August 6, 2015

MEMORANDUM TO: Michael L. Scott, Deputy Director
Division of Reactor Projects
Region I

FROM: Mirela Gavrilas, Deputy Director ***/Lawrence Kokajko for RA/***
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: FINAL RESPONSE TO TASK INTERFACE AGREEMENT 2015-01, ASSESSMENT OF THREE MILE ISLAND NUCLEAR STATION'S USE OF A NON-SEISMIC QUALIFIED CLEANUP PATH FOR THE BORATED WATER STORAGE TANK

By memorandum dated April 10, 2015 (Agencywide Documents Access and Management System Accession No. ML15103A065), the U.S. Nuclear Regulatory Commission (NRC) Region I Office requested assistance from the Office of Nuclear Reactor Regulation (NRR) to conduct a technical assessment of the Three Mile Island Nuclear Station, Unit 1 (TMI) licensing basis and the licensee's response to Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46." The purpose of the assessment was to determine whether the agency accepts the licensee's assertion that TMI was originally licensed and subsequently validated via the USI A-46 seismic validation to recirculate and clean-up the borated water storage tank (BWST) contents at power through non-seismic piping.

In conducting its review of the licensee's licensing basis, the NRR staff has concluded that the BWST cannot be credited to perform its intended safety function when it is connected to the non-seismically qualified piping for cleanup. The basis for this position can be found in Section 3.0 of the enclosure.

Enclosure:
Task Interface Agreement

CONTACT: Holly D. Cruz, NRR/DPR
(301) 415-1053

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TASK INTERFACE AGREEMENT 2015-01

ASSESSMENT OF THREE MILE ISLAND NUCLEAR STATION'S USE OF A NON-SEISMIC QUALIFIED CLEANUP PATH FOR THE BORATED WATER STORAGE TANK

1.0 INTRODUCTION

By memorandum dated April 10, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15103A065), the U.S. Nuclear Regulatory Commission (NRC) Region I Office (Region I) requested assistance from the Office of Nuclear Reactor Regulation (NRR) to conduct a technical assessment of the Three Mile Island Nuclear Station, Unit 1 (TMI) licensing basis and the licensee's response to Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46." The purpose of the assessment was to determine whether the agency accepts the licensee's assertion that TMI was originally licensed and subsequently validated via the USI A-46 seismic validation to recirculate and clean-up the borated water storage tank (BWST) contents at power through non-seismic piping.

In order to focus the effort, Region I requested assistance answering the following questions, which are in alignment with the purpose of the assessment:

1. Regarding Criterion 2 from the Atomic Energy Commission (AEC) General Design Criteria (GDC), dated 1967, in TMI's updated final safety analysis report (UFSAR), Section 1.4.2:

    a. Is it an appropriate interpretation of TMI's licensing basis that following an external event (e.g., earthquake) the reactor plant must retain the capability to achieve and maintain stable shutdown conditions (i.e., safe-shutdown) but not necessarily maintain emergency core cooling system (ECCS) safety function capability as long as the licensee can show no loss of capability to protect the public?

    b. Is it an appropriate interpretation of TMI's licensing basis to conclude that the BWST was/is not required for safe-shutdown after a seismic event (assuming there is no performance requirement for ECCS safety-related function concurrent with a seismic event) and that other borated water sources (tanks in seismic Class 1 protected structures) can be credited to support reactor coolant system (RCS) inventory to achieve and maintain safe-shutdown conditions?

2. Are manual actions considered acceptable to achieve and maintain safe-shutdown to support the performance standard of Criterion 2 from the AEC draft GDC in TMI's UFSAR, Section 1.4.2?

3. Does the NRC's acceptance of the TMI USI A-46 seismic validation response to GL 87-02 recognize that the seismic event could occur with the BWST operating in a recirculating and cleanup line-up?

4. Does the answer to any of these questions constitute a change in NRC staff position previously approved in licensing actions, whereby a backfit evaluation needs to be performed?

2.0 BACKGROUND

The background section provides general information concerning the BWST, the physical configuration of the cleanup flow-path, and the historical events leading up to this Task Interface Agreement (TIA). This information establishes a foundation to understand the licensee's position on the issue, which is the last item discussed in this section.

2.1 BWST Description

The BWST provides a borated source of water for the following:

- ECCS injection during design-basis accidents (DBAs)
- fuel transfer canal filling during refueling
- the reactor building spray system, decay heat removal system, and the makeup and purification system

The BWST water is expected to be clean, clear, and without debris to support its use in the reactor systems and refueling operations. To maintain these expectations, the water is periodically processed through a cleanup flow-path that includes (1) pre-coat filters and cation demineralizers in the liquid waste disposal system and (2) portions of the spent fuel pool system. The sections of the supply and return piping in the cleanup flow-path connected to the BWST are qualified as seismic Class 1, but the supply and return flow-paths transition from seismic Class 1 to non-seismic (e.g., Class II) piping at two manual isolation valves located in the basement of the auxiliary building (See Figure 1 below).

