e. Mapping of Rebar
After removal of the concrete, fully developed original reinforcement must be appropriately mapped (the portion of the reinforcement left in place), photographed, and as-built to eliminate construction issues during restoration. In places where two bars enter into the temporary containment opening, the bar which is continuous from the existing concrete and is a fully developed bar will be where the splice is placed.

f. Reinforcing Steel Removal and Disposal
Existing reinforcing steel will be cut and removed from the construction opening during hydro-demolition once exposed and radiologically surveyed for release prior to exiting the RCA at the discretion of RP and disposed of for recycling when appropriate.

g. Tendon Sheath Removal and Disposal
The remains of existing vertical and horizontal tendon sheaths within the construction opening following hydro-demolition will be cut and removed once exposed. Removed sheaths shall be radiologically surveyed for release prior to exiting the RCA at the discretion of RP and disposed of for recycling when appropriate.

h. Control and Monitoring of Contamination
Breaching the containment liner plate results in another path whereby airborne contamination can potentially exit the Reactor Building. The Reactor Building purge will be maintained as required by Exelon procedures to induce airflow into containment. The Reactor Building purge is a monitored release path and must be maintained. An airborne radioactivity monitor will be established near the construction opening for continuous assessment of the release pathway in the event of loss of reactor building purge. In addition, two (2) curtains that serve to protect the interior of the building from the outside environment and protect the environment from airborne contamination will be provided. Should the RP monitoring identify a potential release issue or if there is a ventilation failure for any reason, RP may direct that any of the following measures be taken until the purge is restored:

TWO CURTAINS SHALL BE PROVIDED

a) Discontinue work activities with potential airborne contamination levels;
b) Close all openings to the outside environment, including the containment access opening (two (2) curtains, an inner and an outer, shall be provided covering the containment opening once the concrete and liner has been removed); and,
c) Provide and operate auxiliary purge HEPA units (as needed) to permit appropriate airborne contamination controls for hot particle work.

i. Security Barrier
The Reactor Building wall is a Vital Area barrier. Before removing the liner plate, a hold point will be established to ensure that appropriate security measures are in place to compensate for the breached Vital Area boundary. Construction of the work platform as well as other site preparations and work activities may hinder area surveillance and execution of the defensive strategy. Therefore, placement of material and equipment at the site and the timing and location of compensatory measures shall be coordinated between Security and SGT. A 48-hour notice prior to breaching the liner plate shall be given to Plant Security.

j. Liner Plate Cutting
1. As planned in the field implementation schedule, cutting of the liner plate will take place following TMI-1 attaining the defueled condition. However, as a contingency in the event of a delay in reactor defueling, complete cutting of the containment liner plate except the stiffener angles may be performed during Refueling Shutdown with 23 feet of water above the Reactor Vessel flange.

2. In order to maintain seismic qualification, the liner plate stiffeners must remain intact until reaching defueled condition.

3. In exercising this contingency, means will be provided to temporarily seal all cuts of the containment liner plate from the inside.

4. Liner plate shall not be breached during power operating conditions.

k. Liner Plate Removal

1. Removal of the liner plate including cutting of the stiffeners shall not occur prior to Defueled.

   Note: It is anticipated that Core Offload activities will be completed before liner breaching activities will occur. However, in case Core Offload activities are delayed, a contingency case, still in compliance with the Technical Specification (Ref. 2.5.1) and plant procedures, may be invoked. It allows the liner plate cutting activity to occur concurrently with Core Offload activities, so long as the stiffeners remain intact.

2. The liner plate will be removed as one unit using the liner plate lifting device.

3. The liner plate will be decontaminated to <1000dpm/100cm^2 loose surface, prior to removal from the contaminated area. It shall be assumed to be Radioactive Material and must therefore be free released if removed from a designated storage area inside the RCA.

4. Prior to removal of the liner, the coating on the liner plate will be removed approximately one foot (1') to both sides of the liner plate cut on the inside face.

5. The containment purge system will be secured or adjusted temporarily, or have the Equipment Hatch open during the final liner plate removal process.

6. During the period of time when the liner plate is removed, the requirements of low pressure containment integrity are applicable as specified in TMI Procedure 1101-3 (Ref. 2.3.39) with proper notifications to Operations.

1.2.2 Restoration of the Reactor Building Opening

1.2.2.1 Liner Plate Prep Work and Restoration Activities

a. The liner plate activities will occur while TMI Unit 1 is Defueled.

b. The liner plate section and stiffeners removed during creation of the construction opening in the Reactor Building will be reinstalled to the original location. Restored liner plate stiffeners will be spliced to existing stiffeners with new ASTM A36 material. If new stiffeners are required to replace existing they will be ASTM A36.

c. New construction stiffeners will be welded to existing vertical stiffeners as a construction aid for installation of concrete formwork as required.

d. 4'x8' plates of 3/8" ASTM A283 Grade C steel will be available for repairs to the liner plate. New liner plate material for repairs shall be furnished to 3/8" thickness with a tolerance of -0.01"/+0.030" per ASTM A6 (Ref. 2.8.32).

e. The coating that was removed approximately one foot (1') to either side of the cut line will be restored per TMI Procedure 1440-Y-5 (Ref. 2.3.16) and Specification SP-1101-06-001 (2.7.8).

