure 4 of the NRC 50.54(f) letter.

Note that the elevations provided herein are from Mean Sea Level (MSL) unless otherwise noted.

A: Design Basis Flood Hazard Level(s)

NRC Information Request:

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

Dominion Response:

Current design and licensing documents, including flood response procedures, were reviewed to identify site-specific features credited for protection and mitigation against external flooding events. Because of the vintage of the Kewaunee plant, it is licensed to the draft General Design Criterion (GDC) 2, dated July 11, 1967 (as commented on by the Atomic Industrial Forum) which meets the intent of Appendix A to 10 CFR Part 50, GDC 2. The following are the requirements for KPS, and come from the draft GDC wording (circa 1967) and not the current GDC wording.

“Those systems and components of reactor facilities that are essential to the prevention of accidents that could affect the public health and safety or to the mitigation of their consequences shall be designed, fabricated, and erected in accordance with performance standards that enable the facility to withstand, without loss of the capability to protect the public, the additional forces that might be imposed by natural phenomena such as earthquakes, tornadoes, flooding conditions, winds, ice, and other local site effects. The design bases so established shall reflect:

- 1) Appropriate consideration of the most severe of these natural phenomena that have been recorded for the site and the surrounding area, and
- 2) An appropriate margin for withstanding forces greater than those recorded, in view of uncertainties about the historical data and their suitability as a basis for design.”

Existing (current) design and licensing documents including external event and/or flood response procedures were reviewed to identify site-specific features credited for protection and mitigation against external flooding events. The KPS Updated Safety Analysis Report (USAR) (Reference 6), Section 2.6, provides a description of external flooding events and resultant flooding levels. The two external flooding events applicable to the site are a Lake Michigan seiche and a precipitation event.

The major portion of the site is 20 feet or more above the International Great Lakes Datum (IGLD) for Lake Michigan. The normal water level of Lake Michigan is El. 577 feet. The maximum Lake Michigan water level on record was El. 582.3 feet. Per USAR Section 2.1, flooding due to rainfall and snowmelt has been investigated and is not a problem at the site. The characteristics of the site and the site surroundings have been investigated to establish bases for storm and flood protection criteria. Soil and subsurface layers have a high clay content, which inhibits percolation and promotes drainage to Lake Michigan.

Seiche

The site layout is such that the basement floor level (El. 586 feet) of buildings containing safety related equipment is entirely below grade except for the east facing screenhouse structure. During the initial site licensing process, the Atomic Energy Commission (AEC) independently calculated the probable maximum seiche lake level for Kewaunee to be at El. 589.9 feet. Kewaunee accepted this elevation as the assumed seiche level. This value is below the grade level of all other plant buildings (minimum grade elevation of 606 feet) except the screenhouse. Therefore, only the screenhouse, which has surfaces exposed to the seiche elevation of 589.9 feet, is subject to walkdowns for flood protection and mitigation for a seiche event.

To accommodate this high water level, the Kewaunee screenhouse was modified during original construction. These modifications are detailed in USAR Section 2.6.2. These modifications were considered adequate by the AEC to protect against adverse effects to safety-related equipment.

The seiche produced probable maximum water level is a relatively fast transient, on the order of 30 minutes or less. The controlled seepage into the screenhouse is captured by a large circulating water pump pit for storage and subsequent removal.

There were no differences or contradictions in the Lake Michigan seiche flood hazard levels found in the design or licensing basis documents.

Flood Level Due to a Precipitation Event

The precipitation flood mechanism was evaluated for KPS. The site is designed for water from a precipitation event to run off or drain away from power block buildings. The maximum probable rainfall may be determined from the 100-year hourly rainfall intensity of 2.5 inches which compares favorably with the greatest hourly rainfall shown in the Weather Bureau records for Green Bay, Wisconsin. A specific flood elevation at various site structures has not been established for the precipitation event. Therefore, for the purpose of the flooding walkdowns, at each site location around the power block structures, the flood level is assumed to be the ground level with no accumulation or significant ponding.

The average and maximum annual precipitation recorded at various locations on the Wisconsin Shore of Lake Michigan is provided in USAR Table 2.6-3. Based on the improbability of flooding from rain and the height of the safety related equipment above the maximum lake water level, it was concluded that flooding due to a rainfall event is not a problem at KPS.