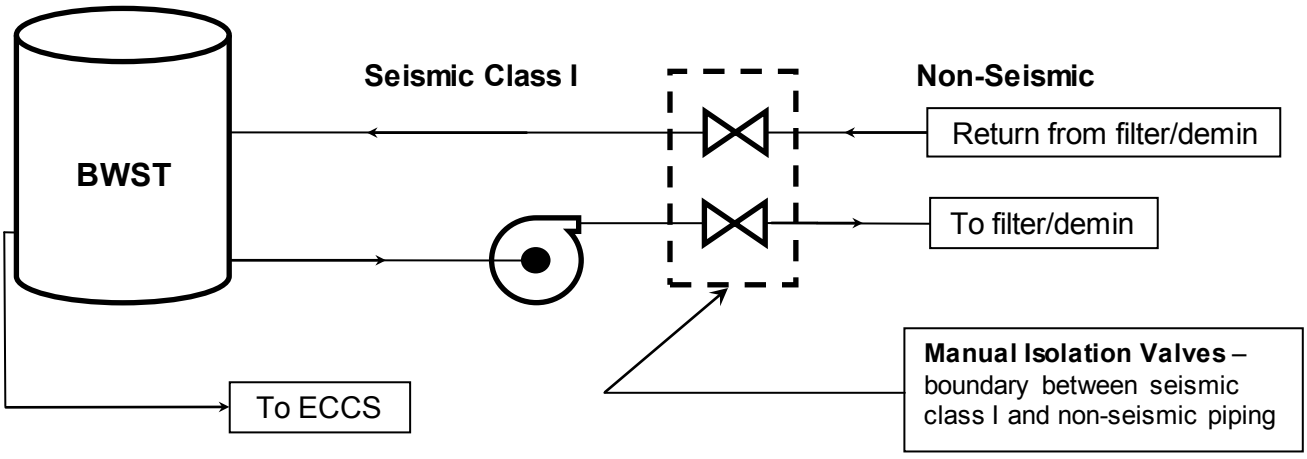


Figure 1: Sketch of BWST Cleanup Flow-Path

The BWST is governed by Limiting Condition for Operation (LCO) 3.3.1.1 from TMI's technical specifications (TS), and it is required to be operable when the reactor is critical. In regard to this

TIA assessment, the physical concern underlying the licensing basis discussion is that an earthquake could rupture the non-seismic piping when it is in communication with the BWST (i.e., boundary isolation valves are open), rendering the tank inoperable from the TS standpoint due to a reduction in the tank's inventory. This would prevent the BWST from supplying a sufficient amount of borated water to the ECCS injection pumps, which would preclude the system from being credited assuming there was a requirement for it to withstand a safe-shutdown earthquake (SSE) while maintaining operability in accordance with TS.