3.19 System operating req'ts changed or added: (4.1.19)

The Reactor Building serves as a fission product barrier while the plant is operating and as a radiation control zone during refueling outages. Technical Specification 3.8.3 allows the Equipment Hatch to be open while handling irradiated fuel so long as the Reactor Building Purge Exhaust System is in service, among other conditions (refer to Section 1.2.1.2.k). The Control Room has a digital readout differential pressure gauge for containment and a hand-switch for controlling inlet air supply to the purge exhaust fans, and with this the Control Room can maintain a slight negative pressure on containment throughout the outage when required. When the liner plate is breached, a potential release path is created. Implementation measures will be taken to mitigate and monitor the potential release of radioactive material.

OUTPUT:

While the purge system is operating it exhausts at a static pressure of 12.3 inch water gauge per SDBD-TI-823 (Ref. 2.9.14), which is equivalent to 0.44 psig. Calculation 38455-CALC-C-006 (Ref. 2.1.6) shows that with concrete removed, the intact liner plate is capable of withstanding the required differential pressure of 5 psig without rupturing. Thus there is no risk that purge exhaust will deform or rupture the intact liner plate. During further interim conditions of the liner plate, to include removal and reinstallation, the Reactor Building Purge and Vent System may be adjusted, for practical reasons, so as to minimize differential pressure across the liner plate. Since it is expected that the Equipment Hatch will be open and supplying a steady flow of inlet air during all of the following listed interim conditions, the condition of the liner plate may be transparent to operation of the purge exhaust. However, as an aid to maintaining the optimal condition of a slight negative pressure on containment such that all effluent air is passing a monitored release site, a single point of contact with operations will be established to communicate with the Operations department regarding these developments:

- Liner plate is first breached via cutting. This is scheduled to occur after the reactor is Defueled, but as a contingency, is allowed during Refueling Shutdown. If this contingency is chosen, Calculation 38455-CALC-C-006 (Ref. 2.1.6) demonstrates that with the stiffeners intact, the breached liner plate will withstand all design basis loads appropriate to Refueling Shutdown before any cutting takes place. The approximate ¼ inch wide kerf-cut around the entire perimeter will have a negligible impact on containment pressure. The breach will be isolatable by an atmospheric pressure barrier (e.g. duct tape) within 45 minutes as specified in Unit 1 Operating Procedure 1101-3 (Ref. 2.3.39) during the handling of irradiated fuel. An assigned crew will be provided the means to temporarily seal the kerf-cut if a fuel handling event is declared. In the case of a loss of DHR (decay heat removal), Unit 1 Operating Procedure 1101-3 (Ref. 2.3.39) is more restrictive. For this application, the opening area in the liner plate must be isolatable by a pressure barrier capable to withstand 5 psi of differential pressure within one (1) hour, or a longer time period if specifically approved by the Operations Director. If the contingency early cut is chosen, the SGRO project will request a suitable extended time period for this purpose based on the decay heat remaining appropriate to the extent of defueling then in effect. The time extension will be obtained and a closure method specified (e.g. restoration by welding) before any liner cutting is allowed to take place.
- Liner plate is removed. This occurs in the Defueled condition. Stiffeners will be severed and the rigged liner plate door sheet will be removed, providing a large unobstructed path for external air. At this time the Equipment Hatch, directly below, will be open and curtains on both the inside and outside face of the temporary construction opening installed as provided in 38455-CALC-C-017 (Ref. 2.1.17) and drawing 38455-00816-008 (Ref. 2.2.37). The impact on containment pressure will be comparable to the initial opening of the Equipment Hatch (the size of which is comparable to the construction opening). The control room may choose to adjust or be requested to adjust differential pressure.
- Liner plate curtains are installed or removed. These activities occur in the Defueled

condition. The control room may choose to adjust or be requested to adjust differential pressure. Calculation 38455-CALC-C-017 (Ref. 2.1.17) provides structural evaluation of the temporary curtain supports and demonstrates there is no impact to the plant nor design basis function of the plant.

- Liner plate is placed back into the opening. This occurs in the Defueled condition after the steam generators and all necessary equipment has moved through the opening. The liner will then be expeditiously restored, and the project may request adjustment to minimize differential pressure across the liner plate, as it may have a detrimental impact to liner plate alignment and welding.

Any purge adjustments must be coordinated with Operations through a single point of contact.

From the time that the liner plate is breached until restoration welding is complete, Station Radiological Protection will have monitoring capability in place and perform special air sampling as required per Offsite Dose Calculation Manual CY-TM-170-300 (Ref. 2.3.50), similar to that done at the Equipment Hatch.

In its final restored configuration, the Reactor Building will perform its design basis functions. No open operability determinations are created by this modification. No changes in operator actions are required by this modification. No on-line maintenance activities are affected by this modification. No changes to the purge exhaust system are required by this modification.

3.20 Human factors changed: (4.1.20)

There are no human factor-system interfaces affected as a result of implementing this ECR per CC-AA-102 (Ref. 2.3.8). However, due to high noise levels resulting from hydro-demolition activities and paint removal on the liner, communication between refueling crews and the fuel handling building as well as workers on the construction opening work platform is a potential human factor impact during implementation requiring ear protection or headsets. Operations can stop any distracting activities at any time.

OUTPUT:
This ECR does not require any new alarms, relocation of switches, or labeling of panels. The configuration change does not affect the control room, remote shutdown panels (RSP), nor alternate shutdown panels. No operator actions, materials, or procedures are changed as a result of this modification.