There are no large rivers or streams in the vicinity of the site. The major part of the site is 20 feet or more above the normal lake level, and there is no record that it was flooded by the lake at any time. The small stream directly south of the plant is one of several drainage channels lying in the immediate vicinity of the plant that drain storm water from a high ridge located some 7000 feet west. The close proximity of these drainage channels and their associated drainage areas relieves the total maximum floodwater flow to the plant drainage channel. The maximum hourly rainfall intensity falls on the area drained by the plant channel which is centered between two other channels; one lying immediately north of the plant area and one immediately south. The drainage area is pie-shaped, with the point at the westerly high ridge, and its base at the Lake Michigan shoreline. The total area is not more than 640 acres.

In considering the runoff from a precipitation event, the rational method was used and was then related to the interval of time, starting from the onset of the period of precipitation for the runoff from the most remote portion of the drainage area. This time interval, when related to maximum hourly rainfall intensity, results in a rainfall equivalent of 1.75 inches per hour. Thus, using the rational method, the peak run to the drainage channel is 336 cubic feet per second (CFS). The peak flow that the drainage ditch can handle, without overflowing, is 466.53 CFS. It was concluded that no flooding of the plant could occur from the probable maximum flood flow.

The original plant design considered that surface water on the site flows to Lake Michigan either through the storm drain system or via three small creeks. The soil and subsurface layers have high clay content, thus no credit was taken for percolation.

There were no differences or contradictions in the precipitation flood hazard levels found in the design or licensing basis documentation. A review and re-evaluation of external flooding was performed in response to NRC Generic Letter GL 88-20, *Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities*, and resolution of generic issue GI-103, *Design for Probable Maximum Precipitation (PMP)* (Reference 7). This IPEEE evaluation was beyond design basis and is not included in the current licensing basis (CLB) for KPS.

Wave Run-Up

The Wave Run-Up flood mechanism was screened out at KPS for Flooding Walkdown purposes because the resulting maximum run-up is calculated at an elevation of 585.4 feet, which is less than the postulated flood level due to the seiche (El. 589.9 feet). Details of this evaluation are provided in USAR Section 2.6.2.

Storm Surge

The storm surge flood mechanism was screened out at KPS for Flooding Walkdown purposes because the resulting maximum water level is calculated at El. 584.2 feet, which is less than the postulated flood level due to the seiche (El. 589.9 feet). Storm surge is not a limiting flood mechanism for other flood hazard considerations such as warning time and dynamic loading. Details of this evaluation are provided in USAR Section 2.6.2.

Ground Water Ingress

The ground water ingress mechanism was not included as a feasible flooding event at KPS. Ground-water ingress is a design consideration but is not considered a credible flooding event. Observations of surface drainage and water levels at the site borings indicate that the static ground water level inland from the lake ranges from 10 to 25 feet below the ground surface.

Tsunami

The tsunami flood mechanism was not included as a feasible event at the KPS and was not explicitly required by the draft GDC 2. No basis for a tsunami is established in the KPS USAR.

B: Protection and Mitigation Features Considered in the Licensing Basis**NRC Information Request:**

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

Dominion Response:

The two events applicable to external flooding for the site are a Lake Michigan seiche and an intense precipitation event.

Seiche

The site layout is such that the basement level (El. 586 feet) of buildings containing safety related equipment is entirely below grade except for the east facing greenhouse structure. The maximum seiche level is at El. 589.9 feet, which is below the grade level of all other plant buildings (minimum grade El. 606 feet) except the greenhouse. Therefore, only the greenhouse, which has openings at El. 586 feet, is subject to potential flooding from the seiche event.

The plant configuration (i.e., modes of operation) is not specifically discussed in the CLB, and therefore it is assumed that the function of flood protection from this event would be applicable to all modes of plant operation. Accordingly, all modes of plant operation were considered in the development of the flooding walkdown list.

The duration of this event is specifically discussed in the CLB. Per USAR Subsection 2.6.2, the seiche produced probable-maximum water level is a relatively fast transient, on the order of 30 minutes or less.