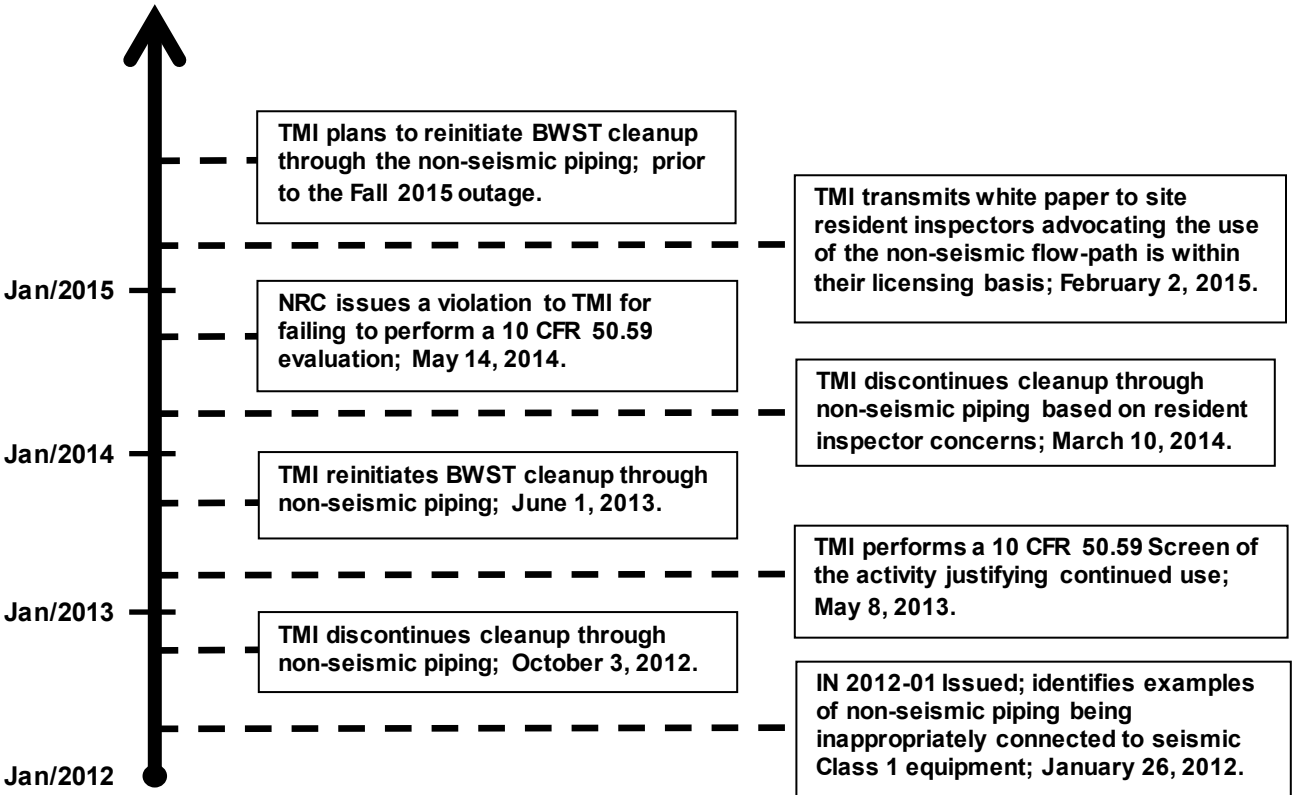
This TIA assessment focuses on evaluating the BWST at power when it is required to be operable by TS; therefore, interchangeable terms will be used throughout the remainder of this document to represent this mode of applicability such as "the reactor is critical," "power operation," "at power," and "when required to be operable by TS." Also, from this point forward in the document when ECCS is discussed, the BWST shall be considered to be encompassed by this system since (1) it is the water source for the injection pumps and (2) both the TS (i.e., LCO 3.3.1.1 for the ECCS Injection Systems) and the UFSAR (i.e., Section 6.1, Emergency Core Cooling System) for TMI identify the BWST as a component of ECCS.

2.2 Historical Background

The sequence of events documented below provides the historical context surrounding the issue of TMI using a non-seismic flow-path to clean-up water in the BWST. Initially, the NRC issued Information Notice (IN) 2012-01 on January 26, 2012 (ADAMS Accession No. ML11292A175), which highlighted examples of other pressurized water reactor (PWR) nuclear stations inappropriately using non-seismic piping to clean up their refueling water storage tank (RWST) contents *(note that the RWST is a tank with a similar design basis as the BWST)*. The licensee reviewed IN 2012-01 and subsequently discontinued the BWST clean-up process through non-seismic piping on October 3, 2012.

On June 1, 2013, the clean-up process was reinitiated based on the results of a screening performed against Section 50.59 to Title 10 of the *Code of Federal Regulations* (10 CFR), "Changes, Tests, and Experiments," that concluded use of the clean-up flow-path was in agreement with the TMI licensing basis; therefore, a license amendment and NRC approval was not warranted to continue this activity. On May 14, 2014, the NRC issued Inspection Report 5000289/2014002 which documented a Severity Level IV, non-cited violation of 10 CFR 50.59 based on TMI's failure to perform a 10 CFR 50.59 evaluation. The following two issues were identified in the inspection report: (1) alignment of the BWST to non-seismically qualified pipe is contrary to the licensing basis function described in UFSAR Section 5.1.1 and (2) NRC approval is needed for operator actions that were credited to close manual valves isolating the BWST from non-seismic piping. The licensee responded to the violation by once again discontinuing the use of the flow-path.

On February 2, 2015, the licensee transmitted a white paper to the site resident inspectors summarizing its position. The white paper (formally transmitted to the NRC on June 22, 2015) advocated that processing BWST water through the non-seismic flow-path is within the bounds of the TMI licensing basis. Based on its stated position, the licensee intends on using the non-seismic flow-path in preparation for the upcoming outage in the fall of 2015 (See Figure 2 below).



2.3 Licensee Position

Figure 2: Timeline of Events

The licensee's position is that the cleanup of the BWST contents via a non-seismic pathway at power is bounded by its licensing basis. This position is based upon TMI's interpretation of the GDC in its UFSAR that establishes performance standards for external events. The details of this interpretation along with supporting reasons for this viewpoint are described below.

TMI was licensed to the AEC draft GDC dated July 1967. Criterion 2 from TMI's GDC establishes the performance standards for a seismic event, and it states,

> *Those systems and components of Reactor Building facilities which are essential to the prevention of accidents, which could affect the public health and safety or to mitigation of their consequences shall be designed, fabricated, and erected to performance standards that will 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, tornados, 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 to reflect uncertainties about the historical data and their suitability as a basis for design.