The hydro-demolition process creates approximately 85 decibels at fifty feet (50'). Implementation of Hearing Conservation Program will be needed and/or possible rerouting of employees during the containment opening cutting process.

Fugitive dust created by various equipment such as compressors, cranes, trucks, hydro-demolition, or air manifold will be monitored by the Project Safety Manager to identify jobs and tasks requiring exposure assessment to industrial contaminants, inform employees of air monitoring results, and to oversee instrument maintenance, calibration, and exposure assessment provisions of this procedure are implemented.

3.21 Procedure changes addressed: (4.1.21)

Section 3.42 of this ECR identifies interfacing departmental reviews that are required to address the full extent of procedural changes required as a result of this ECR. The interfacing

OUTPUT:

The area will be restricted because of heavy loads, tools, and equipment in addition to security reasons. The work area will be posted during work activities to limit and control traffic for only work-related activities.

The concrete rubble removed during hydro-demolition must be tested for contamination and disposed of accordingly. A holding area must be established within the protected area to store the rubble until tests are completed. If not radiologically cleared, Exelon will handle the disposition and a contingency plan for the contaminated rubble will be in place (safe storage location will be provided by TMI). Approved disposal areas will be designated.

Concrete truck washouts will be conducted only at approved areas that will not allow flow into stormwater drains. These areas will be cleaned at the completion of the project.

3.25 Any radiation protection / ALARA concerns: (4.1.25)

1. The Reactor Building serves as a radiation control zone during refueling outages. After the liner plate is removed, a potential for spread or loss of control of Radioactive Material exists. This may occur as contamination spread, airborne release pathway, and radioactive items exiting the RCA in an uncontrolled fashion.

2. Contamination levels will be controlled to a Rad Protection approved level at boundaries well within the Reactor Building. This will ensure an adequate buffer area to ensure contamination does not reach the environment.

3. The Reactor Building is under a negative pressure. This prevents potentially contaminated air from getting to the environment. Additionally, portable Air Sampling equipment will be set up near the containment opening to monitor this potential release point.

OUTPUT:

Equipment will be surveyed upon arrival on site.

The liner plate is located within the RCA and therefore within a RWP area. Any work on the liner plate requires a RWP unless the entire liner plate is free released. This will be posted a radiation work area.

This ECR will incorporate radiological control boundaries as necessary. All areas for this work will occur in an RCA; however, the boundary between contaminated and non-contaminated areas must be controlled. Additionally, the Reactor Building is either a HRA or a LHRA at different times. Inside the Reactor Building is a contaminated area and outside is a clean area.

Radiological Protection and ALARA personnel will survey, control, and post all affected areas during implementation of this ECR per Exelon Radiation Protection procedures.

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(1) The Reactor Building purge will be maintained as required by Exelon procedures to induce airflow into containment. The Reactor Building purge is a monitored release path. In the event of loss of Reactor Building purge, inadvertently or if needed for outage activities, an airborne radioactivity monitor shall be established near the temporary construction opening for continuous assessment of the release pathway in accordance with RP Procedures.

(2) DONE

Control of effluent water is required. Random statistical sampling per ALARA Engineering and Exelon Procedures will be completed.

within the scope of this ECR. Refer to the applicable Exelon Safety Procedures (e.g., SA-AA-series documents). Contractor procedures are provided in Section 3.41 of this ECR. There is no change to existing industrial safety requirements associated with the implementation of this ECR.

3.31 Critic cont / nuc mat'l; account / nuc mat'l or transient or accident analysis: (4.1.31)

Determine the impact on nuclear fuel, core components, core design, reactivity management, criticality control and accountability of nuclear materials as well as transient and/or accident analysis by using CC-AA-102 Attachment 6 (Ref. 2.3.8).

OUTPUT:
CC-AA-102 Attachment 6 (Ref. 2.3.8) was reviewed and it was determined that nuclear fuel, core components, core density, reactivity management, criticality control, accountability of nuclear materials, transient analysis, and accident analysis will not be affected by this ECR.

3.32 Special load path req'ts: (4.1.32)

For TMI-1, a heavy load is defined as greater than or equal to 3,000 lbs.

OUTPUT:
All lifts will be conducted in accordance with QEP 10.05, Rigging & Handling (Ref. 2.3.7). The specific load paths and sequence will be established in the field as required.

Lifts for this ECR include the following:

a. Removal of TMI-1 Sky Climber;
b. Tendon Platforms;
c. Tendon Rams;
d. Tendon Coilers;
e. Tendons;
f. Construction Opening Work Platform;
g. Liner Plate;
h. Concrete Formwork; and,
i. Hydro-Demolition Robots.

3.33 Changes to mechanical and / or HVAC system or req'ts: (4.1.33)

A negative purge will be placed on the containment building during construction activities once the liner has been removed. If purge must be suspended for a short time due to work activities, radiation monitoring and surveillance will be conducted by RP. The temporary containment opening does not affect any mechanical or installed HVAC systems. Coating applications will be completed in accordance with TMI site procedures.

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support of continued operation under the current plant operating license.

- EEC TM 06-00818 (Ref. 2.9.2) – This EEC includes rigging and handling of the Steam Generators.

3.47 Latent Failure Vulnerability

Identify any latent failures in redundant, non-safety related trip circuits which have the potential for causing a reactor scram (CC-AA-103 step 4.3.10.9.A).

