HOLTEC PALISADES

27780 Blue Star Highway, Covert, MI 49043

PNP 2025-054

10 CFR50.55a

July 31, 2025

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Palisades Nuclear Plant
NRC Docket 50-255
Renewed Facility Operating License No. DPR-20

Subject: Relief Request Number RR 5-10, *Proposed Alternative to ASME Section XI Code Requirements for Modification of Reactor Pressure Vessel Head Vent Line Penetration*

Pursuant to Title 10 of the Code of Federal Regulations (10 CFR) 50.55a, *Codes and standards*, paragraph (z), Holtec[1] hereby requests Nuclear Regulatory Commission (NRC) approval of the attached relief request for the Palisades Nuclear Plant (PNP) Inservice Inspection (ISI) Program, fifth ten-year interval.

PNP ceased operation in the Spring of 2022. Holtec is performing modifications to the PNP to support restart of plant operations. The Palisades Reactor Vessel Closure Head (RVCH) Vessel Head Penetration (VHP) vent line penetration is constructed of materials that are susceptible to Primary Water Stress Corrosion Cracking (PWSCC). Modification to the Palisades RVCH vent line VHP is being implemented to mitigate the PWSCC susceptible materials. However, due to the location and limited access to the vent line VHP a one-hundred percent surface examination of the new weld is unachievable without an increase risk to personnel safety and dose exposure. Holtec has determined that modification of the vent line VHP utilizing the alternative specified in this request will result in hardship without a compensating increase in the level of quality and safety. Therefore, this relief is requested in accordance with 10 CFR 50.55a(z)(2).

1 Holtec Palisades, LLC (“Holtec Palisades”) is the licensed owner of PNP. Pursuant to the license transfer amendment received in connection with the PNP restart (Reference 1), licensed operating authority has transferred from Holtec Decommissioning International, LLC ("HDI") to Palisades Energy, LLC (“Palisades Energy”).

The provisions of this relief are applicable to the fifth ten-year Inservice Inspection interval at PNP, which commenced on December 13, 2015, and is currently scheduled to end on December 12, 2025, as identified in the Fifth Interval Inservice Inspection Plan, submitted to the NRC on December 09, 2015, (Reference 2). While this relief request identifies the same code cases as the previous relief requests, updated versions of the applicable code cases, as approved by the NRC and identified in the Fifth Interval Inservice Inspection Plan, are referenced in this submittal.

Attachment 1 to this letter provides the supporting information for this relief request.

This letter contains no new regulatory commitments.

Please refer any questions regarding this submittal to Frank Sienczak PNP Regulatory Assurance Manager, at (269) 764-2263.

Sincerely,

Jean A. Fleming

Digitally signed by Jean A. Fleming
DN: cn=Jean A. Fleming, o=Holtec Decommissioning International, LLC, ou=Regulatory and Environmental Affairs, email=J.Fleming@Holtec.com
Date: 2025.07.31 07:56:18 -04'00'

Jean A. Fleming
Vice President of Licensing and Regulatory Affairs
Holtec International

Attachment:

1. Relief Request RR-5-10, Modification of Reactor Vessel Closure Head Vent Line Penetration

References:

1. U.S. Nuclear Regulatory Commission (NRC) letter to Holtec, *Palisades Nuclear Plant – Order Approving Direct Transfer of Renewed Facility Operating License and Independent Spent Fuel Storage Installation General License and Issuance of Conforming Amendment 275 (EPID L-2023-LLM-0005),* dated July 24, 2025 (ADAMS Accession No. ML25167A243)

2. Entergy Nuclear Operations Inc. letter to NRC, “Inservice Inspection Master Program Fifth 10-year Interval”, dated December 09, 2015 (ADAMS Accession No. ML15343A090)

cc: NRC Senior Resident Inspector, PNP
NRC Project Manager, PNP
NRC Region III Administrator

PNP-2025-054

Palisades Nuclear Power Plant
Docket No. 50-255/Renewed License No. DPR-20

Relief Request RR-5-10,
Modification of Reactor Vessel Closure Head Vent Line Penetration,

1.0 ASME CODE COMPONENT AFFECTED / APPLICABLE CODE EDITION

Component:	Reactor Vessel Closure Head (RVCH)
Description:	Reactor Vessel Head Vent Line and Weld
Code Class	Class 1
Examination Category	ASME Code Case N-729-6
Code Item:	B4.20
Identification:	VHP Vent Line
Reference Drawing:	232-122-11 Closure Head Assembly
Material:	Alloy 600 (SB-167) UNS N06600