The licensee contends that Criterion 2 from the AEC draft GDC does not require a seismic event to be considered concurrent with a LOCA, which implies that the BWST is not required to maintain the ability to perform its specified safety function (i.e., operability in accordance with TS[1]) concurrent with and following an SSE. This interpretation is used to justify why the aforementioned information notice, IN 2012-01, does not apply to TMI, but rather the licensee asserts that it is applicable to plants licensed to Criterion 2 from 10 CFR Part 50, Appendix A, "Appendix A to Part 50 - General Design Criteria for Nuclear Power Plants," which explicitly states, *"Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes…without loss of capability to perform their safety functions."*

The phrase from Criterion 2 in TMI's GDC *"without loss of the capability to protect the public"* is interpreted by the licensee to mean the plant is required to be able to achieve a safe-shutdown condition after a seismic event without considering a coincident LOCA. Other supporting reasons for the licensee's stance are listed below along with more in-depth descriptions in the subsequent sections:

- other instances of structures, systems, or components (SSCs) described in the UFSAR as not being able to withstand natural phenomena events (see Section 2.3.1);
- the cleanup activity through non-seismic piping is described in the original Facility Safety Analysis Report (FSAR) (see Section 2.3.2); and
- the licensee's response to GL 87-02 along with the NRC's acceptance of this response (see Section 2.3.3).

2.3.1 Other Natural Phenomena Events

The licensee points to other examples described in the UFSAR of SSCs not being designed to withstand natural phenomena events. The implication is that these SSCs would not be able to respond to a natural event with a LOCA. For example, the UFSAR states that the BWST is not protected from tornado-generated missiles; therefore, the BWST cannot be credited to perform its specified safety function in the event of a LOCA coincident with a tornado. The licensee has extrapolated this to mean that TMI's GDC Criterion 2 does not require ECCS to be able to perform its specified safety function concurrent with an SSE.

2.3.2 UFSAR Descriptions of BWST Cleanup

The licensee contends that TMI was originally licensed in the FSAR to clean-up the BWST water through non-seismic piping during all modes of operation by using local manipulation and

[1] "Capability to perform a specified safety function", "capability to perform an intended safety function", "operability", and "operability in accordance with TS" are interchangeable terms that represent the ability of a structure, system, or component to perform a function required by TS.

control of equipment. The FSAR sections and information cited by the licensee to substantiate this claim are in agreement with the contents of the current revision of the UFSAR. The UFSAR does not explicitly describe the BWST cleanup path, which includes BWST piping, spent fuel system piping, and waste disposal piping, but the argument put forth is that a comprehensive understanding of the pertinent UFSAR sections represents the cleanup licensing basis. The pertinent UFSAR sections and information include:

- Section 5.1.1.1; the BWST and spent fuel cooling systems are classified as seismic Class 1 systems;
- Section 9.4; cleanup of spent fuel pool water is accomplished by diverting part of the flow, maintained for removal of decay heat, through filters and/or demineralizers of the liquid waste disposal system;
- Section 9.4.2; the spent fuel cooling system circulates refueling water through cleanup equipment during storage in the BWST;
- Section 9.4.5; spent fuel cooling functions are monitored and controlled from the main control room; all other functions of the spent fuel cooling system are accomplished by local manipulation of valves and control of equipment;
- Section 11.2.1.1; the liquid waste disposal system provides operating service functions, which includes cleanup of spent fuel pool water, processing of spent fuel pool water for reuse or disposal, and processing of reactor coolant and refueling water for reuse or disposal; and
- Section 11.2.1.4; the liquid waste disposal system equipment is located inside Class I structures.

The licensee's conclusion drawn from this information is that the operating service functions of the liquid waste disposal system have been used since original operation of the plant to clean up the spent fuel pool and BWST contents using the precoat filters and/or the cation demineralizers during all modes of operation. Also, although UFSAR Section 5.1.1.1 characterizes the BWST as a seismic Class 1 system, the licensee believes the performance requirements from Criterion 2 of the AEC draft GDC do not mandate that the BWST be able to perform its intended safety function of supporting ECCS concurrent with an SSE.

2.3.3 Generic Letter 87-02 Response

GL 87-02 applied to older plants, including TMI, which were not reviewed to current seismic standards during the licensing process. It required licensees to perform an evaluation demonstrating the seismic adequacy of SSCs required for safe-shutdown of the plant, which did not include a burden to prove the plant could be safely shut-down after an SSE concurrent with a LOCA or other extraordinary event. Based on the inclusion of components from the BWST cleanup path in the GL 87-02 analysis and the NRC's subsequent acceptance of the analysis documented in Reference 7, the licensee believes it was recognized that the cleanup could take place during power operation. Also, the GL 87-02 review took into account a procedure that

included a step to manually isolate the BWST from non-seismic piping in the event of an earthquake, which was considered a defense-in-depth response.