The credited flood protection features and flood mitigation measures identified in the USAR for a seiche event are greenhouse walls, greenhouse floors, two bulkhead type doors (in the greenhouse walls facing Lake Michigan), one low interior bulkhead door (screen wash discharge shaft in the south wall), bolted greenhouse floor covers and manholes, gasketed traveling water screen covers, and a ramp (top of ramp at El. 586'-4") across the access tunnel to prevent seepage water from reaching the diesel generator rooms. In the event that a credited flood seiche barrier requires removal for maintenance, procedures require that a temporary barrier (e.g., sandbags) be installed to maintain adequate flood protection.

Notification of a severe weather watch or warning from weather services, such as the National Weather Service, or an actual sighting will initiate KPS abnormal operating procedure OP-KW-AOP-GEN-004, *Response to Natural Events* (Reference 8), which provides guidance for responding to a threat or actual plant damage. As a result, the

screenhouse doors are confirmed closed, the traveling water screen covers are confirmed closed and braced, and the screenhouse floor covers are confirmed bolted down and sealed. No flood water levels initiate actions in this procedure.

Precipitation Event

The site is designed for rainfall from a maximum probable rainfall precipitation event to run off or drain away from the power block buildings. Credited flood protection is achieved by site grading and storm drain systems. Two credited drainage channels lying to the north and south of the plant channel storm water to the lake. The close proximity of these drainage channels and their associated drainage areas relieves the total maximum floodwater flow to the plant drainage channels. The drainage channels have an effective length of 1 mile and average 30 feet in width. The channels only flow during heavy rains. The side contours of the ditches are such that a depth of 4 feet of water can be carried through the plant area without overflowing. The peak flow that the drainage channel can handle, without overflowing, is 466.53 CFS, and the expected peak runoff to the drainage channel is 336 CFS.

The plant configuration (i.e., modes of operation) is not specifically discussed in the CLB, and therefore it is assumed that the function of flood protection for this event would be applicable to all modes of plant operation. The duration of this event is not specifically discussed in the CLB.

Notification of a severe weather watch or warning from weather services, such as the National Weather Service, or an actual sighting will initiate KPS abnormal operating procedure OP-KW-AOP-GEN-004, which provides guidance for responding to a threat or actual plant damage. As a result, external doors are closed, loose equipment around the site is secured, and storm drains are checked for material that could block them, in addition to the activities to confirm that seiche barriers are in place. No flood water levels initiate actions in this procedure.

Adverse weather conditions associated with a precipitation event do not affect the operator's ability to perform the required storm preparation steps stated above.

C: Warning Systems to Detect the Presence of Water

NRC Information Request:

Describe any warning systems to detect the presence of water in rooms important to safety.

Dominion Response:

There are no room water level warning systems that are credited as a flood protection feature for an external flooding event.

There are sump alarms in the screenhouse that alarm when the sump water level is greater than 34.5 inches from the sump bottom, and an operator will be dispatched to the screenhouse per KPS alarm response procedure OP-KW-ARP-47033-P, *Miscellaneous Sump Level High*. However, these alarms and their associated pumps are not credited in the CLB flood protection or mitigation function for a CLB external flooding hazard event. Several water level detection systems are located throughout the turbine building and auxiliary building for detection of internal flooding. These water level warning systems are available but are not credited for flood protection in the plant's external flooding licensing basis.

D: Effectiveness of Flood Protection Features**NRC Information Request:**

Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h.

Dominion Response:**Purpose of the Walkdowns**

The purpose of the flood protection feature walkdowns was to verify the conformance of flood protection and mitigation features to protect against ingress of external flood or rain water consistent with the CLB. The walkdowns are to verify that permanent (exterior and incorporated) and temporary (non-permanent) structures, systems, and components (SSCs) for flood protection and mitigation are as designed, and are capable of performing their design functions as credited in the CLB for external flood events. The walkdowns also are to verify that plant modifications implemented since original construction, such as the addition of plant structures, security barrier installations, and changes to topography and grading, do not adversely affect plant flooding protection.

In addition to the visual component of the flood protection feature walkdowns, a review of the preventative maintenance (PM) program and surveillance procedures was performed. The purpose of the review was to validate that the credited features were contained in a program that would ensure their continued conformance with the CLB.

