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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C 20555-0001

SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO REQUEST FOR INFORMATION
PURSUANT TO 10 CFR 50.54(f) REGARDING
RESULTS OF THE SSES FLOODING WALKDOWN
(REFERENCES 1 AND 2) **Docket Nos. 50-387**
PLA-6938 **and 50-388**

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 Insights from the Fukushima Dai-Ichi Accident," dated March 12, 2012.

2) PLA-6867, "Response to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding the Flooding Aspects of the Recommendations 2.1 and 2.3 of the Near-Term Task Force Review of the Insights from the Fukushima Dai-Ichi Accident,," dated June 11, 2012

On March 12, 2012, the NRC staff issued a letter entitled "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," Reference 1. Enclosure 4 of Reference 1 contains specific Requested Actions and Requested Information associated with Recommendation 2.3 for Flood Protection Walkdowns. In accordance with 10 CFR 50.54, "Conditions of licenses," paragraph (f), addressees were requested to submit a written response to the information requests within 90 days (Reference 2).

In Reference 2, PPL Susquehanna, LLC (PPL) committed to use the NRC-endorsed flooding walkdown procedure, NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," as the basis for the flooding walkdowns at the Susquehanna Steam Electric Station (SSES). PPL also committed to submit a report documenting the results of its flooding design basis walkdowns at SSES within 180 days after NRC endorsement of the generic NEI guidance, which occurred on May 31, 2012.

The Enclosure to this letter provides SSES's Flooding Protection Walkdown Report as required by the response time depicted in Enclosure 4 of Reference 1. The format of the enclosed report follows the format described in NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features."

This letter contains no new regulatory commitments.

If you have any questions regarding the content of this letter, please contact Mr. John L. Tripoli, Manager, Nuclear Regulatory Affairs, at (570) 542-3100.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 11/21, 2012.

T. S. Rausch
Senior Vice President & Chief Nuclear Officer

Enclosure: SSES Flooding Protection Walkdown Report

Copy: Mr. P. W. Finney, NRC Sr. Resident Inspector
Mr. J. A. Whited, NRC Project Manager
Mr. L. J. Winker, PA DEP/BRP
Region I Administrator, NRC

Enclosure to PLA-6938

SSES Flooding Protection Walkdown Report

SUSQUEHANNA STEAM ELECTRIC STATION

FLOOD WALKDOWN REPORT

10 CFR 50.54(f), Recommendation 2.3 Flooding Response

PPL SUSQUEHANNA, LLC

Introduction

This report summarizes the results of the external flooding walkdowns performed in response to NRC Request for Information, under 10 CFR 50.54(f) letter dated March 12, 2012, on Near Term Task Force recommendations per Enclosure 4 titled Recommendation 2.3 – Flooding (Ref. 1). Walkdowns were performed in accordance with the NEI Guidance document NEI 12-07 – Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features (Ref. 2). This report's content is consistent with Appendix D of the above NEI Guidance document. The information requests from the NRC 10 CFR 50.54(f) letter are listed below, as delineated in the NEI Guidance document, Appendix D. The Susquehanna Steam Electric Station (SSES) response to each of these information requests are provided in this report.

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

B. 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.

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

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

A. Design Basis Flood Hazards

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

The external flood hazards evaluated at SSES are described in Section 2.4 of the Final Safety Analysis Report (FSAR). The external flooding sources and events related to Susquehanna River flooding discussed in the FSAR are:

- Probable Maximum Flood (PMF) on streams and rivers
- Seismically induced dam failures
- Probable maximum surge and seiche flooding
- Ice effects

Of all the flood sources and events analyzed, the probable maximum flooding (PMF) event with coincident wind-induced waves produce the highest flood level in the Susquehanna River. The maximum flood level in the Susquehanna River is 548 ft, which is approximately 120' below SSES grade level elevation of 670 ft. SSES is therefore classified as a "dry site" with respect to flood producing phenomena on the Susquehanna River.