2.3.4 Conclusion

In conclusion, TMI's licensing basis incorporates Criterion 2 from the AEC draft GDC as its performance standard for natural phenomena events. The licensee interprets this criterion to require the plant to be able to achieve a safe-shutdown condition after an SSE without having to consider a concurrent LOCA event. The result of this position is that the BWST would not be required to maintain operability per the TS during or after an SSE, which would justify the licensee's use of a non-seismic cleanup path for the BWST during all modes of operation.

3.0 EVALUATION

The questions posed by Region I were comprehensive and fully covered the licensing issue being evaluated, and by answering these questions, the full-scope of the licensing issue will be addressed.

1. Regarding Criterion 2 from the AEC draft GDC dated 1967 in TMI's UFSAR, Section 1.4.2:

   a. Is it an appropriate interpretation of TMI's licensing basis that following an external event (e.g., earthquake) the reactor plant must retain the capability to achieve and maintain stable shutdown conditions (i.e., safe-shutdown) but not necessarily maintain ECCS safety function capability as long as the licensee can show no loss of capability to protect the public?

      Response

      As discussed previously, the licensee contends there is no requirement for ECCS to maintain its intended safety function capability to respond to a LOCA concurrent with an SSE. In regard to a seismic event[2], the NRR staff position is opposed to this viewpoint because (1) TMI's interpretation of the criterion is not in accord with the language from AEC draft GDC Criterion 2 and (2) TMI's seismic design requirements (i.e., design bases) described in the UFSAR represent ECCS as maintaining its capability to perform intended safety functions during and after an SSE. In support of this position, excerpts from the following two documents are provided below: (1) TMI's UFSAR and (2) the AEC safety evaluation report (SER) that documents TMI's original operating license review.

      UFSAR Chapter 1 – Introduction and Summary

      Section 1.4.2, Criterion 2 – Performance Standards (Category A), defines Criterion 2 as the following,

[2] The scope of this TIA assessment is limited to licensing bases requirements associated with seismic events, and it does not address other natural phenomena events.

> *Those systems and components of Reactor Building facilities which are essential to the prevention of accidents, which could affect the public health and safety or to mitigation of their consequences shall be designed, fabricated, and erected to performance standards that will 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….*

The definition above addresses the requirement for systems and components that are essential to the prevention and mitigation of accidents to be able to withstand forces imposed by earthquakes. To read section 1.4.2 as if the SSCs do not need to withstand the forces of an earthquake would make irrelevant the language of that section describing the SSCs. This section also points to section 1.4.1, Criterion 1 – Quality Standards (Category A), to identify the SSCs that are required to meet Criterion 2. Specifically, it states,

> *The systems and components identified in Section 1.4.1 (Criterion 1) have been designed to performance standards that enable the facility to withstand, without loss of capability to protect the public, the additional forces or effects which might be imposed by natural phenomena.*

Section 1.4.1, which is referenced by section 1.4.2 as seen above, identifies Engineered Safeguards as SSCs essential to accident prevention and to mitigation of accident consequences. On page 6.0-1 of UFSAR section 6.0, Engineered Safeguards, the SSCs enveloped by the Engineered Safeguards category of equipment are defined to include ECCS. Therefore, ECCS is among those Engineering Safeguards identified by section 1.4.1 that must meet Criterion 2.

In summary, UFSAR Chapter 1 provides that AEC draft Criterion 2 applies to ECCS, and it addresses the ability of ECCS, which includes the BWST, to withstand natural phenomena (e.g., earthquake events). Other chapters in the UFSAR referenced below describe the seismic design bases associated with ECCS that represent a detailed implementation of Criterion 2.

<u>UFSAR Chapter 4 - Reactor Coolant System</u>

The seismic design basis for the reactor coolant system (RCS) is described in Section 4.1.2.5, Seismic Loads and Loss of Coolant Loads. Specifically, the section states, "*A loss of coolant accident (LOCA) coincident with a seismic disturbance has been analyzed to assure the ability to initiate and maintain reactor shutdown and emergency core cooling.*" The following analysis that demonstrates this capability was also documented in this section: *"Case IV - Design Loads Plus Maximum Hypothetical Earthquake [equivalent to an SSE] Loads Plus Pipe Rupture Loads….the primary concern is to maintain the ability to shut the reactor down and to cool the reactor core."*

In summary, Chapter 4 explicitly states that the plant was designed and analyzed to provide emergency core cooling in the event of a LOCA coincident with an SSE.

UFSAR Chapter 5 - Containment System and Other Special Structures

Chapter 5 elaborates further on the seismic design and performance requirements of plant equipment. Section 5.1, Structural Design Classification, states, *"The plant structures, components, and systems have been classified according to their function and the degree of integrity required to protect the public."* This section, which identifies ECCS and the BWST as Class I components, also details the criteria for Class I designation as, *"[SSCs] whose failure might cause or increase the severity of a loss of coolant accident or result in an uncontrolled release of radioactivity…."* The seismic design basis portion of the chapter makes the following two statements in regard to Class I equipment, *"Primary steady state stress and corresponding strains [from an SSE]…have been limited so that the function of the component, system, or structure is not impaired as to prevent a safe and orderly shutdown of the plant"* and *"Stresses resulting from the simultaneous occurrence of the maximum earthquake [SSE] and the loss of coolant accident shall be limited to permit a safe shutdown of the plant."*

In summary, Chapter 5 establishes the seismic design basis supporting the position that SSCs designated as Class I, including ECCS and the BWST, must maintain capability to perform their intended safety functions concurrent with an SSE.