Acceptance Criteria Development

Considerations that were taken into account when flood protection features were reviewed include the following:

- Flood protection feature configuration is in accordance with as-built drawings, as-built installation records, inspection records, vendor documents, etc.
- Visual inspection does not identify any material degradation that challenges the flood protection function.
- Instructions contained within implementation procedures can be implemented as written and within allowed time considering the warning time available for the applicable flood hazard and expected conditions during the event.
- When applicable, PMs or periodic inspections are in place, within their required periodicity, and of adequate scope.
- There are no unresolved adverse PM or periodic inspection implementation results.
- No topography changes or barrier installations prevent the site run-off and drainage plan from performing its intended function.

Observations that were not immediately judged as acceptable were entered into the Corrective Action Program (CAP), where an evaluation of the observation was made in accordance with established procedures. Flood protection features were considered acceptable if no conditions adverse to quality were identified during walkdowns, verification activities, or program reviews as determined by the CAP. Conditions adverse to quality that would have prevented the flood protection feature from performing its credited function during a design basis external flooding event are "Deficiencies" (as defined in NEI 12-07) and are described in Section II.F of this report.

Evaluation of the Overall Effectiveness of the Plant's Flood Protection Features

A total of 52 walkdown packages covering flood protection features were identified and evaluated for KPS. There were 48 packages covering physical plant features and 4 packages covering procedures.

Features – The results of the flood protection feature walkdown effort show that the flood protection features appear to be effective overall in meeting their intended credited functions based upon the defined acceptance criteria. In those cases where observations suggested that acceptance criteria were not met or where compliance could not be readily confirmed, the potential issue was entered into the CAP to determine if it is a Deficiency and what actions would be taken.

Procedures - Reasonable simulation activities required by the NEI guidelines for credited procedures were satisfactorily completed for KPS. Site procedures that perform actions in preparation or in response to severe weather events were evaluated. Procedural actions for the implementation of flood protection features are minimal at KPS. The evaluation determined that applicable procedures could be executed as written and in the required timeframe under the conditions associated with impending severe weather. Adequate personnel are available to implement the procedure requirements. Procedure adequacy was verified based on Operating Experience (OE) and tabletop discussions with the department representative responsible for performing the specified actions.

Accessibility - The flood features that could be accessed were evaluated against the defined acceptance criteria. None of the flood protection features covered in the walkdowns or walkdown areas themselves were identified as having "Restricted Access" or were considered to be "Inaccessible" in accordance with the definitions provided in NEI 12-07.

Periodic Monitoring Program for Conduit Seals - Fire Barrier Penetration seals are monitored, checked, and controlled by program because of the operating license requirements. Flooding penetration and flooding conduit seals have no such program. The Maintenance Rule Program looks at the structures but does not look at penetration and conduit seals.

Configuration Control of Yard and Storm Drains Changes - Several issues were identified stemming from a lack of rigorous control of yard and storm drain changes.

Other Existing Plant Equipment, Structures, and Procedures that Might Mitigate the Effects of an External Flood under a Variety of Plant Configurations

The current basis for protection and mitigation of an external flooding event, including plant equipment, structures, and procedures, is discussed in Section II.B of this report.

No other existing plant equipment, structures, or procedures were identified as being required to mitigate an "external flooding" event that are not already credited in the CLB.

KPS has internal flood protection and mitigation features installed to cope with internal flooding events. Should water from an external flood source enter an area of the site that contains safety-related equipment, internal flood barriers and mitigation equipment would limit the impact of such an event. For this to happen, however, the event would involve a failure of one of the credited flood protection features evaluated during these walkdowns or it would be due to conditions beyond the current licensing and design basis. In the event of a beyond design basis event, additional on-site equipment such

as portable pumps and portable generators are available to mitigate the consequences of the event.

Assessment of Maintenance Activities that Expose SSCs to Flood Hazards

The assessment identified one maintenance activity that could potentially degrade the identified seiche protection features from performing their credited function. If maintenance required a seiche barrier in the KPS Screenhouse to be removed, it was required that an equivalent but temporary (sandbag) barrier be installed. This temporary barrier ensured that flood protection was available even during these maintenance activities. Some minor enhancements were made to KPS procedure SA-KW-EVL-GEN-001, *Planned Barrier Impairment Control* (Reference 9), as a result of these flooding walkdowns.

No other maintenance activities were found that further exposed SSCs to flood hazards during their performance.