ASME Section XI, “Rules for Inservice Inspection of Nuclear Power Plant Components”, 2007 Edition through 2008 Addenda

ASME Section XI, Code Case N-729-6, as amended in 10 CFR 50.55a(g)(6)(ii)(D)

ASME Section III, “Nuclear Vessels”, 1965 Edition through Winter 1965 Addenda (Original Construction Code)

ASME Section III, “Nuclear Power Plant Components”, Subsection NB, Division 1, Class 1 Components, 2019 Edition

2.0 APPLICABLE CODE REQUIREMENTS

The applicable requirements of the following ASME B&PV Code and Code Cases from which relief is requested are as follows:

Code Case N-729-6, Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds, Section XI, Division 1,

- Table 1, "Examination Categories: Class 1 PWR Reactor Vessel Upper Head", Note 6 states in part:

  "Volumetric or surface examinations shall be performed on essentially 100% of the required volume or equivalent surfaces of the nozzle tube, as identified by Figure 2. A demonstrated volumetric surface leak path assessment through all J-groove welds shall be performed"

- Fig. 2, "Examination Volume for Nozzle Base Metal and Examination Area for Weld and Nozzle Base Metal"

3.0 REASON FOR REQUEST

The Palisades Nuclear Plant (PNP) ceased operation in the Spring of 2022. Holtec is performing modifications to the PNP to support restart of plant operations. The Palisades RVCH vent line is constructed of materials that are susceptible to Primary Water Stress Corrosion Cracking (PWSCC). Modification to the Palisades RVCH vent line VHP is being implemented to mitigate the PWSCC susceptible materials.

Figure 3 shows the location of the vent nozzle in the RVCH.

The modification technique for the vent line will involve removing a portion on the existing J-groove weld and vent line to establish a weld preparation. The remaining Alloy 82/182 J-groove material will be encapsulated with Alloy 52M/152, a more PWSCC resistant weld material.

Machining will leave approximately 1/4-inch of existing Alloy 82/182 J-groove material attached to the vent nozzle. Machining of the new J-groove weld preparation is controlled to ensure there is greater than 1/8-inch of austenitic Nickel-alloy weld material between the new Alloy 52M/152 weld and the SA-302, Grade B (Modified) RVCH base material. Therefore, temper bead welding is not required for this modification.

After the PSI is performed, rotary peening, meeting the surface stress requirements of Reference [3] will be applied to remediate the tensile surface stresses in the vent line. As a result of rotary peening remediation and encapsulation of the PWSCC susceptible Alloy 82/182 weld material using Alloy 52M/152 weld material, there is high confidence that adequate measures will be applied in the modification of the vent line with respect to PWSCC for the life of the modification.

The PSI and ISI examination region of the modified weld configuration will be performed as shown in Figure 2 herein, in accordance with the requirements of Code Case N-729-6, Table 1, Note 6, and Figure 2 therein, to the extent practical. Because of the interferences discussed in the paragraphs below, the preferred PSI and ISI surface examination technique of the vent line weld configuration is remote eddy current of the nozzle inner diameter and the outer surface of the weld, see Figure 2. The final geometry of the modified weld configuration, however, will result in areas that cannot be examined by the remote eddy current surface examination technique. The area of the modified geometry that cannot be examined using eddy current is in the region where the face of the new Alloy 52M/152 weld is blended into the RVCH cladding surface.

To achieve the required surface examination coverage of the face of the new weld for PSI and ISI, surface examination would have to be performed utilizing the liquid penetrant testing method. The Section III surface examination of the new weld has been successfully completed using the manual liquid penetrant technique. The acceptance examination covers one hundred percent of the final weld face surface, including the transition areas where the weld surface is blended into the cladding, see Figure 1. Manual liquid penetrant examination was feasible for the Section III acceptance examination because the below-mentioned RVCH grid and extension structure has been completely removed to accommodate the tooling and processes required to modify the control rod drive mechanism (CRDM) and Incore Instrumentation (ICI) nozzles. The removal of the grid and extension structure allows for open access to the vent line.

Manual liquid penetrant examination for ISI of the vent line weld is not feasible because it would increase risk to personnel safety and dose exposure due to the location of the vent line and the design of the Palisades RVCH grid and extension structure. As an alternative to the liquid penetrant surface exam, Holtec is proposing that the PSI should be performed using the same remote eddy current technique that is planned for the ISI to obtain a baseline for future ISI.

