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May 15, 2006

BVY 06-043

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

Reference: 1. Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station, License No. DPR-28, License Renewal Application," BVY 06-009, dated January 25, 2006

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
License Renewal Application, Amendment No. 2

On January 25, 2006, Entergy Nuclear Operations, Inc. and Entergy Nuclear Vermont Yankee, LLC (Entergy) submitted the license renewal application for the Vermont Yankee Nuclear Power Station (VYNPS) as indicated by Reference 1. Based on recent discussions between industry and NRC staff, Entergy is providing Attachment 1 to provide additional information concerning the drywell shell.

Just prior to the submittal of this letter, proposed license renewal interim staff guidance was published in the Federal Register (May 9, 2006). The NRC proposed guidance, "LR-ISG-01: Plant-Specific Aging Management Program for Inaccessible Areas of Boiling Water Reactor Mark I Steel Containment Drywell Shell," was issued for public comment. The proposed guidance is expected to be finalized by NRC staff after the comment period.

This letter contains no regulatory commitments.

Should you have any questions concerning this letter, please contact Mr. Jim DeVincentis at (802) 258-4236.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 15, 2006.

Sincerely,

Ted A. Sullivan
Site Vice President
Vermont Yankee Nuclear Power Station

Attachment (1)

cc: (on next page)

A117

cc:

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Attachment 1

Vermont Yankee Nuclear Power Station

License Renewal Application – Amendment No. 2

Drywell Shell Information

Purpose

For license renewal, the NRC evaluates the potential for corrosion of the Mark I steel containment drywell shell. This issue previously was the subject of generic NRC communications in the 1980s. Specifically, Generic Letter (GL) 87-05 addressed potential degradation of Mark I drywells due to corrosion. This document provides additional information on the Vermont Yankee Nuclear Power Station (VYNPS) drywell shell relative to recent industry experience in this area.

Background

In 1980, the Oyster Creek Station observed water coming from lines that drain water from the annulus region between the drywell wall and the surrounding concrete and the sand cushion region. The water source was initially identified in 1983 as coming from the Drywell-Refueling Cavity bellows drain line gasket. After performing ultrasonic thickness measurements in 1986, Oyster Creek Station reported that corrosion and material loss had occurred to the Drywell Shell in the area of the sand-cushion. This led to the NRC's issuance of Information Notice 86-99 (Degradation of Steel Containments), Generic Letter 87-05 (Request for Additional Information Assessment of Licensee Measures to Mitigate and/or Identify Potential Degradation of Mark I Drywells), and Information Notice 86-99 Supplement 1.

The purpose of GL 87-05 was "...to initiate the collection of information of the licensee's current and proposed action to assure the degradation of the Drywell Shell plates adjacent to the sand-cushion has not occurred and to determine if augmented inspections above and beyond those planned by the licensee's are necessary."

In 1995, subsequent to the GL responses, the staff approved the use of ASME Section XI, Subsection IWE (Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants) which exempts, in accordance with Subparagraph IWE-1220(b), "embedded or inaccessible portions of containment vessels, parts, and appurtenances that met the requirements of the original Construction Code..." However, Paragraph IWE-1240 establishes criteria for determining the need for augmented examinations.

VYNPS Primary Containment Design

At VYNPS, the primary containment includes the drywell, the suppression chamber, and the drywell to suppression chamber vent headers. The drywell is an inverted light bulb-shaped carbon steel primary containment structure enclosed in reinforced concrete founded on bedrock. Above the transition zone between the spherical and cylindrical portions, the drywell is separated from the reinforced concrete by a two-inch gap. This gap allows for drywell expansion.

Drywell Shell Exterior

A sand-filled cavity encircles the drywell to cushion the concrete to free standing steel transition. This sand cushion is equipped with drains to remove any water that might enter the sand and cause accelerated corrosion of the drywell shell. The sand cushion area is drained to protect the exterior surface of the drywell shell at the sand cushion interface from water that might enter the air gap.

During construction, the exterior surface of the drywell shell was coated with an inorganic zinc primer and a protective top coat. The coating is intact in areas that have been examined.