OUTPUT:
A latent failure vulnerability review (CC-AA-103, Section 4.3.10.9.A, Ref. 2.3.9) has been performed for this configuration change. This modification does not involve any redundant, non-safety related trip circuits with the potential for reactor scram.

3.48 Interim Configuration Impact

Identify any plant configuration that will occur during installation of the change that affects other systems or creates internal or external hazards (CC-AA-103 step 4.3.10.9.B).

During implementation of this configuration change, numerous interim configurations will occur. The Reactor Building serves as a radiation control zone during refueling outages. During removal and reinstallation of the liner plate, the Reactor Building Purge and Vent System must be secured if the Equipment Hatch is closed (refer to Section 1.2.1.2.k for details) so as to prevent creating a differential pressure across the liner plate which would interfere with its fit-up and welding. In its unsupported configuration, operation of the Reactor Building Purge and Vent System will be controlled so as to not place pressure loadings upon the liner plate that could cause deformation. After the liner plate is removed, a potential airborne contamination release path is created.

PURGE OPERATION

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OUTPUT:
This ECR does not change any systems; however, while the liner plate is cut and during removal and reinstallation, the purge may be compromised if the Equipment Hatch is closed (refer to Section 1.2.1.2.k). In this event the HVAC system is affected. In the incident that a contigency early cut of the liner must be made, a predetermined contingency will be exercised. The construction opening must be isolatable by an atmospheric barrier within 45 minutes as specified in Unit 1 Operating Procedure 1101-3 (Ref. 2.3.39) during the handling of irradiated fuel. Implementation measures will be taken to minimize and monitor the potential release of radioactive material by covering the opening with curtains and maintaining a slight negative pressure at all times.

Through adherence to the American Hydro Procedures, industry best-practices, and review of SGT lessons learned, water intrusion will be minimal. Water intrusion, if any, will be limited to a small area below the construction opening only (from the bottom of the concrete opening to the next horizontal L4x3x1/4 stiffener which at most is 5'-6", associated with the spacing of horizontal stiffeners). The separation of the liner plate from the concrete wall after detensioning of tendons is anticipated to be negligible due to the embedded horizontal and vertical stiffeners in the existing concrete, and the liner is expected to partially move back into contact with the concrete. Any potential water intrusion would be created only during the final pass of concrete removal when the last layer is breached. While the existing concrete is a low porous mix, it is doubtful any significant amount of water will seep through the concrete voids and make way to what space there may be, if any, between the liner plate and concrete.

of the rubble may take up to 96 hours, so a holding area located inside the protected area will be made available. Once the rubble is radiologically cleared it is disposed of in a designated land fill unless it can be sent to a recycler. If not radiologically cleared, Exelon will handle disposition of the material by holding it in contaminated storage until it can be transported to a contaminated fill disposal area. Approved disposal areas will be designated. Rock drills, splitters, rivet busters, or other mechanical means will be used to clean-up the concrete around the construction opening border so as to obtain proper profile and a good interface for concrete placement between existing and new concrete.

a. Before starting the hydro-demolition process ensure Control Room has started fire service pump FS-P-2 and connection FS-V-662, FS-V-608, FS-H-4, or FS-H-5 is available. Fire water is the approved water source. Alternate water source can be used if approved by TMI.
b. During hydro-demolition ensure the following activities are completed:

    1. Cover the exposed ends of the horizontal and vertical tendons so that water in-leakage is minimized. As the tendons become exposed plug the end of the tendon in the construction opening.
    2. Valves and steel plates or other suitable devices will be placed at the bottom of the vertical tendons in the tendon gallery prior to cutting of the tendon sheath to control water spillage and prevent flooding in the tendon gallery. This device will release water and debris from the sheath into a collection device located in the tendon gallery. Empty barrels may be used to collect water and debris as they drain through the exposed tendon sheaths. Rad Waste will be contacted to ensure this water is collected, sampled, and disposed of properly.
    3. To prevent water leakage and incidental leaks and spills from entering the station stormwater collection system the following steps will be implemented:
        a. Berms will be placed around all tanks;
        b. All hoses will be wired to prevent separation; and,
        c. Silt controls will be placed around storm drains.
    4. The water used in the hydro-demolition process will be chemically treated by WasteWater Management and disposed of through RM-L-7 or other approved and monitored location, which has adequate capacity to handle the volume of water used. RM-L-7 is operated by TMI, and the wastewater will be disposed of in accordance with TMI procedures and TMI NPDES Permit (Ref. 2.9.17).

4.2.7 Prior to liner plate cutting, the inside of the liner plate is decontaminated, and coating at the cut line is removed. The coating is removed from a strip approximately 1 foot on both sides of the cut line. Decontamination and coating removal is conducted by SGT in accordance with Exelon Procedure 1440-Y-5 (Ref. 2.3.16) and Specification SP-1101-06-001 (Ref. 2.7.8). The liner plate lifting frame will be provided in accordance with drawings 38455-00816-009 thru 38455-00816-013 (Ref. 2.2.38 thru 2.2.42) and 38455-CALC-C-016 (Ref. 2.1.16).

A construction hold point for field implementation of this ECR will be placed on any intended cutting of the liner plate prior to achieving Defueled until Engineering has obtained a time extension from the Operators Director to isolate the pressure boundary from 5 psig of differential pressure.