E: Implementation of the Walkdown Process

NRC Information Request:

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j, including actions taken in response to the peer review.

Dominion Response:

Walkdown Procedures and Guidance Documents

Per the March 12, 2012, NRC 50.54(f) letter, Kewaunee is one of four Dominion nuclear sites required to perform flooding walkdowns in accordance with the guidance provided in NEI 12-07. In order to ensure that the NEI guidance was uniformly implemented across the Dominion nuclear sites, a fleet Guidance and Reference Document (GARD) was prepared. This fleet GARD, CM-AA-BDB-1002, *Beyond Design Basis Project – Walkdowns of Flood Protection and Mitigation Features* (Reference 9), incorporated the content of NEI 12-07 and applied the Dominion specific details to portions of the NEI guidance where utility discretion or requirements were identified. GARD CM-AA-BDB-1002 was reviewed and approved by the Dominion Fleet Engineering Peer Group and by the engineering organization at each nuclear site.

CM-AA-BDB-1002 covered the full scope of the flooding walkdown efforts including the development of the CLB, development of the site-specific flooding features walkdown lists, selection and training of inspection team members, inspection documentation via

the Flooding Walkdown Form (NEI 12-07, Appendix B), and reporting requirements of flood walkdown results. In addition, a site-specific procedure was prepared for each Dominion nuclear site for conducting that site's walkdowns to ensure compliance with the flood feature walkdown scoping, execution, and documentation based on the criteria outlined in NEI 12-07, Section 5.3, Section 7, and Appendix B. Kewaunee procedure ER-KW-BDB-FLD-001, *Walkdown of Flood Protection Features* (Reference 10), was used to document inspection team member qualifications, provide inspection guidance and examples, and to direct the inspection documentation activities in accordance with NEI 12-07.

No exceptions were taken to the NRC-endorsed NEI flood walkdown guidance in either the fleet GARD or the site-specific walkdown procedures.

Flooding Walkdown Team Members and Training

Training was provided, as recommended in NEI 12-07, Section 5.3. Walkdown team members completed both the NANTeL Flood Protection Training and site-specific training prior to performing the walkdown inspections. The site-specific training was developed and implemented in accordance with the Dominion Nuclear Training Department's systematic approach to training procedure and addressed the learning objectives identified in the NEI 12-07, Appendix C.

In addition to the training discussed above, qualification as a walkdown inspector also required: 1) completion of a required reading list regarding the background of the Fukushima event and the NRC recommendations, 2) documentation of previous walkdown experience. Procedure ER-KW-BDB-FLD-001 provided the forms to document an individual's qualifications and the requirement that the qualification records be maintained as a station QA record. An Engineering Technical Evaluation document (ETE-KW-2012-0036, Reference 11) was used to transmit inspector qualification forms along with the documentation of each walkdown package to station Records Management. The inspection team members and project management personnel directly involved in the execution and review of the flooding walkdowns were trained and qualified as walkdown inspectors.

Walkdown teams at KPS were comprised of a mix of station engineering personnel and corporate engineering support. Various disciplines were represented including civil and mechanical engineering. Corporate support was used to provide consistency in the flooding walkdown process across the Dominion fleet. Corporate support included both engineering and licensing support personnel. Station support provided the advantage of overall site familiarity and specific experience with flood protection and mitigation features and procedures. Each inspection team consisted of a minimum of two qualified inspectors. Whenever possible, both corporate and station personnel participated on each walkdown team. Walkdown feature assignments considered the composition,

discipline, and experience of the team members. Several vendor personnel (trained and qualified as inspectors) participated in the walkdowns, primarily as additional support. The flood walkdown teams were also supported by station personnel (operations, maintenance, health physics, security, craft, etc.) in the performance of the walkdowns. These additional station support personnel were not required to be trained as walkdown inspectors.

Identification of Restricted Access or Inaccessible Areas

The Dominion fleet GARD for implementation of flooding walkdowns describes the process for identification and classification of Inaccessible or Restricted Access areas and what actions are allowed/required when Inaccessible/ Restricted Access areas are identified. Discussions with the flooding walkdown teams during conduct of the inspections and review of each flooding walkdown package were used to identify Inaccessible or Restricted Access areas.