A pliable bellows assembly between the drywell shell and the refueling cavity (area 'A' on the enclosed general arrangement drawing) separates the filled refueling cavity from the exterior surface of the drywell shell during refueling operations. The assembly utilizes a fully welded stainless steel to carbon steel design, providing a channel to collect any potential leakage from the bellows. Leakage, if any, through the bellows assembly is directed to a drain system equipped with an alarm for notification of operators. While the refueling cavity is filled, plant operators examine areas around the drywell shell exterior to determine if leakage is occurring.

An additional source of water that could impact the drywell shell exterior is leakage from the spent fuel storage pool and dryer-separator pit liner welds. Channels behind the welds direct leakage, if any, to funnels. These funnels are routinely inspected by plant operators to determine if leakage exists from the spent fuel storage pool, the dryer-separator pit, or the refueling cavity drains. The majority of the drywell shell exterior surface is inaccessible for examination.

Drywell Shell Interior

The majority of upper portion of the drywell shell interior surfaces are accessible for inspection. The lower portion of the drywell is not accessible where it is covered by the concrete drywell floor which provides structural support for the reactor pedestal and other equipment.

The VYNPS primary containment system is inerted with nitrogen gas during normal power operations so that oxygen levels are maintained at less than 4%. Inerting with nitrogen provides an atmosphere that is not conducive to corrosion of containment interior surfaces.

Operating Experience and Actions Taken to Prevent Drywell Corrosion

VYNPS responded to GL 87-05 on May 8, 1987 indicating no evidence of degradation to the drywell was noted. Further, VYNPS committed to ensure continued drywell integrity via IWE inspection and inspections (including internals) of the eight 1" sand cushion drain lines for integrity and freedom from obstruction.

VYNPS reported on the refuel cavity design, explaining that the design is a fully welded stainless steel/carbon steel construction (vice Oyster Creek design) with a backup barrier channel that utilizes a seal (i.e., bellows) rupture drain with an alarm system for notifying operators in the event of any bellows or drain line connection leakage.

In 1991, during normal operations, leakage from a main steam line drain valve was condensing on and traveling along the primary containment atmosphere control piping to the drywell shell exterior. The typical penetration design slopes piping away from the drywell however, this atypical penetration is sloped towards the drywell. To ensure drywell shell integrity, the exterior drywell shell in the area of the sand cushion and the sand cushion itself (area 'B' on the enclosed general arrangement drawing) were examined by boroscope and the sand cushion drains were verified functional. No corrosion was found on the drywell shell and the sand cushion was found dry, compacted, and with adequate ventilation to assure the sand would remain dry. Spray shields were installed on piping penetrations that sloped towards the drywell shell.

A periodic surveillance (approximately every 10 years) was established to examine the drywell shell sand cushion drain lines for integrity and freedom from obstructions.

In 1992, the drywell interior, in the area of the sand-cushion was examined. The examination identified a missing section of the moisture barrier at the concrete floor to drywell shell interface joint (area 'C' on the enclosed general arrangement drawing). No evidence of corrosion of the interior drywell shell surface was observed. In 1999, during the implementation of the ASME Section XI IWE Program, corrosion was identified on the interior surface of the drywell shell in the area of the missing moisture barrier. The maximum pit depth was 1/16". The nominal plate thickness of the drywell shell in that area is 2.5".

In 2001 a replacement moisture barrier was installed. Prior to installation, the drywell shell interior and the concrete floor were stripped of all coatings and sealant for approximately a six inch band either side of the intersecting joint. The corrosion was removed. The drywell shell was then examined by VT-3, VT-1, and UT measurement processes. Observations and measurements met acceptance criteria. The replacement moisture barrier was installed. The moisture barrier was subsequently examined in 2002, 2004 and 2005. The examination evaluated the adherence of the drywell shell coating, no evidence of corrosion, elastomer to shell and concrete interface, and hardening of the elastomer.

Ongoing actions to Prevent Drywell Degradation

During approximately 95% of a fuel cycle, the VY primary containment system atmosphere is inerted with nitrogen. During this period, the atmosphere oxygen concentration is maintained less than 4%. The moisture content is reduced by a dehumidification system. Condensate from the dehumidification system is routed to dedicated drain lines and collected in sumps. The result is that the drywell interior is dry and oxygen-free at a relatively constant temperature that does not promote corrosion.

