NEXTera ENERGY SEABROOK

April 30, 2014

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Docket No. 50-443
SBK-L-14066

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

Seabrook Station

Response to Request for Additional Information Regarding
Bulletin 2012-01, "Design Vulnerability in Electric Power System" (TAC NO. ME9385)

References:

1. NRC Bulletin 2012-01, Design Vulnerability in Electric Power System, dated July 27, 2012 (Accession No. ML12074A115)
2. NextEra Energy Seabrook, LLC Letter SBK-L-12220, Response to NRC Bulletin 2012-01, Design Vulnerability in Electric Power System, dated October 22, 2012 (Accession No. ML12299A467)
3. NRC letter, Request for Additional Information Regarding Response to Bulletin 2012-01, Design Vulnerability in Electric Power System, dated December 20, 2013 (Accession No. ML13351A314)
4. NextEra Energy Seabrook, LLC letter SBK-L-14017, Response to Request for Additional Information Regarding Response to NRC Bulletin 2012-01, Design Vulnerability in Electric Power System, dated January 29, 2014 (Accession No. ML14035A217)
5. NRC letter, Request for Additional Information Regarding Bulletin 2012-01, "Design Vulnerability in Electric Power System," dated March 31, 2014 (TAC NO. ME9385)(Accession No. ML14083A614)

In Reference 1, the NRC requested information about each facility's electric power system designs in light of operating experience involving the loss of one of the three phases of the offsite power circuit (single-phase open circuit condition) at Byron Station, Unit 2.

In Reference 2, NextEra Energy Seabrook, LLC (NextEra) provided its response to NRC Bulletin 2012-01.

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In Reference 3, the NRC requested additional information (RAI) regarding NextEra's response to NRC Bulletin 2012-01.

In Reference 4, NextEra Energy Seabrook, LLC (NextEra) provided its response to the RAI regarding the NextEra response to NRC Bulletin 2012-01.

In Reference 5, the NRC requested NextEra to provide its engineering assessment as it relates to Seabrook based on the South Texas, Unit 2 and Forsmark, Unit 3 operating events.

The enclosure to this letter contains NextEra's response to the request for additional information regarding the Reference 4 response to the NRC request for additional information.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding this letter, please contact Mr. Michael Ossing, Licensing Manager, at (603) 773-7512.

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

Executed on April 30, 2014.

Sincerely,

Tom Vehec
Plant General Manager
NextEra Energy Seabrook, LLC

Enclosure

cc: NRC Region I Administrator
J.G. Lamb, NRC Project Manager
NRC Senior Resident Inspector

Enclosure to SBK-L-14066

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Request for Additional Information

NextEra's response to the NRC staff's RAI regarding Bulletin 2012-01 stated that:

> "Since a single credible failure that could cause an undetected open phase condition is not a credible event at Seabrook Station, no plant design changes and modifications are being pursued to resolve issues with an open phase of electric power."

Based on the South Texas, Unit 2 and Forsmark, Unit 3 operating events, which identified open phase conditions due to circuit breaker malfunctions, please provide NextEra's engineering assessment as it relates to Seabrook.

NextEra Response

The transmission grid connections that provide offsite power to Seabrook Station consist of three 345kV transmission lines, as shown in the Simplified One-Line Diagram (see Page 4). Each transmission line, associated 345kV buses and circuit breakers have the capacity to supply the power requirements of station auxiliaries under all plant conditions. These lines are designed and built to provide the electrical and structural independence necessary to insure continuity of offsite electrical power to the station. At Seabrook Station, the three lines terminate at separate terminating structures. From the terminating structures each circuit is routed in a metal-enclosed, Sulphur Hexafluoride (SF6) gas-insulated bus to a common switching station as shown in the Simplified One-Line Diagram. Two separate and independent safety-related 4.16kV emergency buses and associated diesel generators are the source of power for the plant auxiliaries, protection system and Engineered Safety Features (ESF) loads during normal, abnormal and accident conditions. The normal supply to Train A (Bus E5) and Train B (Bus E6) 4.16kV emergency buses is from separate Unit Auxiliary Transformers (UATs). When the unit is operating the turbine generator output is supplied through the generator circuit breaker and the UATs to the emergency buses. When the unit is shutdown, the generator breaker is opened and the current flow is reversed through the Generator Step-Up Transformer (GSU) and supplied to the UATs. The Reserve Auxiliary Transformers (RATs) provide an alternate source of power to the emergency buses. On loss of normal supply (UAT) to a bus, the alternate supply (RAT) is automatically connected. In addition to a normal and alternate supply, each emergency bus has an emergency power supply in the form of an emergency diesel generator.

The Seabrook Station Generator Step-Up Transformers (GSUs) and the Unit Auxiliary Transformers (UATs) are connected to the ring bus through two circuit breakers (11 & 12). The Seabrook Station Reserve Auxiliary Transformers (RATs) are also connected to the ring bus through two circuit breakers (52 & 695). As such, it is not credible that a single failure in one breaker would result in a loss of one or two phases in the switchyard supply circuit to either the GSU/UAT circuit or the RAT circuit.