UFSAR Chapter 6 - Engineered Safeguards

Chapter 6 of the UFSAR further describes the design bases and performance requirements of ECCS equipment. Section 6.1.2.4(e), Seismic Design, states, *"Components and piping in the emergency injection systems are designated as Class I equipment and are designed to maintain their functional integrity during a safe shutdown earthquake (SSE). Chapter 5 defines the acceptable stress limits for the Class I equipment."*

In summary, Chapter 6 provides another statement augmenting the position that ECCS is required to maintain its capability to perform intended safety functions concurrent with an SSE.

SER from the Operating License Review

In 1973, the AEC issued an SER documenting the operating license review, and it contained the following two statements concerning the design of seismic Class I equipment: *"Class I seismic items have been designed to withstand the Design Basis Earthquake (Safe Shutdown Earthquake) without loss of function"* and *"We [AEC] find these classifications to be acceptable and have concluded that the applicant placed the safety related structures, systems and components in their appropriate category."* Also, the FSAR being reviewed during original licensing categorized ECCS as a seismic Class I system.

This information provides the following two insights: (1) the requirement for seismic Class I SSCs (e.g., ECCS) to maintain their safety function following an SSE has existed

since the original licensing of the plant and (2) the regulatory bodies (i.e., AEC and the NRC) have consistently held the viewpoint from original licensing to the present that ECCS is correctly designated as a seismic Class I system that must be designed to withstand an SSE.

Conclusion

The previous discussions from the UFSAR and the SER laid the foundation for the NRR staff position in response to the original question from the TIA request about maintaining ECCS operability during an SSE. NRR staff does not agree with the licensee's position concerning this question for two reasons. First, an implicit interpretation from the UFSAR was used to justify the subject activity being part of the original licensing basis. NRR staff would agree that there is a general description of the cleanup flow-path in the UFSAR, but no details are provided that would lead to a rational conclusion that it is acceptable to connect a non-seismic system to a seismically-qualified Class I SSC during power operations when it is required to be operable by TS. The NRR staff position is fortified by (1) the UFSAR description of the AEC draft GDC Criterion 2 and (2) the UFSAR design bases descriptions of the seismic Class I SSCs in question, which clearly state functional integrity shall be maintained during an SSE. Secondly, the licensee points to other events (e.g., natural phenomena, aircraft impact) that the plant is not designed to withstand. Of the natural phenomena examples, one pertains directly to the BWST. According to the UFSAR, the BWST is not protected against tornado-generated missiles and, therefore, it cannot be credited to respond to a LOCA coincident with a tornado. This example is used by the licensee to justify its interpretation of Criterion 2 from the AEC draft GDC. The NRR staff viewpoint is that this example (i.e., tornado-generated missiles) represents a specific exception to Criterion 2 that was documented and approved in the UFSAR rather than a justification for a broad interpretation of Criterion 2 to not require ECCS to be operable during an SSE.

In contrast to the licensee's position above, the NRR staff's interpretation of AEC draft GDC Criterion 2 is founded on explicit statements in the UFSAR regarding the criterion and its implementing seismic design requirements (i.e., design bases). The NRR staff has concluded that TMI's licensing basis requires ECCS to maintain the capability to perform its intended safety functions concurrent with and following an SSE, which represents a consistent position from original licensing to the present.

b. Is it an appropriate interpretation of TMI's licensing basis to conclude that the BWST was/is not required for safe shutdown after a seismic event (assuming there is no performance requirement for ECCS safety-related function concurrent with a seismic event) and that other borated water sources (tanks in seismic class 1 protected structures) can be credited to support RCS inventory to achieve and maintain safe shutdown (SSD) conditions?

Response

This question is not applicable in light of the NRR staff's response to the previous question. Based on the staff's previous interpretation of TMI's licensing basis that the

BWST is required to maintain its functional integrity concurrent with and following an SSE, this would preclude operating the BWST in an unanalyzed condition during power operations (i.e., the mode of applicability for the BWST).

2. Are manual actions considered acceptable to achieve and maintain safe-shutdown to support the performance standard of AEC draft GDC 2 in TMI's UFSAR, Section 1.4.2?

Response

The NRR staff deems it unacceptable to credit unidentified and unapproved manual actions as a justification for using the BWST non-seismic cleanup path during power operations for two reasons. First, UFSAR Chapters 9 and 11, which provide system descriptions for the cleanup flow-path equipment, do not include any description of these manual actions as a justification for maintaining the system's operability at power. The UFSAR's silence on this issue indicates the non-seismic flow-path represents an unanalyzed condition at power.