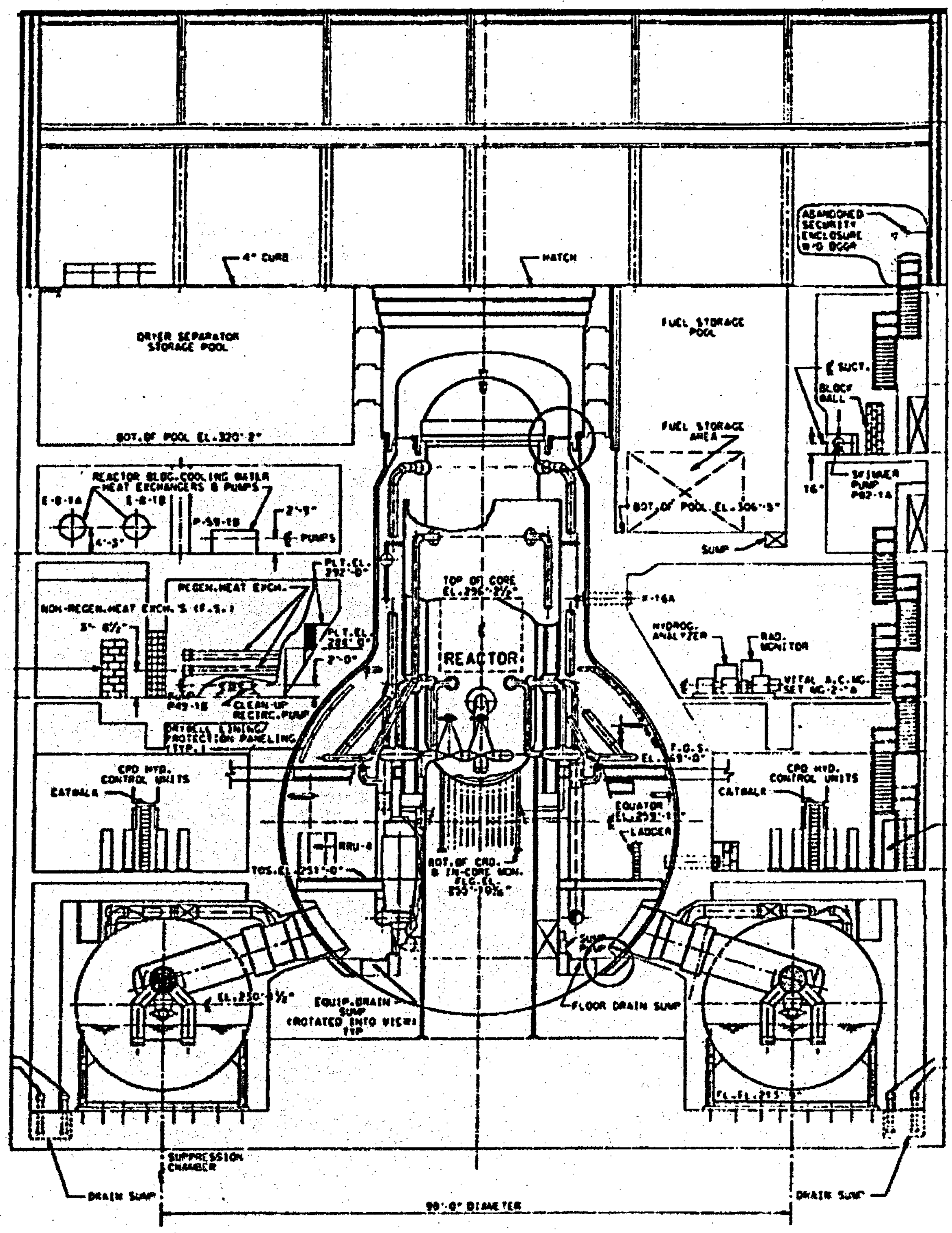
The suppression chamber exterior and interior surfaces, the majority of the vent header exterior and interior surfaces, the majority of the drywell shell interior surfaces, the drywell hemi-spherical head exterior and interior surfaces, and some penetrations in the cylindrical and spherical portions of the structure are accessible for examination. The structures are examined in accordance with ASME Section XI – 1998 Edition with 2000 Addenda, Subsection IWE, Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants. The accessible portions of the drywell shell interior surfaces are examined in accordance with the ASME code, three times during each ISI ten-year interval. As of May 2006, no surface areas are subject to the requirements of Paragraph IWE-1240, "Surface Areas Requiring Augmented Examination."