The effects of local intense precipitation were also evaluated in the FSAR (Ref. 3). It was concluded that the effects of local intense precipitation would not endanger the integrity of the safety-related facilities and that adequate drainage systems are provided for the roofs of all safety related buildings. Drainage systems for the roofs are designed so that hydrostatic loadings on the roofs resulting from a local probable maximum precipitation (PMP) flooding event are within the design limit.

The all-season 24-hr probable maximum precipitation (PMP) event discussed in the FSAR was derived using the procedures suggested by the National Weather Service. The maximum 6-hr precipitation was disaggregated into one-half hour increments in accordance with a time distribution proposed by the US Army Corps of Engineers. For storms less than one-half hour, the rainfall increments were determined using the ratios suggested by the National Weather Service. The postulated 24 hour PMP results in approximately 30 inches of rain in a 24 hour period (Ref. 3).

The grading and natural topography of the plant site area are such that storm runoff is directed away from safety related buildings by a system of culverts, surface drainage channels, and underground storm drains. In the Current Licensing Basis (CLB) evaluation of the effects of the PMP relative to the flooding of the safety-related facilities, all the culverts and underground storm drains, except the culverts in the emergency spillway for the spray pond were assumed to be blocked by debris or ice accumulation (Ref. 3). The runoff from the PMP was assumed to occur only as surface flows, traversing the plant site in drainage channels or over low sections in the roads.

The CLB for SSES indicates that no significant buildup of water occurs near safety related buildings and structures during this postulated PMP flooding event, consequently no exterior flood barriers or maximum flood levels were included in the SSES licensing basis

documentation. The CLB states that pressure resisting doors are provided to prevent water from reaching safety-related equipment should any water build up or ponding were to occur adjacent to the power block. It was concluded that the possibility of flooding any of the safety-related facilities due to PMP is precluded.

The following flooding events are discussed in the current licensing basis (CLB) for the spray pond:

a) Probable maximum flood (PMF) – for this event, the emergency spillway is credited with limiting maximum water levels in the spray pond to 682.3 ft.

b) Standard Project flood (SPF) – for this event, which is defined as one-half the PMF, the maximum water level in the spray pond is 681.8 ft.

c) Ten(10) year flood – for this event, the maximum water level in the spray pond is 679.6 ft

The Design Basis Flood Level (DBFL) for the spray pond was determined in accordance with NRC Regulatory Guide 1.59 (Rev. 1, 4/76) by superimposing the effects of coincident wind-generated wave activity on the various flood levels; namely:

1) A sustained 40 mph wind on the probable maximum flood (PMF) level

2) The worst wind of record at Avoca Airport (65 mph) on the standard project flood (SPF) level

3) A probable maximum gradient wind (80 mph) on a 10-year flood level.

The effects of the coincident wind-generated wave activity were estimated in accordance with methods suggested by the US Army Corps of Engineers for each of the above conditions. The maximum spray pond DBFL resulting from wind generated wave activity was found to be 684.8 ft. This water level does not represent a threat to any safety-related equipment since the safety-related equipment is located at elevation 685.5 ft. or higher and is protected from splash effects by the walls of the pumphouse and slab at top elevation 685.5 ft.

The current licensing basis documentation associated with the spray pond demonstrates that the maximum design basis flood level, established in accordance with NRC Regulatory Guide 1.59, would remain below grade level at the ESSW pumphouse and below the safety related equipment inside the pumphouse.

Other external flooding events discussed in the SSES CLB (i.e., FSAR) include the postulated cooling tower basin rupture flooding event (Ref. 3), or the simultaneous rupture of the Unit 1 Condensate storage tank (CST) and Refueling Water Storage Tank (RWST) or the rupture of the Unit 2 CST (Ref. 4).

For the postulated cooling tower basin rupture, the CLB describes the possible leakage pathways through site buildings and structures. The safety related areas potentially affected by this condition include the Control Structure at the 676' elevation (grade level) and the west side of the Reactor Building at the 676' elevation. Flood doors are credited for protecting safety related equipment during this flood event. The FSAR states that the diesel generator E building's doors and the external doors on the eastern side of the

buildings, such as the Diesel Generator 'A-D' and Reactor Building doors, are not protected from flood because the sloped terrain precludes water entrance through these doors. It is noted that the SSES current licensing basis does not specify any maximum flood levels for this postulated flooding event.