Hardship

The Palisades RVCH is unique in that nozzle extension assemblies attach to the CRDM nozzles and extend down to a plane just above the mating surface between the closure head and the reactor vessel. The nozzle extension assemblies consist of a nozzle extension with a concentric reducer welded to the bottom of the extension. The CRDM nozzle extension assemblies are interconnected by a grid plate that is welded to each CRDM extension assembly. As shown in Figure 5, the available distance between the grid structure for personnel to pass through is approximately 13-inches.

The grid and nozzle extension structure provide extremely limited access to the vent line for workers. Figure 4 provides a sectioned view of the RVCH CRDM nozzle extension assemblies and grid plate in the vicinity of the RVCH vent line nozzle penetration. This highly congested area is also subject to high radiation levels to gain access. Due to the extremely limited access and high dose rates, compliance with the ASME Code requirements for ISI of the vent line would not meet the intent of the site's as low as reasonably achievable (ALARA) radiological control program and presents a hardship to the utility and workers.

Holtec has determined that modification of the vent line utilizing the alternatives specified in this request will result in hardship without a compensating increase in the level of quality and safety. Relief is requested in accordance with 10 CFR 50.55a(z)(2).

4.0 PROPOSED ALTERNATIVE AND BASIS FOR USE

4.1 Preservice Inspection (PSI) and Inservice Inspection (ISI) of VHPs Repaired

The new vent line weld acceptance examination was performed in accordance with the requirements of Section III, Reference [3], using the liquid penetrant method. The examination did not identify any rejectable indications.

After NDE acceptance examination and PSI, the PNP RVCH vent line will undergo rotary peening mitigation. The residual plus operating surface stresses on the peened vent line nozzle have been evaluated and meet the requirements of MRP-335 Revision 3-A, Reference [3]. Follow-up ISI is required during the second refueling outage after the peening mitigation per Code Case N-729-6.

Code Case N-729-6, as approved by the NRC in 10 CFR 50.55a, specifies requirements for performing PSI and ISI examinations of RVCHs with nozzles having partial penetration welds. Prior to modification, the vent line was examination category B4.20 of Code Case N-729-6, Table 1. Post modification, the exam requirements of B4.60 of Code Case N-729-6, Table 1, modified for the weld geometry, as shown in Figure 2, will be applied to the vent line. Code Case N-729-6, Table 1, Note 6, permits either volumetric or surface examination for Item B4.60. Item B4.60 examination coverage is specified in Figure 2 of Code Case N-729-6.

PSI and ISI examination of the vent line will be performed using a surface examination method as shown in Figure 2. Due to the dose and safety concerns associated with performing manual liquid penetrant examination of the vent line, and the unavailability of remote eddy current tooling to examine the complex geometry, relief is being requested from being required to examine 1/4-inch beyond the Alloy 52M/152 weld-to-cladding interface shown in Figure 2 of Code Case N-729-6.

The new J-groove weld surfaces and existing vent line tube inner diameter will be subject to PSI and ISI examinations utilizing eddy current testing. The PSI and ISI examination surfaces on the ID of the vent line will extend up to 1-1/2-inches above the root of the existing Alloy 82/182 J-groove weld as shown in Figure 2. This examination coverage includes the rotary peened surfaces.

Examination coverage on the face of the new weld will obtain the maximum surface practical. Examination coverage is considered sufficient because the repair weld material (Alloy 52M/152) is highly resistant to PWSCC and completely encapsulates all susceptible Alloy 82/182 weld material.

The future ISI examinations will comply with Code Case N-729-6 as modified by 10 CFR 50.55a(g)(6)(ii)(D) and as described above and depicted in Figure 2.

4.2 *Basis for Use – Safety Risk*

There are two possible ways to access the vent line modification weld:

1. During RVCH examinations, the closure head is placed on a stand that is designed to move up and down to provide clearance underneath the nozzle extension assemblies to operate the remote inspection tooling. The head stand would have to be lowered to an elevation sufficient for personnel to enter the grid plate and nozzle extension structure through the outside of the structure via scaffolding or a ladder. After entering the structure, personnel would have to navigate and balance on the narrow support grid ligaments to perform the manual liquid penetrant examination. Personnel would also likely be in a slightly crouched position as most individuals would not be able to fully stand up once on top of the grid plate. The confined conditions created by the grid and extension structure present a safety risk to the personnel performing the inspection.

