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BVY 13-003

February 5, 2013

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

SUBJECT: Response to Request for Additional Information Regarding Inservice Inspection Program Relief Request ISI-PT-02
Vermont Yankee Nuclear Power Station
Docket No. 50-271
License No. DPR-28

REFERENCE: 1. Letter, Entergy to USNRC, "Inservice Inspection Program Relief Request ISI-PT-02 (Fourth ISI Program Interval)," BVY 12-086, dated December 21, 2012

Dear Sir or Madam:

In Reference 1, Entergy Nuclear Operations, Inc. (Entergy) requested NRC approval of a relief request for Vermont Yankee Nuclear Power Station (VY) for the fourth ten-year inservice inspection (ISI) program interval. The submittal requested relief from the ASME Boiler and Pressure Vessel Code inspection requirements for the ASME Code Class 2 reactor pressure vessel (RPV) head flange leak-off lines. On January 15, 2013, the NRC provided a request for additional information (RAI). Attachment 1 of this letter provides the RAI responses.

There are no new regulatory commitments being made in this submittal.

If you have any questions or require additional information, please contact me at (802) 451-3166.

Sincerely,

Robert J Wanczyk

RJW/plc

cc list: next page

A047
NRR

Attachments: 1. Response to Request for Additional Information

Enclosures: 1. Reactor Pressure Vessel Head Flange Leak-Off Lines Piping and Instrumentation Diagram; Drawing 5920-00327 and Drawing 5920-02051

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Attachment 1

Vermont Yankee Nuclear Power Station

Response to Request for Additional Information

Response to Request for Additional Information (RAI)

RAI

By letter dated December 21, 2012, Entergy Nuclear Operations (the licensee) requested relief from the requirements of the 2001 edition through 2003 addenda of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, IWC-5221. Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), the licensee requested to use the alternative in Relief Request ISI-PT-02 on the basis that complying with the specified ASME Code requirement would result in hardship or unusual difficulty. Relief Request ISI-PT-02 is applicable to the system leakage test of the reactor pressure vessel (RPV) head flange leakoff lines at the Vermont Yankee Nuclear Power Station for the fourth ten-year inservice inspection (ISI) interval.

To complete its review, the NRC staff requests the following additional information:

1. (a) **Provide a legible piping and instrumentation diagram (P&ID) of the RPV head flange leak detection piping because parts of the P & ID in the submittal are illegible. Please clearly identify the affected components in the P&ID. If available, provide a piping isometric diagram.**

Response

A markup of the piping and instrumentation diagram is provided in Enclosure 1. Components to which relief is requested are highlighted.

No piping isometric diagram is available.

(b) **Provide a detailed drawing of the configuration of the opening of N13 and N14 at the seal ring area and the connection between the N13 and N14 nozzles and the leakoff system piping, which shows how the connections are fastened to the reactor vessel flange.**

Response

The configuration of the openings for N13 and N14 at the seal ring area is shown on drawing 5920-00327 provided in Enclosure 1. Section B-B shows the 3/16 inch diameter hole drilled between the seal rings for N13. Section C-C shows the ½ inch diameter hole drilled on the outside of the outer seal ring.

Details for the connection of the N13 and N14 nozzles to the system piping are also shown on drawing 5920-00327. There are two nozzle details below Section B-B and Section C-C and three more along the right side of the drawing.

The connections are also shown on drawing 5920-02051 provided in Enclosure 1.

(c) **Discuss whether the N13 and N14 taps are pipes inserted into the RPV head flange or a bore hole inside the head flange.**

Response

For each of the taps, a bore hole is drilled through the RPV head lower flange. These bore holes are shown on drawing 5920-00327 in Sections B-B and C-C.

(d) **Identify in the P&ID which portion of the leakoff piping is and is not required to be examined in accordance with the ASME Code, Section XI, IWC-5000.**

Response

The provided markup of the piping and instrumentation diagram highlights the components required to be examined in accordance with the ASME Code, Section XI, IWC-5000. These consist of the Class 2 piping originating from nozzle N13 up to valve FCV-21 and out to the pressure switch PS-102 and pressure indicator PI-101.