Although not specifically described in the SSES licensing basis documentation, it is postulated that a Unit 1 cooling tower basis rupture could impact the ESSW pumphouse. An evaluation was performed which conservatively estimates the maximum water levels at the ESSW pumphouse as a result of a Unit 1 cooling tower basin rupture, which was used as input when developing the station flood barrier drawings to facilitate these inspections.

For the simultaneous rupture of the Unit 1 CST and RWST or a postulated rupture of the Unit 2 CST, the CLB states that these tanks are surrounded by walls designed to retain the total volume of water contained in tanks; therefore, the water would be contained in these bermed areas.

In response to INPO IER 11-1, a more conservative look at exterior flooding events was performed to establish flood barriers that could be used to facilitate the required flood walkdowns per IER 11-1. The flood levels as a result of the postulated external flooding events described above were conservatively established and are documented in station flooding analyses. Flood barrier drawings were created to document the external flood barriers and to facilitate these inspections. The INPO 11-1 inspections confirmed seal/door integrity for those doors/penetrations within the exterior flood barriers and ensured that external flood protection features, such as the doors and penetrations, are routinely inspected. Any degraded non-conforming conditions found during these inspections were entered into SSES's corrective action program.

In support of the inspections required in response to NRC Request for Information, Recommendation (RFI) 2.3 – Flooding, the station flood barrier drawings created for the INPO walkdowns were also used to facilitate these external flooding walkdowns. As part of the exterior flood barrier walkdowns being performed in response to the NRC RFI for Recommendation 2.3 (Flooding), the actual penetration seal ratings (and door pressure ratings) were evaluated to determine if the seal/door can withstand the conservative exterior flood levels shown on the station flood barrier drawings. This information was used to determine the "available physical margin" for each exterior flood door or penetration seal. Condition reports were generated for seals/doors where there was inadequate physical margin identified, to determine if seal/door replacement or upgrades were required.

Current Licensing basis with regard to below grade penetrations:

It is noted that there is no discussion in the FSAR or other licensing basis documents with regard to below grade penetrations. The SSES licensing basis documents do not address the need for underground conduit seals to prevent the possibility of water intrusion in safety related structures since groundwater levels are below the level of the underground conduit ductbanks and the site topography directs water away from safety related buildings as described above. The station underground conduit is typically encased in concrete ductbanks, which are connected to exterior walls of safety related buildings. Electrical manholes are provided outside safety structures/buildings, which provide access to the underground conduit/raceway. Typically, no conduit seals were installed inside this underground conduit, either inside the manholes or inside the safety-related buildings where the underground conduit is routed. From a design standpoint,

no internal seals were required for this underground conduit for flood protection. Per FSAR Section 2.4.13.4, the maximum design groundwater level at SSES is elevation 665', the site topography in the vicinity of safety related structures restrict the maximum elevation of the water table to approximately 660'. All underground conduit penetrations entering safety related structures are above elevation 665'. In addition, the underground electrical manholes, which have underground conduits routed to the safety related structures, were constructed above the maximum design groundwater level of 665'.

There will be some local ponding around some of the underground electrical manholes during the postulated 24 hour PMP flooding event as described in the CLB, which could be a source of water intrusion into the vaults; however, most of the safety related electrical manholes are elevated a minimum of 8 inches above grade level. It is noted that two of the safety related electrical manholes are not elevated and are installed flush with grade level.

A review of the history of these manholes shows that some of the safety-related electrical manholes experience inleakage and are required to be pumped out periodically to maintain the manholes dry. Historical data shows that two manholes just outside the ESSW pumphouse, which are not elevated, experience the most inleakage. Monthly PM's have been established to routinely pump out these safety-related electrical manholes. Inspections show that rain water enters these manholes from the manhole structure itself, rather than the concrete underground ductbanks. From a flood protection standpoint, if water levels inside the electrical manholes reach a high enough level, it is conceivable that water will start to infiltrate into the affected safety related buildings (e.g., Diesel generator Buildings, ESSW pumphouse, Reactor Buildings) thru the conduit in these manholes, since typically no seals are provided.