2. The nozzle extensions and grid plate would have to be removed from the CRDM nozzle locations 1, 2, 5, and 9 surrounding the vent line. Removal of these nozzle extension assemblies and sections of grid plate would provide more access to the vent line, which could then be accessible to reach after construction of scaffolding or installation of a ladder. After the manual liquid penetrant examination, the nozzle extensions and sections of grid plate that were removed would be reinstalled. Removal and installation of nozzle extensions and sections of grid plate would likely be accomplished by means of manual grinding and welding, which adds additional personnel dose exposure.

At the time of the Section III acceptance examination, the on-contact dose rate on the RVCH dome near the vent was approximately 1200 mRem/hr and the working area dose rate 12-inches below the dome surface is approximately 600mRem/hr. The on-contact dose rate of the RVCH dome surface measured during nozzle repairs in 2020 was approximately 7000/4900 mRem/hr (max./min). The working area dose rate 12-inches below the dome surface was approximately 4800/3900 mRem/hr (max./min.). The area dose rate 2-feet below the dome surface was approximately 3900/3200 mRem/hr (max./min.). During the proposed follow-up ISI examination of the vent line after two refueling cycles, the dose rates can be expected to be similar to those recorded in 2020. Additionally, the work area under the RVCH is currently classified as Alpha Level III. At the time of the follow-up vent line ISI, personnel performing work in the area under the RVCH will be expected to wear PAPRs. The additional PPE adds further challenges for personnel attempting to perform a manual liquid penetrant examination.

Based on the discussion above, the conclusion is the combination of the physical environment and radiological conditions presents a significant radiological and safety risk to personnel attempting to access the surface of the vent line weld for manual surface examination. The support activities discussed would result in further exposure and unnecessary industrial safety concerns.

4.3 Conclusions

Implementation of the modification to the RVCH vent line penetration will produce an effective modification that will restore and maintain the pressure boundary integrity of the PNP vent line. The PWSCC resistant weld material will provide improved structural integrity and reduced likelihood of leakage for the primary system. Based on the discussions above, it is requested that the NRC authorize this proposed alternative in accordance with 10 CFR 50.55a(z)(2) as the alternative provides an acceptable level of quality and safety.

5.0 DURATION OF PROPOSED ALTERNATIVE

Per the Life Assessment Summary, Reference [2], the results of the analyses performed to establish the overall acceptable life of the modification design demonstrate that the design of the VHP modifications is acceptable for continued operation until the end of the 60-year licensed life (until 2031) plus a 20-year operational life extension for a total of 80 years of operation. The life evaluation performed to qualify the life of modification for the new vent line weld began its life assessment in 2025.

The duration of this relief request is for the remainder of the 60-year licensed operational life (2031) plus an additional 20-year operational life extension. The modifications have been designed to meet the requirements of ASME Code, Section III, Reference [3] and Section XI, Reference [5]. The design considers operation for the remainder of the 60-year licensed operational life (until 2031) plus an additional 20-year operational life extension.

In accordance with N-729-6 as conditioned by 10 CFR 50.55a(g)(6)(ii)(D), the modified penetration requires examination in the second refueling outage after peening. Thereafter, the inspection frequency will not exceed one inspection interval (nominally 10 calendar years). The modification installed in accordance with the provisions of this relief shall remain in place for the remaining operational life of the plant/modification.