Also required to be examined is all Class 2 piping originating from nozzle N14 out to the cap.

The non-class piping downstream of valve FCV-21 is not required to be examined in accordance with the ASME Code, Section XI, IWC-5000.

(e) **For the pipe segments that are required to be examined, identify in the P&ID the portion of the leakoff lines that are and are not accessible for visual examinations under the proposed alternative leakage testing.**

Response

It is unknown at this time which pipe segments inside the Drywell are not accessible. All segments of the instrumentation piping in the Reactor Building are accessible.

As permitted by ASME Code, Section XI, IWA-5241(b), for any pipe segments that are inaccessible, a VT-2 examination of the surrounding area will be performed for evidence of leakage. This includes floor areas or equipment surfaces located underneath the pipe segment or other areas where leakage may be channeled.

(f) **Provide a percentage in terms of the total length of the leakoff lines of the pipe length that is inaccessible for examination.**

Response

As discussed in the response for 1.e above, it is not yet possible to estimate the percentage of inaccessible piping.

2. (a) **Describe exactly where and how the operator visually examines potential through-wall leakage from the subject piping using the proposed alternative.**

Response

The VT-2 examination will be performed in accordance with Entergy procedure CEP-NDE-0902. The examination will begin after the RPV head has been removed and the reactor cavity has been filled to its normal refueling level for at least four hours.

A procedure demonstration using a character card or light meter will be performed to verify suitable lighting conditions. This demonstration will be performed at the examination location or at a simulated location for remote examination.

For non-insulated sections of the line, the VT-2 examination will be conducted by examining the accessible external exposed surfaces for evidence of leakage. Evidence of leakage includes areas of general corrosion. If access is limited, the Operator will improve access by use of items such as mirrors or ladders. Remote examination using items such as binoculars or scopes is permitted.

For insulated sections of the line, the VT-2 examination will be conducted without the removal of insulation by examining the accessible and exposed surfaces and joints of the insulation. Vertical surfaces of insulation will be examined at the lowest elevation where leakage may be detectable. Horizontal surfaces of insulation will be examined at each insulation joint.

For the pipe sections that are inaccessible for direct VT-2 examination, an examination of the surrounding area will be performed for evidence of leakage. This includes floor areas or equipment surfaces located underneath the pipe section or other areas where leakage may be channeled.

The Operator will note any leakage identified regardless of its origin. A condition report will be initiated and the source of the leakage investigated. Corrective actions will be dependent upon the leak location and severity.

(b) If the pipe is insulated, discuss whether the insulation will be removed during the proposed testing. If insulation is not removed, how pipe through-wall leakage would be detected.

Response

No insulation will be removed for performance of the exam.

In accordance with procedure CEP-NDE-0902, the accessible and exposed surfaces and joints of the insulation will be examined. Also examined will be the surrounding area for evidence of leakage. This includes floor areas or equipment surfaces located underneath the piping or other areas to which leakage may be channeled.

(c) If the affected pipe is located in a high elevation and is far away from the operator, describe how the operator identifies pipe through-wall leakage.

Response

In accordance with procedure CEP-NDE-0902, the examiner would improve access by using a ladder. Binoculars or scopes may be used to perform a

remote examination. The floor areas or equipment surfaces located underneath the piping or other areas to which leakage may be channeled will be examined.

(d) Discuss how the operator determines leakage from bolted connections and pipe through-wall leakage during the proposed leakage testing.

Response

Regardless of the origin of the leakage, the Operator will document the leakage on the examination form and have a condition report initiated. The source of the leakage will then be investigated. It may be necessary to remove insulation or install scaffolding to positively identify the origin.

(e) Demonstrate the structural integrity and leak tightness of the unexamined portion of the leakoff lines.

Response

For piping that is inaccessible, the surrounding area will be examined for evidence of leakage. This includes floor areas or equipment surfaces located underneath the piping or other areas to which leakage may be channeled.

3. Is radiation dose considered to be part of the hardship? If so, provide a radiation dose estimate associated with performing a system leakage test in accordance with the ASME Code, Section XI, IWC-5000.