Actions have been generated to seal the perimeter of the two (2) ground level electrical manholes to minimize future manhole inleakage. In addition, actions have been generated to install conduit seals in the two (2) ground level electrical manholes outside the ESSW pumphouse. These actions minimize the potential for inleakage into these ground level electrical manholes and will prevent water from cascading to other safety related electrical manholes at lower elevations.

B. Protection and Mitigation Features:

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.

The probable maximum precipitation (PMP) flooding event is a 24 hour rain event in which up to 30 inches of rain is postulated to occur over a 24 hour period on time on site. This event can occur during all modes of operation.

There are two separate cooling tower basin rupture events postulated. The first event is a complete rupture the cooling tower basins with water directed toward the west wall of the Unit 1 and Unit 2 Turbine Building. During this event, water migrates toward the Reactor Buildings. The second postulated cooling tower basis flooding event is a complete rupture of the Unit 1 cooling tower basin, with water directed toward the ESSW

pumphouse. Both events are of short duration (minutes). These events can occur at any time and during all modes of operation.

There are other postulated external flooding events analyzed at SSES, such as the simultaneous rupture of both the Unit 1 condensate storage tank and refueling water storage tank and the rupture of the Unit 2 condensate storage tank. These events are also of short duration (minutes) and can occur at any time during all modes of operation.

The short duration external flooding events describe above establish the bounding exterior flood levels shown on the station flood barrier drawings. There are no immediate operator actions required or credited for mitigating these flooding events since these flooding events would be over before any operator actions could be initiated to mitigate the effects of the flood.

The postulated PMP flooding event results in some local ponding around safety related buildings or structures, with no significant water accumulation against any safety related buildings. From a design basis standpoint, no storm drains are credited to mitigate flooding effects from PMP flooding events. Consequently, no special flood protection measures are required for mitigating the postulated PMP flooding events.

The station credits the flood protection features (doors and penetrations within the exterior flood barriers), to prevent water from entering safety related buildings during all postulated external flooding events. It is noted that procedures are in place to prepare the station for severe weather operation (such as hurricanes, winter storms). Actions include, but are not limited to establishing manpower needs, topping off vehicles with fuel, completing station button down actions, tying-down equipment, setting up sleeping accommodations and ensuring storm drains are clear. Although actions to prepare for severe weather operation are necessary, there are no credited time dependent actions associated with external flooding events at SSES and there are no specific mitigating actions required to protect against the ingress of water into SSC's important to safety during any PMP flooding event (or any external flooding event). It is concluded that no "reasonable simulations" were required to be performed at SSES, in response to NRC, Recommendation 2.3.

The SSES flood protection features are classified as "Incorporated Barriers" as defined in Section 3.1 of NEI 12-07 (Ref. 2), since they are features that are permanently installed in the plant that protect safety related systems, structures and components from the effects of external flooding events. In addition, the SSES exterior flood protection features are classified as "Exterior Passive" features, as defined in NEI 12-07 guidance document, Section 3.9 (Ref. 2). SSES credits these "Exterior Passive" features for external flood protection, such as normally closed external flood doors, exterior wall penetrations and openings within the exterior walls of safety-related structures. SSES considers flood doors as passive components since they are not required to function (they are designed to remain closed) during flooding events. These flood protection features were visually inspected in accordance with NEI Guidance document 12-07 (Ref. 2). Actions were generated to identify any degraded or non-conforming conditions, as recommended in the NEI document. The roofs of safety related buildings are also credited to mitigate the affects of flooding from a PMP flood event. The building roofs are required to be routinely inspected for damage or degradation under the Structural Monitoring Program (Ref. 5); therefore, no inspections were performed on the building roofs in response to Recommendation 2.3.