Prior to liner plate cutting, the area outside the construction opening must have appropriate radiological postings installed and personnel monitoring equipment in operation. An air monitoring system (radiological) must be installed and in operation at the construction opening. The personnel monitoring station must be a covered, climate-controlled structure. Monitoring equipment is furnished by Exelon (Radiation Protection).

Coordinate adjustment of containment purge with Operations as required to prevent negative pressure from pulling on the plate (see Section 3.19). Caution shall be used, as the liner tends to

move inward during this process. Coordinate the adjustment of containment purge as required after the removal.

4.2.8 The steel liner plate is cut and moved to the Release Facility and once free released to the lay down area for inspection and repair/preparation activities required prior to its reinstallation. Rigging of the liner plate for removal is detailed in drawings 38455-00816-009 thru 38455-00816-013 (Ref. 2.2.38 thru 2.2.42).

4.2.9 Two (2) temporary curtains are installed per Calculation 38455-CALC-C-017 (Ref. 2.1.17) and drawing 38455-00816-008 (Ref. 2.2.37) once the concrete and liner plate is removed; one (1) on the inside of the Reactor Building temporary construction opening attached with magnetic connections to the liner plate and one (1) on the outside face of the Reactor Building temporary construction opening attached with anchor bolts to act as a weather barrier to the exterior environment and as a physical contamination barrier.

4.2.10 During the SGRO, and while in storage outside the Reactor Building, additional liner plate stiffeners will be added as a construction aid to the liner plate per drawing 38455-00816-001 (Ref. 2.2.1). The end sections of the new stiffeners are added after the liner plate has been reinstalled and after the liner plate weld has been accepted. Prior to reinstalling, all existing concrete will be removed from the liner plate and stiffeners.

4.3 Restoration of the Reactor Building Construction Opening

4.3.1 Mock-ups of the rebar, tendons, forms, and concrete placement will be performed in advance to train the craft personnel and to identify potential issues prior to the actual concrete placement.

4.3.2 The restoration of the Reactor Building opening begins after the new steam generators have been moved into the Reactor Building, and rigging equipment and structures have been removed from the Reactor Building. Restoration of the Reactor Building involves the following activities:

a. Removal of temporary Reactor Building opening curtain magnets to liner plate and anchor bolts to concrete, and inspection and testing of removal areas;
b. Reinstallation of the liner plate and its angles and stiffeners;
c. Inspection and testing of all welds;
d. Installation of floating interior reinforcing mat;
e. Installation/Coupling of new tendon sheaths to the existing tendon sheaths;
f. Splicing of reinforcing steel to the existing reinforcing steel and installation of new reinforcement;
g. Installation of the replacement tendons in the construction opening;
h. Installing forms and placement of new concrete;
i. Tensioning and greasing of all affected tendons, and reinstallation of tendon caps; and,
j. Temporary Reactor Building liner plate alignment aids may be left in place. If removed, inspection and testing of removal areas is required.

4.3.3 When the construction opening is no longer needed for moving equipment or material into/out of the Reactor Building, the liner plate is reinstalled as shown in drawing 38455-00816-001 (Ref. 2.2.1). The liner plate is welded back into place, tested, and accepted prior to proceeding with additional restoration activities. Welding and nondestructive examinations of welds will be per the QEP 12 and 20 series (Ref. 2.3.23-2.3.37), ASME Section VIII Appendix 6 (Ref. 2.8.8), SP-5490 (Ref. 2.7.7), and ASME Section XI, Subsection IWE (Ref. 2.8.9) for surface examination. Liner plate welding will be performed with the Welding Procedure Specification QEP 20.02 (Ref. 2.3.31) qualified in accordance with ASME Section IX (Ref. 2.8.29) and QEP 20.02 (Ref. 2.3.31). Repair of defective welds shall be in accordance with ASME Section XI (Ref. 2.8.9). A 4'x8' plate of 3/8" ASTM A283 Grade C steel will be available for repairs to the liner plate. New liner plate

Station/Unit(s): Three Mile Island Unit 1

Activity/Document Number: ECR TM 06-00816 **Revision Number:** 1

Title: Containment Structural Opening

Effect of Activity:
(Discuss how the activity impacts plant operations, design bases, or safety analyses described in the UFSAR.)

The design and implementation activities performed to create the Containment Opening in order to provide access to the Reactor Building, and those activities which restore the Containment Opening at the completion of the SGR outage are acceptably evaluated to result in no adverse effect to plant operations, design basis functions, or safety analyses described in the UFSAR and will not require prior NRC approval. Design basis functions for the Reactor Building are maintained as required during implementation plant conditions. The restoration configuration of the Reactor Building meets or exceeds design criteria described in the UFSAR to support the operating and accident requirements as specified in UFSAR Section 5.2 for:

- Design Basis Accident structural loadings from a Loss-of-Coolant-Accident (LOCA) (UFSAR Section 5.2.1.2.1).
- Structural loadings of Dead Load (UFSAR Section 5.2.1.2.2), Prestress Load (UFSAR Section 5.2.1.2.3), Live Load (UFSAR Section 5.2.1.2.4), and weather related loads of Wind, Snow, or Ice (UFSAR Section 5.2.1.2.5), and Tornado Load (UFSAR Section 5.2.1.2.6).
- Pressure loadings from normal expected range of environmental conditions: External Pressure (UFSAR Section 5.2.1.2.7) and Internal Pressure (UFSAR Section 5.2.1.2.8).
- Temperature induced loadings to the Reactor Building structure from Operating Temperature (UFSAR Section 5.2.1.2.9) and Accident Temperature (UFSAR Section 5.2.1.2.10).
- Miscellaneous loadings upon the Reactor Building Structure from Earthquake (UFSAR Section 5.2.1.2.11), Polar Crane Loads (UFSAR Section 5.2.1.2.12), Effects of Groundwater and Floods (UFSAR Section 5.2.1.2.13), Aircraft Impact Loadings (UFSAR Section 5.2.1.2.14), and Other Missiles (including Tornado Missiles (UFSAR Section 5.2.1.2.15).