6.0 REFERENCES

1. ASME Code Case N-729-6 “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds”, Section XI, Division 1

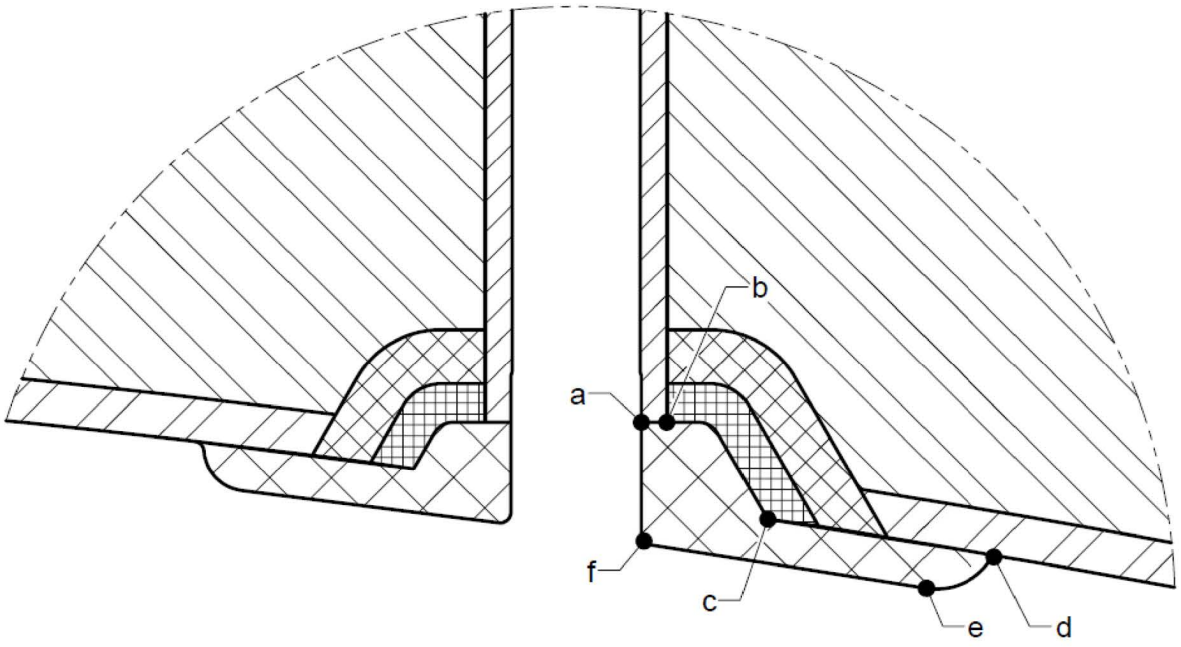
2. Framatome Evaluation 51-9384372-000, “Life Assessment Summary for Palisades CRDM, ICI, and Vent RVCH Nozzle Mitigation” (Proprietary)

3. EPRI Technical Report 3002009241, MRP-335, Revision 3-A, “Materials Reliability Program Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement”

4. ASME Section III, “Nuclear Power Plant Components”, Subsection NB, Division 1, Class 1 Components, 2019 Edition

5. ASME Section XI, “Rules for Inservice Inspection of Nuclear Power Plant Components”, 2007 Edition including Addenda through 2008

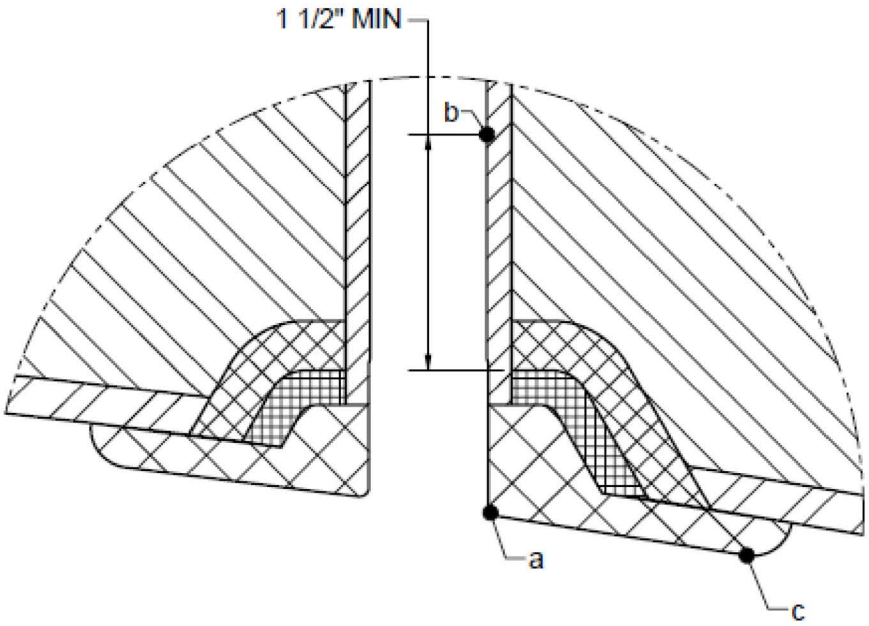
Figure 1
Section III Surface Examinations



Pre-Weld PT	a – b – c – d
Post-Weld PT	d – e – f

NOTE: The Post-Weld PT examination into the bore, above point f, is limited due to the bore diameter. Therefore, the examination is to the extent practical.