C. Flood Warning Systems

Describe the room water level warning systems (e.g., alarms) credited for their flood protection function in the plant's external flooding licensing basis

Credited Flood Detection Instruments:

The flood detectors used to help identify flooding events at SSES are listed below. These flood detectors provide an alarm function in the control room to notify operators of a potential flood condition. This instrumentation has been evaluated and determined to be capable of withstanding a safe shutdown earthquake (SSE). In addition, preventative maintenance (PM) is performed to confirm functionality of these instruments on a routine basis. They are typically powered from a DC power source and would be available in the event of a concurrent LOOP during design basis flooding events. One exception is the unique Diesel Generator E flood detectors which use class 1E 120V AC power, rather than DC power, which is also considered acceptable.

Although these instruments are primarily credited for internal flooding events, these instruments would also provide the control room alarm function during external flooding events, should an external flood protection feature (such as an exterior wall penetration or external flood door) fail, resulting in significant inleakage into a safety related building or structure. These are no other separate warning systems for external flooding events at SSES.

I. Flood Detection Level Switches:

Reactor Building:

LSH-1(2)5640 – HPCI Room – El. 645' (Panel 1(2)C601)

LSH-1(2)4940 - RCIC Room - El. 645' (Panel 1(2)C601)

LSH-1(2)5240A&B – CS Pump Rooms – El. 645' (Panel 1(2)C601)

LSH-1(2)5140A&B – RHR Pump Rooms – El. 645' (Panel 1(2)C601)

LSH-1(2)1020A&B – RBCCW HX room – El. 683' (Panel 1(2)C668)

Diesel Generators

LSH-01103A-D – Diesel Generator A-D basements – El. 660' (Panel 0C653)

LSH-01103E – Diesel Generator E basement – El. 656'-6"

ESSW Pumphouse

LSH-01102A&B – ESSW Pumphouse – El. 660' (Panel 0C653)

ESW/RHRSW Valve Vault

LSH-01224A(B) – Valve Vault Flood Detector El. 678' (Panel 0C529B)

Turbine Building

LSH-1(2)1516A-D – Condenser Area – El. 656' (Panel 1(2)C668)

LSH-1(2)0901 – TBCCW HX Area – El. 656' (Panel 1(2)C668)

D. Flood Protection System Effectiveness

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.

SSES credits "Exterior Passive" features for external flood protection, such as normally closed external flood doors, exterior wall penetrations and openings within exterior walls of safety–related structures. These flood protection features were visually inspected in accordance with NEI Guidance document 12-07. At SSES, no specific operator actions are required or credited for external flood mitigation.

Station Flood Barrier drawings were created in support of the response to INPO IER 11-1. Although not included in the CLB, these drawings defined the scope of Inspections to be performed in support of the NRC required External Flooding Walk downs. The exterior flood barriers credited for flood protection include all doors, penetrations and openings within the exterior walls of safety related structures, as defined on the flood barrier drawings. Significant cracks in the exterior flood wall or flood barrier would also be reported if the crack threatens the wall or barriers ability to protect against flooding. It is noted that the exterior flood walls included in the scope of these walkdowns are routinely inspected in accordance with the SSES Structural Monitoring Program (Ref. 5). The external flood barriers are located in the Unit 1 and 2 Reactor Buildings, the Diesel Generator A-D Building, the Diesel Generator E Building, and the ESSW Pump house, as shown on the flood barrier drawings. In addition, penetrations inside the ESSW underground valve vaults were included in these inspections since there is safety related equipment (spray pond bypass valves and spray valves) that may be required to function during an external flooding event. The station external flood barriers also include the safety related building roofs and the underground safety related manways. The roofs and manways are credited with preventing water from entering these safety related structures. In lieu of performing inspections of the building roofs and electrical manways, credit was taken for the existing Structural Monitoring Program (Ref. 5), which requires periodic inspection of the building roofs and manways for damage.