UFSAR Appendix 5A (Summary of Aircraft Impact Design) and Appendix 5E (Report on Structural Integrity Testing of Reactor Containment Structure) were considered during preparation of ECR TM 06-00816.

Appendix 5B (Report of BBRV Post-Tensioning Systems) is largely historical and involves descriptions of tendon work, testing, and industry information that was assembled in 1969 when TMI-1 was constructed. Appendix 5B has been reviewed for the impact of ECR TM 06-00816 activities to ensure no adverse effects.

Implementation of ECR TM 06-00816 has no adverse effect upon the capability for leak rate testing of the Reactor Building described in UFSAR Section 5.7.4.

The design and implementation of ECR TM 06-00816 maintain the assumptions and conclusions unchanged of the analytical and historical UFSAR appendices during the interim configurations of ECR TM 06-00816 implementation and in the final configuration of the restored Reactor Building wall. As is addressed in the 10 CFR 50.59 Screening performed for ECR TM 06-00816, the interim configuration that results from creating the Containment Opening until its restoration accommodates contingency cutting of the containment liner plate prior to Unit 1 achieving the defueled condition without any adverse effect. However, the configuration effects associated with 1) the protection function of the Reactor Building against tornado missiles, and 2) the capability to de-tensioning of up to six (6) contiguous vertical tendons and two (2) specifically named horizontal tendons prior to Unit 1 shutdown in preparation for general tendon de-tensioning to prepare the Containment Opening were determined to require 10 CFR 50.59 Evaluation review (10 CFR 50.59 Evaluation No. SE-000153-021).

With regard to implementation conditions for ECR TM 06-00816, the Reactor Building serves as a radiation control zone during refueling outages. After the liner plate is removed, a potential airborne contamination release path is created. ECR TM 06-00816 implementation measures will be taken to minimize and monitor the potential release of radioactive material in accordance with the Offsite Dose Calculation Manual (ODCM). Additionally, a tarp or covering will be employed over the Containment Opening, and a slight negative pressure will be maintained in the Reactor Building. The Reactor Building also

TS 3.8.7

Station/Unit(s): Three Mile Island Unit 1

Activity/Document Number: ECR TM 06-00816 **Revision Number:** 1

Title: Containment Structural Opening

Note that based on the Code Reconciliation performed for ECR TM 06-00816, performance of 100% magnetic particle surface examination (MT) is an appropriate substitute NDE for non-structural members, such as the containment liner plate, to performing the spot radiography (RT).

Technical Specification Section 3.8.7 – Containment Closure Requirements

As envisioned by the field implementation schedule in relation to reactor defueling activities, cutting of the containment liner plate will take place following TMI-1 attaining the defueled condition. However, as a contingency in the event of a delay in reactor defueling, complete cutting of the containment liner plate may be performed prior to achieving the defueled condition. The acceptability of this particular activity is based upon the implementation design which assures that the configuration of liner plate supporting stiffeners (which remain intact and uncut until TMI-1 achieves the defueled condition) maintains seismic qualification of the liner plate, as demonstrated in Calculation 38455-CALC-C-006 (Liner Plate Formwork at Temporary Containment Access Opening). Since the contingency cutting of the containment liner plate during reactor defueling creates a "penetration providing direct access from the containment atmosphere to the outside atmosphere," the requirements of Technical Specification 3.8.7 apply, which are implemented by Unit 1 Operating Procedure 1101-3, Containment Integrity and Access Limits. Specifically during fuel handling, the opening areas in the liner plate must be isolatable by an atmospheric barrier within 45 minutes. Field implementation of ECR TM 06-00816 will specify the means to achieve the Containment Closure against atmospheric and Reactor Building ventilation system operation pressures of any liner plate areas which may be cut during reactor defueling. The capability to achieve Containment Closure of the containment liner plate cut areas within the 45 minute time limit will be assured with dedicated personnel provided access to readily seal the liner plate early cuts.

Note that for the specific case of a loss of DHR, Procedure 1101-3 conservatively adds requirements in addition to those of Technical Specification 3.8.7. For this application, the opening area in the liner plate must be isolatable by a pressure barrier capable to withstand 5 psi of differential pressure within one hour, or a longer time period if specifically approved by the Operations Director. If the contingency early liner cut is chosen, the SGR Project will request a suitable extended time period for this purpose based on decay heat remaining appropriate to the extent of defueling then in effect. The time extension will be obtained and a closure method specified (e.g., restoration by welding) before any liner cutting is allowed to take place.

No changes to the Technical Specifications are required to implement ECR TM 06-00816.