The moisture barrier is examined at least once every period, in accordance with ASME Section XI inservice inspection requirements.

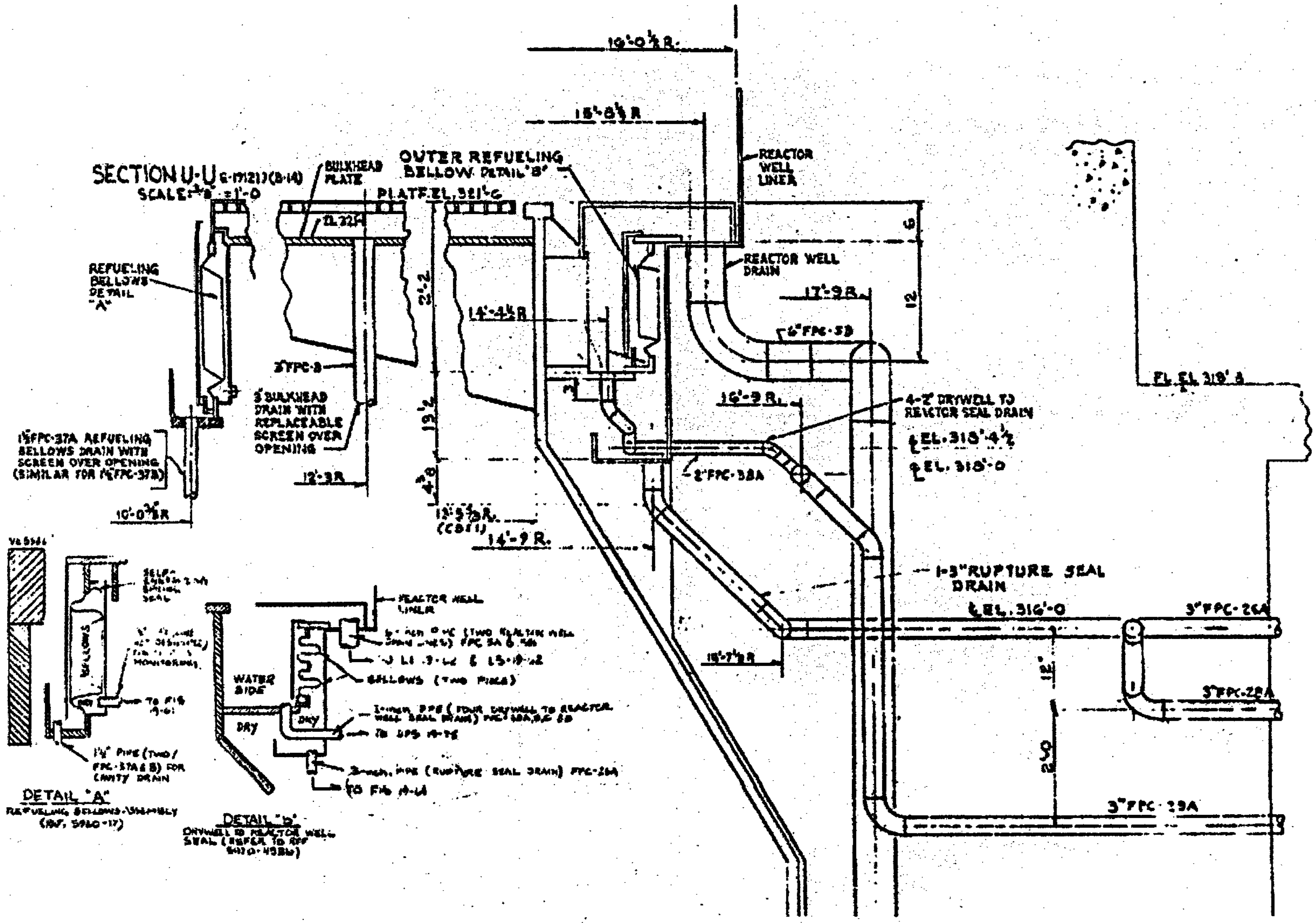
Approximately once every 10 years, the drywell shell sand cushion drain lines are examined to verify integrity and freedom from obstructions.