The criteria included in NEI guidance document 12-07, Section 5.5.2, for exterior incorporated passive flood protection features, was used to facilitate these inspections. Inspections records have been compiled and are available for review, as recommended in the NEI guidance document. Inspections that did not meet the criteria included in the guidance document for exterior passive features have been entered in SSES's corrective action program.

At SSES, procedures are in place to prepare the station for adverse weather conditions (such as hurricanes, winter storms), as discussed in Section B above. Although actions to prepare for severe weather operation are necessary, there are no credited time

dependent actions associated with external flooding events at SSES and there are no specific mitigating actions required to protect against the ingress of water into SSC's important to safety during any PMP flooding event (or any external flooding event). As part of the flood walkdown effort, procedure enhancements have been recommended to improve preparations for adverse weather conditions at the station.

E. Walkdown Implementation Process

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.

The SSES external flood protection features were visually inspected in accordance with NEI Guidance document 12-07. The NEI walkdown record forms included in Appendix B of the guidance document were used as a template for the inspections. Rather than filling out a walkdown record form for every flood protection feature, a spreadsheet is used in conjunction with the form to record the inspection results. One form is completed for each wall or barrier, which may included multiple flood protection features. This recommendation came from the peer review of the documentation package.

Training was provided, as recommended in the guidance document. All team members completed both the NANTEL Flood Protection Training and the site specific training prior to performing the inspections. The site specific training, EG-316 - Walkdown of External Flood Protection Features, was developed and implemented in accordance with the station's systematic approach to training procedure. The content of this training was consistent with the recommendations included in the NEI guidance document, Appendix C - Sample Training Content.

The inspection team consisted of two (2) station engineers and one (1) design engineer with extensive experience that met the qualifications provided in the NEI guidance document. A minimum of two engineers were used for each walkdown. The third team member served as the lead and as a backup to support the required walkdown inspections. The lead also developed and delivered the site specific training for these walkdowns.

Based on a review of the station CLB related to flooding, it was determined that SSES credits "Exterior Incorporated Passive" features for external flood protection, such as normally closed external flood doors, exterior wall penetrations and openings within exterior walls of safety-related structures. Although the guidance document labeled flood doors as active components, the SSES flood doors are considered flood passive components since they are normally closed and are not required to function during an external flooding event (they are designed to remain closed). Consequently, the acceptance criteria included in Section 5.5.2 of NEI 12-07 was used to facilitate these inspections.

F. Walkdown Results

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.

Walkdowns have been performed in the safety related buildings/structures at SSES including the Diesel Generator A-D building and the Diesel Generator E building, ESSW pumphouse, the ESSW Valve Vaults and Unit 1 and Unit 2 Reactor Buildings. It was recognized that the SSES CLB does not specifically identify external flood barriers; consequently, the newly created station flood barrier drawings were used to define the exterior flood barriers and facilitate the required inspections. The generic issues identified from the walkdowns, which have been entered in the corrective action program, include:

- Degraded Penetrations/Door Seals – degraded penetrations/door seals are defined as those penetrations/seals for which there is either evidence of inleakage or the visual inspection reveals damage to the penetration or door seal material, indicating the penetration or door seal is degraded. These penetration/door seals did not meet the acceptance criteria provided in NEI Guidance document 12-07, Section 5.5.2. Further engineering evaluation is required to either recommend rework of the penetration/door or to except the degraded seal as–is. These deficiencies have been entered in SSES's corrective action program.

- Conduit Penetrations with No Internal Seals – These are typically spare conduits within the exterior flood boundaries with no internal seals. These deficiencies have been entered in SSES's corrective action program.

- Penetrations with No Labels – Approximately 40 percent of the station external flood penetrations were not labeled. These have been captured in SSES's corrective action program to generate and install the required labels to facilitate future inspections.

- Inadequate Seal Pressure Ratings – As part of the exterior flood barrier walkdowns being performed in response to the NRC Request For Information (RFI) for Recommendation 2.3 (Flooding), the actual penetration seal ratings (or door pressure rating) were evaluated to determine if the seal/door can withstand the conservative exterior flood levels shown on the new station flood barrier drawings. This information was used to determine the "available physical margin" for each exterior flood door or penetration seal.