I.2 Conditions of License – Quality Assurance Program (10CFR50.54(a))

ECR TM 06-00816 is prepared and implemented as part of the TMI Unit 1 Steam Generator Replacement (SGR) Project performed by vendor Steam Generating Team (SGT). SGT's Quality Assurance (QA) Program complies with the requirements of 10 CFR 50 Appendix B and the licensing commitments applicable to the Steam Generator Replacement Project. Therefore, no changes to the TMI QA Program will be required as a result of SGT-performed SGR Project activities.

I.2 Conditions of License – Security Plan (10CFR50.54(p))

In addition to the UFSAR described functions of the Reactor Building, the building itself serves as a vital area security barrier. With the creation of the Containment Opening, appropriate security measures will therefore be required to maintain the integrity of the breached vital area boundary. The extent of the additional security measures taken by the plant's security team shall be coordinated with SGT for schedule purposes and potential impact. Appropriate temporary security measures shall be taken in accordance with the applicable Exelon Security procedures to ensure that Exelon Security Plan requirements are maintained. No changes to the Security Plan are required to implement ECR TM 06-00816.

Leak Rate Test (the Integrated Leak Rate Test (ILRT)) that is performed after the restored concrete has attained proper strength.

d) Performance of a General Visual or a VT-3 examination of the inside surface of the containment liner plate after coatings are applied and before and after performance of the ILRT.

Note that based on the Code Reconciliation performed for ECR TM 06-00816, performance of 100% magnetic particle surface examination (MT) is an appropriate substitute NDE for non-structural members, such as the containment liner plate, to performing the spot radiography (RT).

Technical Specification Section 3.8.7 – Containment Closure Requirements

As envisioned by the field implementation schedule in relation to reactor defueling activities, cutting of the containment liner plate will take place following TMI-1 attaining the defueled condition. However, as a contingency in the event of a delay in reactor defueling, complete cutting of the containment liner plate may be performed prior to achieving the defueled condition. The acceptability of this particular activity is based upon the implementation design, which assures that the configuration of liner plate supporting stiffeners (which remain intact and uncut until TMI-1 achieves the defueled condition) maintains seismic qualification of the liner plate, as demonstrated in Calculation 38455-CALC-C-006 (Liner Plate Formwork at Temporary Containment Access Opening). Since the contingency cutting of the containment liner plate during reactor defueling creates a "penetration providing direct access from the containment atmosphere to the outside atmosphere," the requirements of Technical Specification 3.8.7 apply, which are implemented by Unit 1 Operating Procedure 1101-3, Containment Integrity and Access Limits. Specifically for this application, the opening areas in the liner plate must be isolatable by an atmospheric barrier within 45 minutes. Field implementation of ECR TM 06-00816 will specify the means to achieve the Containment Closure against atmospheric and Reactor Building ventilation system operation pressures of any liner plate areas which may be cut during reactor defueling. The capability to achieve Containment Closure of the containment liner plate cut areas within the 45 minute time limit will be assured with dedicated personnel provided access to readily seal the liner plate early cuts.

Note that for the specific case of a loss of DHR, Procedure 1101-3 conservatively adds requirements in addition to those of Technical Specification 3.8.7. For this application, the opening area in the liner plate must be isolatable by a pressure barrier capable to withstand 5 psig of differential pressure within one hour, or a longer time period if specifically approved by the Operations Director. If the contingency early liner cut is chosen, the SGR Project will request a suitable extended time period for this purpose based on decay heat remaining appropriate to the extent of defueling then in effect. The time extension will be obtained and a closure method specified (e.g., restoration by welding) before any liner cutting is allowed to take place.

No changes to the Technical Specifications are required to implement ECR TM 06-00816.

VI. List the documents (e.g., UFSAR, Technical Specifications, other licensing basis, technical, commitments, etc.) reviewed, including sections numbers where relevant information was found (if not identified in the response to each question)

1. Updated Final Safety Analysis Report (UFSAR) for Three Mile Island – Unit 1, Update 19; Sections 2.4.2, 2.5.2, 5.1, 5.2, 5.5.2, 5.6.3.2, 5.7.1, 5.7.2, 5.7.3, 5.7.4, 5.7.5, and 9.9; Appendices 5A, 5B, and 5C; Figures 5.2-1 to 5.2-24, 5.2-26 to 5.2-31, 5.5-1, 5.6-1, 5A-19 to 5A-21, 5A-29, and 5A-34 to 5A-41
2. Three Mile Island – Unit 1 Technical Specifications, Amendment 269; Sections 3.1.1.2, 3.3, 3.4, 3.6, 3.8, 3.19.1, 4.4.2, 5.2.1, and 6.8.5
3. TMI-1 Surveillance Procedure No. 1301-9.1, Reactor Building Structural Integrity Surveillance, Revision 20
4. Exelon Procedure No. LS-AA-104-1000, Exelon 50.59 Resource Manual, Revision 4
5. SGT Environmental Safety and Health (ES&H) Manual, Latest Revision

ATTACHMENT 9

ATTACHMENT 2
ALARA Installation Review
Page 1 of 1

CC Number: TM-06-00816 Title: CONTAINMENT OPENING
Station: TMI Units: 1

1	Dose Reduction Techniques Necessary?	☐ Yes	☒ No
2.	Control of Contaminated Liquids Necessary?	☒ Yes	☐ No
3	Control of Airborne Contamination Necessary?	☒ Yes	☐ No

If any question above is answered yes, then record the concern(s) and the installation techniques that will be used to maintain dose ALARA (attach additional sheets, if necessary)