Second, AEC draft GDC 14, Core Protection Systems, states, *"Core protection systems…shall be designed to act automatically,"* and in the UFSAR discussion of how TMI meets this criterion, the licensee states, *"Certain long term operations in the emergency core cooling systems which do not require immediate actuation…are performed manually by the operator."* This reference to ECCS in the UFSAR discussion of how the plant satisfies the requirements of Criterion 14 indicates that this criterion is applicable to the BWST because, as established above, the BWST is part of ECCS. Also, isolation of the BWST cleanup path would need to be an immediate action to prevent the contents of the tank from draining below the level required by TS. Criterion 14 and TMI's implementation thereof provide that immediate actions be performed automatically, whereas manual actions are allowed only for longer term operations. Therefore, TMI's use of manual actions to isolate the BWST from non-seismic piping – an immediate action – instead of using an automatic actuation is inconsistent with Criterion 14.
The NRR staff concludes that it is unacceptable to credit manual actions as a justification for adhering to Criterion 2 of the AEC draft GDC without inclusion into the TMI licensing basis in accordance with NRC regulations (e.g., 10 CFR 50.90 or 50.59) due to (1) the lack of supporting evidence in the UFSAR indicating these manual actions are part of the licensing basis and (2) the stipulations of Criterion 14 from the AEC draft GDC.

3. Does the NRC's acceptance of the TMI USI A-46 seismic validation response to GL 87-02 recognize that the seismic event could occur with the BWST operating in a recirculating/cleanup line-up?

Response

The purpose of GL 87-02 was to verify the seismic adequacy of equipment in plants that could not be verified to meet the current licensing criteria when USI A-46, "Seismic Qualification of Equipment in Operating Plants" was identified. TMI was in the population of plants that had to respond to GL 87-02, and the NRC accepted the licensee's response, which identified and evaluated components necessary to bring the plant to a safe-shutdown condition. Equipment necessary for cleanup of the BWST contents was included in this evaluation.

As previously stated, the NRR staff interprets the design bases described in the UFSAR to require ECCS to maintain the capability to perform its intended safety functions during and after a seismic event. The GL 87-02 analysis only evaluated the plant's ability to safely shut-down after an SSE without consideration of a coincident LOCA, which translates to ECCS not having to maintain its TS operability during or after an SSE. This represented an evaluation of the plant to a lower standard as compared to the requirements of the plant's licensing basis, which are documented in the UFSAR [see the response to Question (1.a.)]. Although the GL 87-02 evaluation criteria was met and accepted by the NRC, this does not imply that the design basis described in the UFSAR was superseded by information in the GL 87-02 analysis. In fact, the licensee did not change its UFSAR to reflect the GL 87-02 analysis relevant here. Therefore, as discussed previously, the NRR staff maintains its position that operation of the non-seismic BWST cleanup path at power is outside the TMI licensing basis.

4. Does the answer to any of these questions constitute a change in NRC staff position previously approved in licensing actions, whereby a backfit evaluation needs to be performed?

Response

The regulation at 10 CFR 50.109, "Backfitting," defines a backfit, in part, as "a modification of…the procedures or organization required to design, construct or operate a facility; any of which may result from…the imposition of a regulatory staff position interpreting the Commission's regulations that is either new or different from a previously applicable staff position…."

The NRR staff's responses to the questions posed by the TIA request were based on an interpretation of the current language in TMI's UFSAR, which is consistent with the FSAR reviewed by the AEC during original licensing. Also, as stated earlier, NRR's position is in alignment with the SER issued by the AEC during the original licensing process.

Therefore, the NRR staff position represents an interpretation of TMI's licensing basis that has remained consistent from original licensing to the present, is neither new nor different from its previous position, and therefore does not constitute backfitting.

4.0 REGULATORY REQUIREMENTS

The NRR staff evaluation was based on a review of TMI's UFSAR, and more specifically, the GDC and design basis descriptions contained in the UFSAR. Impacts on TMI's TS requirements were also considered during the assessment. Therefore, the applicable regulatory requirements pertaining to the FSAR content, updating the FSAR, implementing design bases, and TS are listed below:

- 10 CFR 50.34(b), states, "*Final safety analysis report. Each application for an operating license shall include a final safety analysis report. The final safety analysis report shall include information that describes the facility, presents the design bases and the limits on its operation…."* The design bases from the UFSAR are the foundation of the NRR staff's position, and this regulation requires design bases to be included in the FSAR.

Therefore, the NRR staff is using information required by a regulation to establish its position.