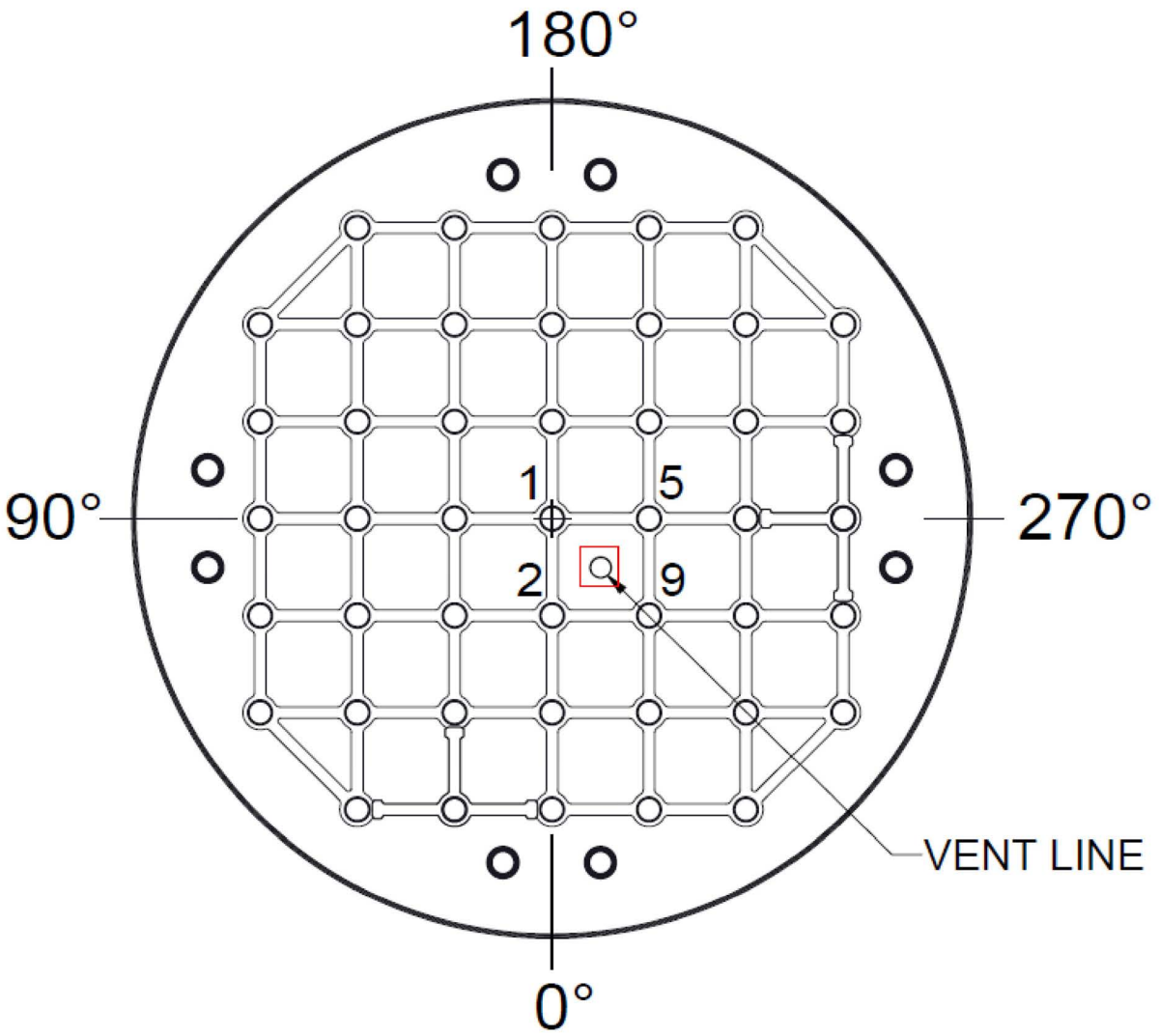
Figure 2
Nozzle PSI / ISI ET Examination



ET	b – a - c

Note: Extent of examination above the original J-groove weld is 1-1/2". The extent of examination on the surface of the new weld covers the ground face of the pad, excluding the blended radius between the new weld and the RVCH cladding.