2. CONTROL OF EFFLUENT WATER IS REQUIRED. RANDOM STATISTICAL SAMPLING PER ALARA ENGINEERING & EXELON PROCEDURES SHALL BE DONE

3. CHARACTERIZATION & MITIGATION OF AIRBORNE RELEASE AS FOLLOWS:
- PORTABLE MONITORING CONSISTENT WITH EDMS HATCH OPENING SHALL BE PROVIDED PER PROCEDURE.
- NEGATIVE VENTILATION SHOULD BE MAINTAINED BY RB PURGE PER EXELON PROCEDURES.
- A CURTAIN SHALL BE INSTALLED AND TO BE PULLED OVER THE OPENING TO MITIGATE EFFECTS OF INCLEMENT WEATHER OR LOSS OF RB PURGE

CURTAIN FOR
① WEATHER OR
② LOSS OF PURGE

Prepared by: FRANK W. LINSENBACH / [signature] / 12-27-07
Print Sign Date

Approved by: FRANK W. LINSENBACH / [signature] / 12-27-07
(RP Manager) Print Sign Date

SGT	Standard ECP	Form No QEP 11.01-3	Form Rev No / Status 0E1 / AFU	Form Revision Date 21-Feb-06	Form Title WORK PACKAGE INSTRUCTION SHEET

Project: 38455	Unit No: 1	Work Package Number: 1720	Work Package Revision No / Status: 0 / AFU	Work Package Revision Date: 21-May-09	Work Package Sheet 28 of 34

Step No.	WORK PACKAGE INSTRUCTION	HOLD POINT	RELEASES CONST.	RELEASES OTHERS
900	The TMI SGRP Operations (Ops) Representative shall be the single point of contact during the process of cutting and removing the liner plate. The purpose of the contact is to communicate the need to have the Containment Purge System adjusted, as needed, to minimize the amount of differential pressure across the liner plate. Enter the SGRP Ops name in the space below SGRP Ops_____ Date___/___/___ Time_____			
	Note: As planned in the implementation schedule, cutting of the liner plate will take place following TMI-1 attaining the defueled condition. However, as a contingency in the event of a delay in reactor defueling, complete cutting of the containment liner plate may be performed during Refueling Shutdown with 23 feet of water above the Reactor Vessel flange. In exercising this contingency, the liner plate stiffeners must remain intact, until defueled condition is reached, to maintain seismic qualification. A means (e.g. duct tape) must be provided to temporarily seal all cuts. In the event of a delay in defueling, the Construction Superintendent shall coordinate with Engineering and Management before going forward. Even though this contingency is allowed by ECR TM 06-00816, it still may or may not be allowed by the plant.			
910	Prior to cutting the liner plate, verify that the area eighteen inch (18") from the liner plate cut line both sides and along the entire perimeter, is thoroughly clean of concrete and debris. Contact the Construction Superintendent if found not to be clean.	FE		

SGT	Standard ECP	Form No QEP 11.01-3	Form Rev No / Status 0E1 / AFU	Form Revision Date 21-Feb-06	Form Title	WORK PACKAGE INSTRUCTION SHEET

Project:	Unit No:	Work Package Number:	Work Package Revision No / Status:	Work Package Revision Date:	Work Package Sheet
38455	1	1720	0 / AFU	21-May-09	28 of 34

Step No.	WORK PACKAGE INSTRUCTION	HOLD POINT	RELEASES CONST.	RELEASES OTHERS
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	Note: As planned in the implementation schedule, cutting of the liner plate will take place following TMI-1 attaining the defueled condition. However, as a contingency in the event of a delay in reactor defueling, complete cutting of the containment liner plate may be performed during Refueling Shutdown with 23 feet of water above the Reactor Vessel flange. In exercising this contingency, the liner plate stiffeners must remain intact, until defueled condition is reached, to maintain seismic qualification. A means (e.g. duct tape) must be provided to temporarily seal all cuts. In the event of a delay in defueling, the Construction Superintendent shall coordinate with Engineering and Management before going forward. Even though this contingency is allowed by ECR TM 06-00816, it still may or may not be allowed by the plant.			CB - these are 2 of several OPS notifications which are extracted from the Work Pkg 12/7
910	Prior to cutting the liner plate, verify that the area eighteen inch (18") from the liner plate cut line both sides and along the entire perimeter, is thoroughly clean of concrete and debris. Contact the Construction Superintendent if found not to be clean.	FE		

SGT	Standard ECP	Form No QEP 11.01-3	Form Rev No / Status 0E1 / AFU	Form Revision Date 21-Feb-06	Form Title WORK PACKAGE INSTRUCTION SHEET

Project: 38455	Unit No: 1	Work Package Number: 1720	Work Package Revision No / Status: 0 / AFU	Work Package Revision Date: 21-May-09	Work Package Sheet 33 of 34

Step No.	WORK PACKAGE INSTRUCTION	HOLD POINT	RELEASES CONST.	RELEASES OTHERS
1060	Place cribbing underneath the lift frame assembly end opposite the counter weight as shown on Attachment 11, view "C".			
1070	Install / hang the outside Containment opening curtain tarp onto the outside curtain track and roller assembly in accordance with the "Outside Tarp Support Attachment Detail" shown on Attachment 5.			
1080	Notify the TMI SGRP Operations (Ops) Representative that the Containment Purge System can be returned to normal service. Enter the SGRP Ops name in the space below. SGRP Ops_____. Date___/___/___ Time_____	FE		