Conclusion

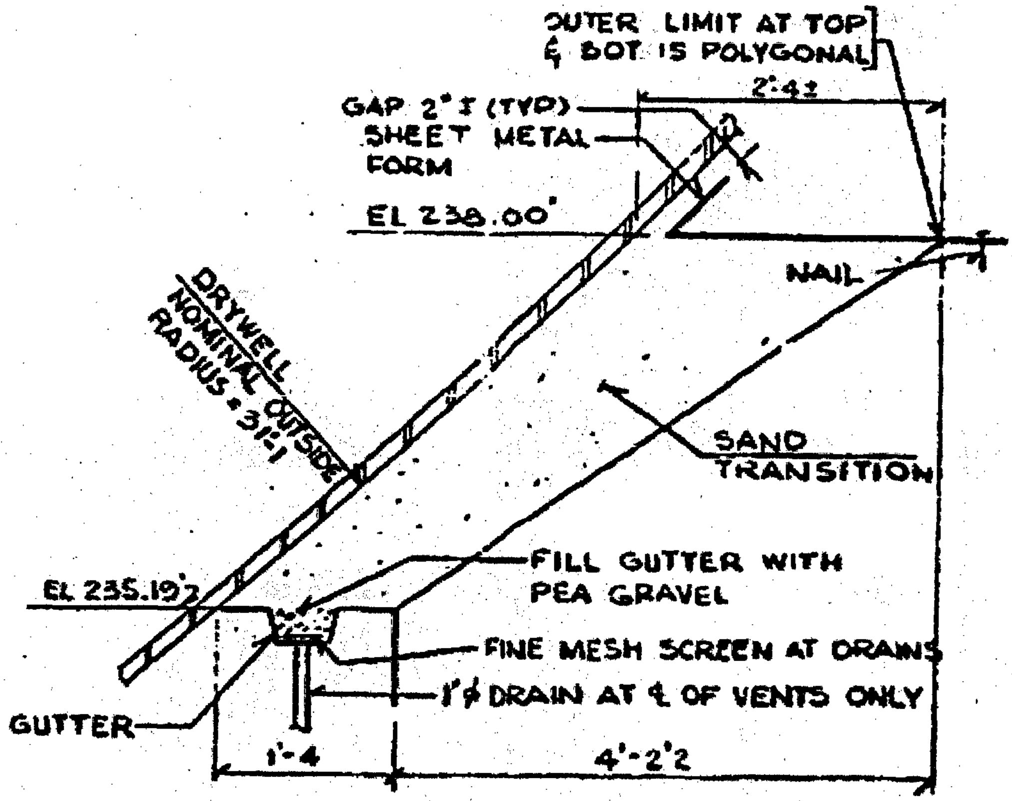
VYNPS has effectively addressed the issue of drywell shell corrosion through actions taken in response to GL 87-05 as well as additional actions subsequent to the response to GL 87-05. UT examinations to determine the drywell wall thickness at the sand cushion region indicated no detectable loss of material and hence no discernable corrosion rate. Based on this corrosion rate, no discernable loss of drywell shell thickness is projected through the period of extended operation. The above described ongoing actions to prevent drywell shell degradation provide continuing reasonable assurance of satisfactory drywell shell condition through the period of extended operation.



General Arrangement – Reactor Building
from G-191150 [Sect A-A]



VY Refueling Bellows and Drywell to Reactor Well Seal
from G-191277



DETAIL OF SAND TRANSITION
AT ℄ OF SEGMENT