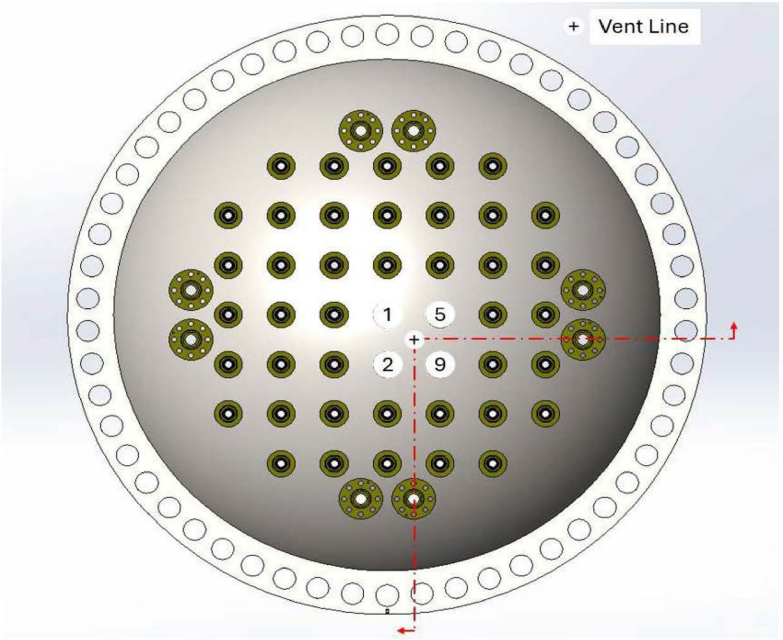
Figure 3
Reactor Vessel Head Penetration Location



(Plan View Looking Down)