  It was recognized that some of the below grade penetrations may not support the conservative flood levels shown on the station flood barrier drawings. The flood barrier drawings were created to facilitate the INPO IER 11-1 inspections and were used to facilitate these external flood barrier walkdowns. Corrective action requests were generated to evaluate those penetrations identified with insufficient physical margin to determine if seal or door rework/repairs are required. These

actions will ensure the station external flood protection penetrations/doors are capable of supporting all postulated external flooding events. A generic engineering change has been initiated to upgrade station penetrations, as required, to meet station flood ratings.

- Configuration Control Issues - There were configuration control issues identified during the walk downs such as incorrect drawings or no drawings showing details of external wall penetrations. Corrective action requests were generated to resolve these discrepancies.

- Diesel Oil Unloading Pad Drain Issue – The current plant design allows rain water to enter the Diesel Generator B Building sump room (0SP502) during external flooding events through the diesel oil unloading pad drain (CB SP-3). A corrective action request has been generated to evaluate alternatives to minimize inleakage into the diesel building sump during postulated flooding events.

- Underground Electrical Manhole Flood Protection Enhancements – It was identified during the walkdowns that the stations safety-related manholes have a history of inleakage. Corrective action requests have been generated to seal specific manholes at grade level. In addition, corrective action requests have been generated to install internal conduit seals in specific manholes to eliminate the potential for inleakage into downstream manholes at lower elevations. It is noted that the SSES CLB does not require internal conduit seals in these electrical manholes. These actions are considered enhancements to SSES's external flood protection features.

- ESSW Valve Vaults Flood Protection Enhancements – A corrective action request has been generated to seal the top of these below grade vaults and to improve grading around these vaults to minimize the potential for inleakage.

- Off Normal/NDAP Procedure Enhancements – Recommendations to improve actions required in response to adverse weather conditions were initiated via SSES's corrective action program. Although not required to mitigate the effects of any external flooding events at SSES, these procedure enhancements will improve stations readiness for adverse weather conditions.

- Flood Barrier Inspection Procedure Enhancements – A Test Procedure is used to periodically inspect the station flood barriers. A corrective action request has been generated to update the procedure to identify the specific exterior flood doors and penetrations to inspect and to revise inspection frequency to be consistent with station fire barrier penetration inspections.

There were several deficiencies identified during the INPO IER 11-1 flooding walkdowns, which were also entered in SSES's corrective action program. The major external flooding deficiencies identified during these walkdowns are listed below. Corrective actions have been implemented for the following deficiencies:

- Doors in Flood Boundary with Large Gaps Under the Door - Gaps were found at the bottom of the entrance doors to the Diesel Generator A-D Building during these walkdowns. Corrective actions have been implemented. Door thresholds have been installed to minimize potential inleakage into this Diesel Generator Building during a postulated cooling tower basin rupture flooding event.

- Leakage Path into Diesel Generator E Building - Gaps were found in the removable steel panels on the north side of the 'E' Diesel Generator Building. This represented a leakage path into the building during a postulated cooling tower basin rupture flooding event. Corrective actions to seal the gaps in this removable panel have been implemented.

- Blowout Panel Steam Vents Located Below Maximum Flood Levels – The vacuum relief holes for the Unit 1/Unit 2 RHR/RCIC blowout panel steam vents were found close to grade level and below the maximum flood levels during a postulated cooling tower basin rupture flooding event. Sandbags have been installed around these vacuum relief holes as an interim action to prevent water from entering the steam vents during a postulated external flooding event. As a permanent fix, modifications will be installed to raise the relief holes up above the maximum external flood levels

It is noted that there were no "restricted access" items identified during the flooding walkdowns. Two (2) Internal conduit seals for penetrations X-25-1-1008 & 1009 were considered "inaccessible" as defined in section 3.6 of NEI 12-07 (Ref. 2). They are located in a normally energized 4.16 KV junction box. In order to remove the junction box cover, both divisions would be exposed. It is not practical or safe to inspect these internal conduit seals. There are QC records available that document installation of the internal conduit seals in these penetrations. It is noted that once the seal is installed, the seal material can not be removed. There are four (4) similar internal conduit seals in penetrations X-25-1-1010, 1011, 1012 & 1013 which were inspected and found to be acceptable. Based on these inspections, there is reasonable assurance that these two (2) inaccessible internal conduit seals will perform their intended flood protection function. There are no adverse aggregate affects on SSES flood protection features as a result of these inaccessible penetrations.