- 10 CFR 50.34(b)(2), states, *"A description and analysis of the structures, systems, and components of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which such requirements have been established, and the evaluations required to show that safety functions will be accomplished. The description shall be sufficient to permit understanding of the system designs and their relationship to safety evaluations."* The design bases from the UFSAR are the foundation of the NRR staff's position, and this regulation requires design bases to be included in the FSAR. Therefore, the NRR staff is using information required by a regulation to establish its position.

- 10 CFR 50.36(c)(2)(i), states, "*Limiting conditions for operation. (i) Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met."* ECCS and the BWST are SSCs encompassed by TS, and they have associated LCOs. Operating SSCs outside of their approved licensing basis is a non-conforming condition that brings into question the capability of SSCs to meet their LCO requirements. Therefore, the NRR staff's position that operating the BWST outside of its licensing basis renders it inoperable would require action in accordance with its associated LCO based on this regulatory requirement.

- 10 CFR 50.71, "Maintenance of records, making of reports," requires the licensee to update their FSAR, which was the primary source of information used for the evaluation. The regulation states, *"[the licensee] shall update periodically…the final safety analysis report (FSAR) originally submitted as part of the application for the license, to assure that the information included in the report contains the latest information developed."* Information from TMI's UFSAR is used to establish the NRR staff's position. This regulation requires the UFSAR be updated periodically to correctly represent the plant. The requirements that (1) the FSAR include design bases descriptions and (2) the FSAR be updated periodically ensures that the NRR staff is using current information that is required by regulation.

- 10 CFR Part 50, Appendix B, "Appendix B to Part 50 – Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," imposes requirements concerning design bases. Specifically, Criterion III, Design Control, from the regulation states, *"Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions."* The NRR staff's position is based upon the design bases described in TMI's UFSAR. This regulation requires that design bases be correctly translated into specifications, drawings, procedures, and instructions. The NRR staff's position is that the design basis

- associated with ECCS and the BWST is not being translated correctly based on the way the plant is being operated. Operation of the BWST in this manner renders it inoperable in accordance with TS.

5.0 CONCLUSION

Based on a review of TMI's licensing basis (i.e., the draft GDC and design bases in the UFSAR), the NRR staff has concluded that the BWST cannot be credited to perform its intended safety function when it is connected to the non-seismically qualified piping for cleanup. This configuration is unanalyzed and renders the BWST inoperable according to TS. Also, manual actions are not approved as a justification for compliance with Criterion 2 of the AEC draft GDC. Finally, since this viewpoint represents a consistent position from original licensing to the present, the NRC staff position does not constitute backfitting.

6.0 POTENTIAL OUTCOME PATHS

Immediate Implications: Upon receiving the conclusions of this TIA, the licensee would be expected to continue to not use the non-seismically qualified cleanup path during the TS modes of applicability for the BWST, until and unless the licensing basis is changed to allow the practice.

Generic Implications: This issue was previously addressed in NRC Information Notice 2012-01: Seismic Considerations-Principally Issues Involving Tanks (ADAMS Accession No. ML11292A175), and it does not warrant the issuance of an additional generic communication.

Backfit Considerations: Resolution of this issue does not constitute a backfit because it does not involve a new or different position from a previously applicable staff position.

6.0 REFERENCES

1. NRC Memorandum, Request for Technical Assistance Regarding Three Mile Island Licensing Bases and Acceptability to Use a Non-Seismic Qualified Cleanup Path for the Borated Water Storage Tank (TIA 2015-01); dated April 10, 2015; ADAMS Accession No. ML15103A065.

2. NRC Generic Letter GL 87-02, Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46 (Generic Letter 87-02); dated February 19, 1987.

3. Three Mile Island Nuclear Station, Unit 1 Updated Final Safety Analysis Report, Revision 22; dated April 2014.

4. NRC Information Notice 2012-01: Seismic Considerations – Principally Issues Involving Tanks; dated January 26, 2012; ADAMS Accession No. ML11292A175.

5. Three Mile Island Station, Unit 1 – NRC Integrated Inspection Report 5000289/2014002; dated May 14, 2014; ADAMS Accession No. ML14134A500.

6. Three Mile Island Nuclear Station, Unit 1 Renewed Facility Operating License, Appendix A - Technical Specifications, Amendment 284.

7. NRC Safety Evaluation Report for USI A-46 Program Implementation at Three Mile Island Unit 1 (TAC No. M69486); dated August 12, 1998.

8. Safety Evaluation by the Directorate of Licensing U.S. Atomic Energy Commission in the matter of Metropolitan Edison Company Jersey Central Power & Light Company Pennsylvania Electric company Three Mile Island Nuclear Station Unit 1 Dauphin County, Pennsylvania Docket No. 50-289; dated July 11, 1973.

9. Three Mile Island Nuclear Station, Unit 1, USI A-46 Seismic Evaluation Report; dated May 17, 1995.

10. Submittal of TMI White Paper – TMI BWST Cleanup Path Issue, TMI-15-076; dated June 22, 2015; ADAMS Accession No. ML15177A098.

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