In addition, the Seabrook Station design has pole disagreement protection for the switchyard breakers that would protect against the condition of all breaker poles not opening or closing together (Ref. UFSAR Section 8.3.1.4). Upon detection of pole disagreement the breaker gets a trip signal. If all poles do not open within a specified time delay, a second level of protection is available: the breaker failure scheme is initiated and the adjacent breakers are tripped to isolate the failed breaker. Both pole disagreement and breaker failure protection schemes are redundant in the System 1 and System 2 protection. The redundant relaying protection scheme and a breaker-and-half switching station minimize the likelihood of any single failure to cause loss of more than a single circuit. With this switchyard breaker protection scheme, a failure of any switchyard breaker pole to open similar to the Forsmark event will be quickly isolated.

The manufacturers for both the ITE/ABB and Mitsubishi Electric Power Product, Inc. (MEPPI) switchyard breakers were contacted for Operating Experience (OE). Only one case of ITE/ABB breaker contacts burning open due to a lack of maintenance was identified. Based on NextEra's aggressive switchyard maintenance plan which routinely inspects the breaker contacts and internal components, this type of failure is not credible at Seabrook Station.

Also, only one case of MEPPI breaker failure where one pole of the breaker did not close due to the connector pin falling out of the linkage mechanism was identified (reference INPO OE12419, Switchyard Breaker Failure Results in Loss of All Circulating Water- South Texas Unit 2). The subject connector pin is located in the operating mechanism box of the breaker. The cause for this failure described in the OE was that a bushing that is required between the linkage pin and the operating linkage was not installed. This bushing was most likely left out during fabrication at the manufacturing facility. Adequate measures were not in place to identify this condition prior to putting this breaker in service and this condition appears to be a one-time fabrication/installation issue.

MEPPI identified that the breaker associated with the South Texas Unit-2 OE was manufactured by MEPPI at their factory in Warrendale, PA. The South Texas Unit-2 breaker failure is the only incident of this type that MEPPI is aware of. The MEPPI breakers installed at Seabrook were manufactured at their factory in Japan. MEPPI has responded that the factory in Japan has multiple assembly check points which prevent this type of assembly error.

NextEra has initiated Procedure Change Requests (PCRs) for the MEPPI breaker preventive maintenance procedures to inspect the linkage connector pin / bushing assembly with consideration of the South Texas Unit-2 OE.

New MEPPI breakers were installed at Seabrook Station as part of Seabrook Substation Reliability Upgrade Project in 2009 and 2011. Extensive factory and onsite inspection/testing were performed during and prior to installation of these breakers to detect and correct any fabrication/installation issues and to ensure that the breakers perform in accordance with the design. Based on this testing and NextEra's robust switchyard breaker maintenance plan, this type of failure is not credible at Seabrook Station. It is likely that an internal breaker failure would lead to a fault condition that would be detected and isolated by protective relaying.

In addition, the Switchyard Operations Procedure has been revised to ensure all three phase currents are checked prior to and following 345kV breaker switching operations as a backup to local visual verification of breaker position. With this Switchyard Operations Procedure, a mis-operation of any switchyard breaker pole prior to and following the breaker switching operation will be quickly isolated. Once the breaker pole position has been verified following a switching activity, there is no OE that an open phase condition has occurred with a static breaker. Operations procedures have also been revised to include recognition of equipment problems caused by an open phase condition.

The Seabrook Substation Reliability Upgrade Project was undertaken in 2009 with the main goal of improving the reliability of the five key transmission elements interconnected at the Seabrook Substation (main generator/GSU bus, RAT bus, and three transmission lines). The first phase of the switchyard reliability upgrade project was implemented in 2009 which involved installing five new Gas Insulated Substation (GIS) breakers, three new breaker positions and two replacements. This project improved the reliability of the Seabrook Station 345kV substation by changing the switchyard topology and by replacing aging equipment with new equipment of a more reliable design. The second phase of the switchyard reliability upgrade project was implemented in 2011 which involved relocating the main generator/GSU bus connection from the existing 345kV Bus-3 breaker bay to 345kV Bus-6 located in a new breaker bay.

Based on the above, due to Seabrook Station's unique design, configuration of 345kV switchyard and station buses, pole disagreement and breaker failure protection schemes, switchyard reliability improvements and proper operating and maintenance practices, a single credible failure that could cause an undetected failure of any switchyard breaker pole to open and cause an open phase conditions is not a credible event at Seabrook Station.

REFERENCES

- Drawing 1-NHY-309714, Three Line Diagram Reserve Auxiliary Transformer
- Drawing 1-NHY-309716, 25KV Three Line Diagram Generator and GSU Transformer
- Drawing 1-NHY-309718, Three Line Diagram Unit Auxiliary Transformer
- Drawing 1-NHY-310002, Unit Electrical Distribution One Line Diagram
- UFSAR Sections 8.1, 8.2 and 8.3
- OE12419, Switchyard Breaker Failure Results in Loss of All Circulating Water- South Texas Unit 2
- Operations Procedure OS1046.04, 345KV Operations

Seabrook Station Simplified One Line Diagram