Peer Reviews

Peer review was accomplished throughout the process. Procedures were created in accordance with appropriate nuclear standards which include the preparer/reviewer process. The GARD CM-AA-BDB-1002 was reviewed and approved by a Dominion fleet peer group. The walkdown teams each included a minimum of two inspectors for peer checking. Training material was peer checked, reviewed, and approved. Flooding Walkdown Forms were signed by both inspectors and were independently reviewed.

F: Results of the Flood Protection Feature Walkdowns

NRC Information Request:

Results of the walkdown including key findings and identified degraded, non-conforming, or unanalyzed conditions. Include a detailed description of the actions taken or planned to address these conditions using the guidance in Regulatory Issues Summary 2005-20, Rev 1, Revision to NRC Inspection Manual Part 9900 Technical Guidance, "Operability Conditions Adverse to Quality or Safety," including entering the condition in the corrective action program.

Dominion Response:

The KPS plant flood protection and mitigation features including site topography, the site drainage systems, and barriers were walked down and found to be consistent with the described CLB. These features were found to be available, functional, and fairly well maintained.

In addition, several walkdowns were performed on other external flood protection and mitigation features that are implicitly contained in the CLB, such as walls, floors, doors, roofs, penetrations and seals, manholes, dikes, as well as four procedures directing activities for flood protection.

Forty-eight walkdown packages, the majority of which covered passive protection features, were examined. None of the flood protection features covered in the walkdowns were identified as having Restricted Access or were considered to be Inaccessible in accordance with the definitions provided in NEI 12-07.

Conditions identified as unacceptable were entered into the CAP during the flooding walkdowns resulting in a total of 37 condition report (CRs) being issued. Most of these CRs were due to material condition, for example, some component rusting or wall staining, and slightly degraded hatch bolts, seals, plugs and a missing drip shield on a door. Some CRs were the result of minor in-leakage and/or weepage through walls and/or penetrations. Some yard drains were partially blocked and were not addressed in existing preventive maintenance (PM) procedures and thus documented in a CR. Water was discovered in one manhole, and one area of the plant appeared to have the potential for ponding. These conditions were also documented in the CAP system. However, none of these conditions challenged any of the flood protection and mitigation features to the level that would cause them not to be able to perform their intended flood protection function. Therefore, there were no Deficiencies identified at KPS during the flooding walkdowns. The flood protection features were found to be available, functional, and fairly well maintained. Thus, there is reasonable assurance that there were no conditions that would have prevented these features from performing their function as credited in the CLB.

This assessment found reasonable assurance that there were no adverse conditions that would have prevented these features from performing their function as credited in the CLB.

G: Cliff-edge Effects and Available Physical Margin

NRC Information Request:

Document any cliff-edge effects identified and the associated basis. Indicate those that were entered into the corrective action program. Also include a detailed description of the actions taken or planned to address these effects.

Dominion Response:

As documented in Section I of this report, consistent with NEI 12-07, neither cliff-edge effects nor APM are documented in this report. As defined in NEI 12-07, APM is the difference between the licensing basis value of a critical characteristic and the as-found

value for that characteristic. Information related to APM was collected during the flooding walkdowns, consistent with the recommendations of NEI 12-07, and is documented in the flooding walkdown records.

H: Other Planned and/or Newly Installed Flood Protection Features or Measures

NRC Information Request:

Describe any other planned or newly installed flood protection systems or flood mitigation measures including flood barriers that further enhance the flood protection. Identify results and any subsequent actions taken in response to the peer review.

Dominion Response:

Walkdown Process and Methodology

No changes were required to the walkdown process/methodology as a result of peer reviews. The walkdown process/methodology was consistent with the NEI guidance; and Dominion nuclear fleet GARD and KPS site-specific procedures were approved as required by procedure processes. Dominion made minor additions to the NEI guidance to specify the utility-specific instructions, as necessary (for example, providing a definition of "Small Margin"). Peer review methodology included two inspectors on visual inspections, preparer/reviewer on documentation, and corporate review on the completed walkdown packages.