G. Available Physical Margin

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.

The current SSES licensing basis considers Susquehanna to be a "dry site" with respect to flooding since the site is situated approximately 120' above maximum postulated river flood levels. To facilitate the inspections, conservative and bounding flood barriers were established from postulated cooling tower basin rupture flooding events and postulated refueling water storage tank (RWST)/condensate storage tank (CST) flooding events to ensure there is adequate margin available for the station flood protection features. These short term flooding events were treated and evaluated as a longer term flooding events, similar to a potential river flooding event. The conservative approach used in establishing station flood levels ensures the station flood protection features are designed with adequate physical margin to support all station external flooding events.

As part of the exterior flood barrier walkdowns, the actual penetration seal ratings (or door pressure ratings) were evaluated to determine if the seal/door can withstand the conservative exterior flood levels shown on the new station flood barrier drawings. This information was used to determine the "available physical margin" for each exterior flood door or penetration seal. The Available Physical Margins (APM) have been evaluated

and documented in the Walkdown Records for the doors and penetrations inspected in response to this NRC RFI. This information will be used in the flood hazard reevaluations to be performed in response to NRC – RFI, Recommendation 2.1 – Flood Hazard Reevaluations and therefore, are not included in this report. It is noted that any flood protection features that did not support the established flood levels have been entered in SSES's corrective action program.

H. Recommended Changes from Walkdowns

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.

The actions and enhancements generated as a result of the flooding walk downs are identified in Section F above. These actions include replacing or upgrading penetration material to meet required flood ratings, replacing degraded penetration/door seals, installing labels on all external flood penetrations to facilitate future inspections and resolving configuration control issues identified during the walk downs (update penetration drawings and component database, as necessary). Actions were also generated to seal underground safety-related electrical manholes and the ESSW valve vaults and to improve grading around the ESSW valve vaults to minimize potential for inleakage from a probable maximum precipitation flooding event.

Actions completed in response to the INPO IER flooding walkdowns have also been identified in Section F above. These include installation of door thresholds in Diesel Generator A-D building, sealing removable wall panels in Diesel Generator E building, and installing sand bags around RCIC/RHR vacuum relief holes to protect the blowout panel steam vents from water intrusion during external flooding events.

Although the plant does not require emergency flood protection measures, enhancements to the stations procedures for preparing for adverse weather conditions have been identified. These procedure enhancements will improve stations readiness for adverse weather conditions.

Routine flood barrier inspection procedure enhancements have been identified. An action has been generated to update this procedure to identify the specific exterior flood doors and penetrations to inspect and to revise inspection frequency to be consistent with station fire barrier penetration inspections.

The actions generated as a result of the flooding walkdowns have been entered in SSES's Corrective Action Program, as required by the NEI 12-07 guidance document. Corrective actions will be prioritized and completed consistent with other station priorities. These actions will improve station readiness and coping capabilities for all postulated external flooding events at SSES.

REFERENCES

1. NRC Request For Information, Recommendation 2.3, included In Enclosure 4 of NRC's March 12, 2012 50.54(f) Letter on Near-Term Task Force Recommendations

2. NEI 12-07, Rev. 0, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features"

3. SSES Unit 1 & 2 FSAR Section 2.4, "Hydrologic Engineering"

4. SSES Unit 1 & 2 FSAR Section 9.2.10.3, "Safety Evaluation"

5. Procedure NDAP-QA-1163, "Structural Monitoring Program"

6. NRC Regulatory Guide 1.59, Rev. 2, "Design Basis Floods for Nuclear Power Plants"