1, 2, 5, and 9 CRDM Nozzles

Figure 4
Reactor Vessel Head Vent Line Section View



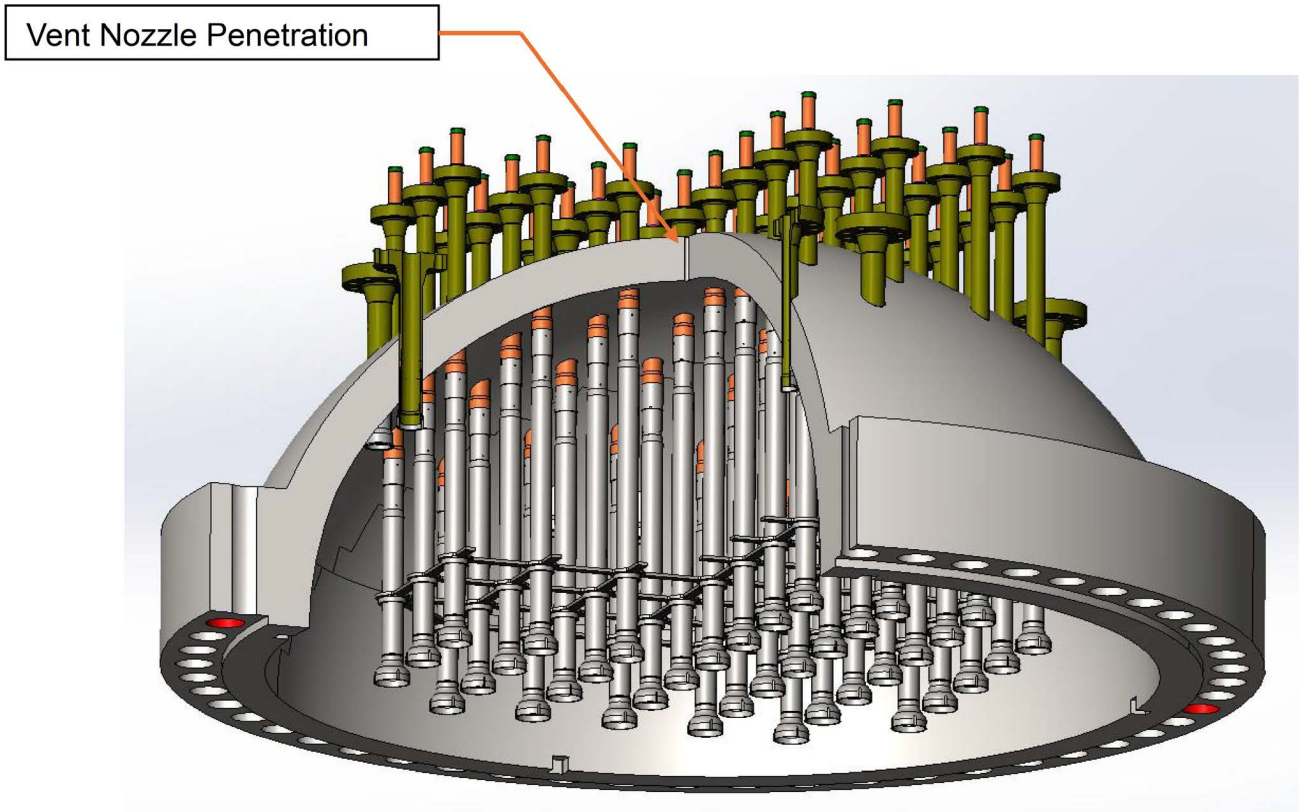
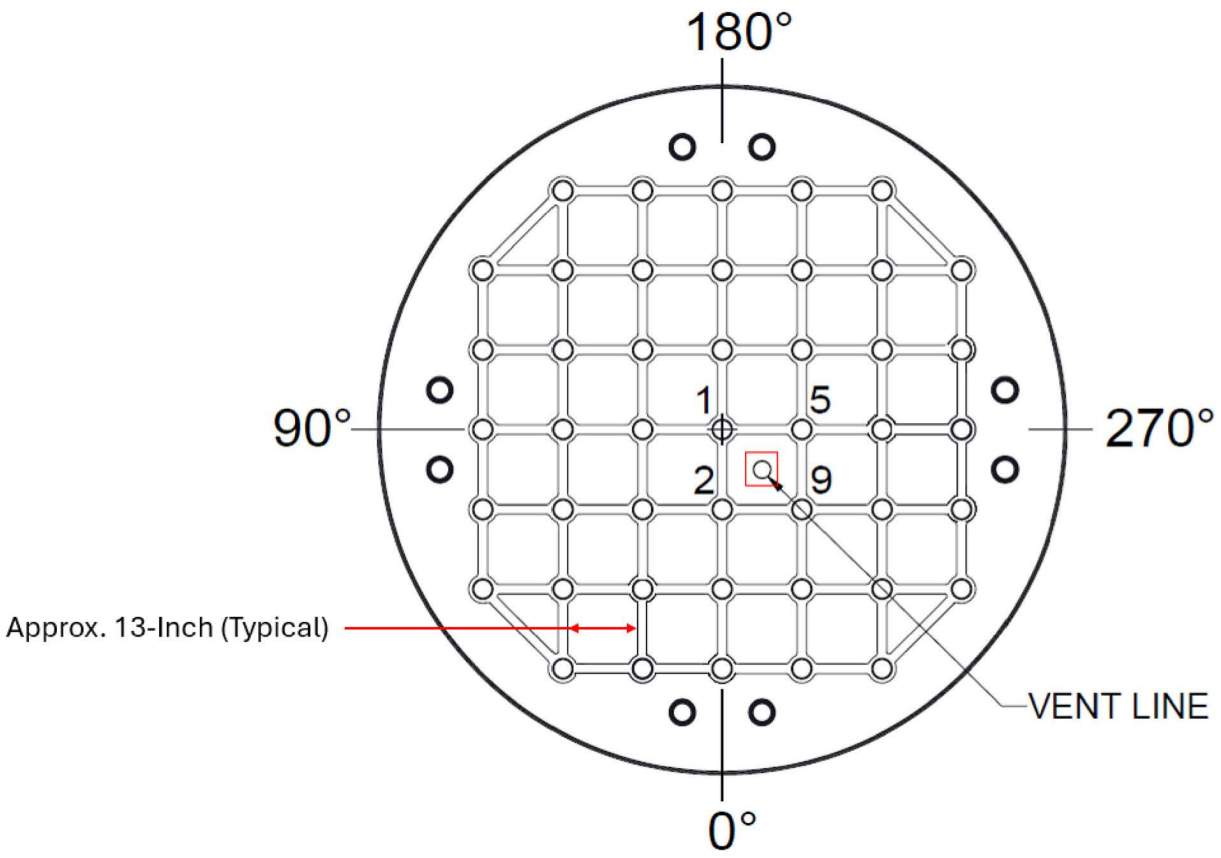


Figure 5
Reactor Vessel Head Grid Plate Dimensions



(Plan View Looking Down)

1, 2, 5 and 9 CRDM Nozzles