Control of Yard and Storm Drains Systems Changes

Review of the Flooding Walkdown Results from the Dominion fleet of nuclear plants identified a lack of programmatic controls for changes to the yard and storm drains systems and a lack of preventive maintenance of the storm drains systems. A new fleet initiative has been initiated to establish engineering standards for storm drains system changes and a training initiative has been initiated to enhance knowledge and understanding of how yard changes can affect effectiveness of the storm drains systems. These programmatic controls are scheduled to be in place by December 31, 2013.

Flood Protection Systems / Mitigation Measures

No physical changes were required to the flood protection systems or flood mitigation measures as a result of the flooding walkdowns.

A small number of procedural enhancements to a maintenance procedure (SA-KW-EVL-GEN-001), three abnormal operating procedures (OP-KW-AOP-MDS-001,

OP-KW-AOP-GEN-004, and OP-KW-AOP-GEN-005), and an alarm response procedure (OP-KW-ARP-47033-P) were recommended as a result of the flooding walkdowns. Procedure changes have been initiated and are scheduled to be completed by July 31, 2013.

PMs for Conduit and Penetration Seals

Review of the Flooding Walkdown Results from the Dominion fleet of nuclear plants identified a lack of adequate periodic programmatic inspection of conduit and penetration seals required for flood protection. Dominion is initiating a fleet-wide initiative for programmatic periodic inspection of conduit and penetration seals for flood protection. These programmatic controls are scheduled to be in place by December 31, 2013.

III. Conclusions

A comprehensive inspection (flooding walkdowns) of flooding protection features has been performed at KPS, by trained and qualified personnel; using plant procedures developed using the NRC-endorsed guidance of NEI 12-07. Forty-eight walkdown packages, the majority of which covered passive protection features, were created and those items within scope of the walkdowns were examined. In general, flood protection and mitigation features were found to be available, functional, and fairly well maintained, consistent with the CLB. The flooding walkdowns also included reviews of operational requirements such as surveillance, inspection, and testing programs; change control processes; and PM practices. Several minor conditions adverse to quality were identified during the flooding walkdowns. Each of these issues has been entered into the CAP for resolution.

Deficiencies

No Deficiencies as defined in NEI 12-07 were found at KPS during the flooding walkdowns. The flood protection features were found to be available, functional and fairly well maintained thus allowing them to perform their design function as credited in the CLB. Also, no unavailable flood protection features or unanalyzed conditions were identified.

Restricted Access or Inaccessible Features

No flood protection features were identified as Inaccessible or having Restricted Access.

Feasibility and Reliability of Credited Operator Actions

Credited operator actions at KPS are limited to confirm that doors are physically closed and to secure loose material from the yard and grounds. There are no systems to align, no barriers to install, and no monitoring to initiate in the event of a storm. Credited operator actions can be readily accomplished as outlined in station procedures.

IV. References

1. NRC Letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3 of the Near-Term Task Force Review of the Insights from the Fukushima Dai-ichi Accident*, dated March 12, 2012 (ML12073A348).
2. NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A, dated May 2012.
3. Dominion Energy Kewaunee, Inc. (Dominion) letter to the NRC, *Kewaunee Power Station, 90 Day Response to March 12, 2012 Information Request Regarding Flooding Aspects of Recommendations 2.1 and 2.3*, dated June 11, 2012.
4. NRC Letter to NEI, *Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features,"* dated May 31, 2012 (ML12144A142).
5. NRC Letter to NEI, *Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features,"* dated June 14, 2012 (ML12159A290).
6. Kewaunee Power Station (KPS) USAR, Revision 23.02.
7. Letter from WPSC to NRC Regarding IPEEE Submittal, Letter No. NRC-98-102, September 28, 1998.
8. Kewaunee Procedure OP-KW-AOP-GEN-004, *Response to Natural Events*, Revision 11.
9. KPS Procedure SA-KW-EVL-GEN-001, *Planned Barrier Impairment Control*, Revision 2.
10. Fleet Guidance and Reference Document (GARD), CM-AA-BDB-1002, *Beyond Design Basis Project – Walkdowns of Flood Protection and Mitigation Features*, Revision 0.
11. Kewaunee Procedure ER-KW-BDB-FLD-001, *Walkdown of Flood Protection Features*, Revision 0.
12. KPS Engineering Technical Evaluation ETE-KW-2012-0036, *Transmittal of Flooding Walkdown Information Related to the March 12, 2012 NRC 50.54(f) Request for Information*, Revision 0.