Response

Radiation dose is considered part of the hardship. It is estimated from historical data that approximately 5 rem in additional dose would be received if the system leakage test was performed in accordance with the ASME Code, Section XI, IWC-5000. This dose was estimated assuming the test was performed with both the inner and outer seal rings removed requiring that the RPV head be subsequently removed to install the seal rings for normal plant operation. The RPV head would then be reinstalled for the second time.

It is estimated the radiation dose that will be received using the proposed examination method will be less than 100 mrem.

4. (a) Discuss the pressure inside the affected pipe based on the static head of the refueling cavity filled to its normal refueling water level as discussed in the relief request.

Response

When at the normal refueling water level (el. approximately 343'-6 ¾"), pressure at the RPV head flange (el. 321'-6") will be approximately 9.5 psig.

(b) Discuss degradation history of the affected piping.

Response

There is no site-specific history of degradation identified on this line. However, stainless steel piping is known to be susceptible to stress corrosion cracking. There were four instances of industry experience identified documenting cracking on this line.

- Transgranular stress corrosion cracking attributed to chlorides present in lines since initial construction; two instances (INPO OE 142543)
- Stress corrosion cracking (INPO OE 301177)
- Cause unknown due to inadvertently disposing of the pipe section (Dresden Nuclear Power Station Unit 3 Licensee Event Report 82-014)

(c) Provide the material specification of the affected piping and associated welds.

Response

The material specification for the seamless stainless steel pipe is per ASTM A-376 or A-312, grade TP304 or TP316. The weld filler metal complies with ASME SA-371 or ASTM A371.

(d) Provide the design pressure and pipe diameter with associated wall thickness of the leakoff lines.

Response

The design pressure of the 1 inch and ½ inch diameter piping is 1250 psig. The wall thickness for both diameters is schedule 160.

5. The following questions are related to normal operation.

(a) Describe the normal operation of the subject piping system such as system alignment and configuration (i.e., valve positions, alarm setpoints). Describe how the normal leakoff is detected and disposed during normal operation.

Response

Normal system alignment and configuration is as shown on the piping and instrumentation diagram markup provided in Enclosure 1. Valve FCV-20 located in the Drywell is normally open. Valve FCV-21 located in the Drywell is normally closed. Manual isolation valve V-22 and excess flow check valve SL-23 located on Reactor Building elevation 280' are normally open. Pressure indicator PI-101 and pressure switch PS-102 are both located outside the Control Room on Reactor Building elevation 280' on Rack 25-5.

During normal plant operation, the line originating from N13 is not expected to pressurize from leakage through the seal rings. However, following a refueling outage when the line becomes filled, the line will pressurize due to heatup of the trapped water. This is an expected condition.

Pressure switch PS-102 is set at approximately 613 psig. Upon exceeding this setpoint, an alarm is actuated in the Control Room on Panel CRP 9-4. Per the alarm response procedure, ARS 21002, the first action is to have an Operator verify the condition by observing pressure indicator PI-101. Following verification, Control Room personnel will cycle solenoid-operated valves FCV-20 and FCV-21 in order to direct the pressurized water to the Drywell Equipment Sump. The Operator will continue to monitor the pressure indicator for a subsequent pressure rise. Control Room Personnel will monitor Drywell sump leakage for evidence of leakage. If pressure remains high, the valves will not be cycled again; plant management will then decide if plant operation can continue.

The line originating from N14 is provided in the event plant operation is desired to continue when there is leakage past the inner seal ring. It is possible to use this line for providing a low pressure seal beyond the outer seal ring. This line would then be monitored for leakage past the outer seal ring. Drywell entry would be required to install the required equipment and instrumentation.

(b) Discuss how the pipe through-wall leakage would be detected, how soon the operator would be notified, what would be the corrective actions.

Response

Through-wall leakage assumes either the inner seal ring or both seal rings have failed. If leakage has been identified or is suspected, the issue will be captured in the corrective action program.

During normal plant operation with the Drywell closed, through-wall leakage would be detected via an increase in unidentified Drywell leakage (sump volume), Drywell temperature, and/or Drywell radiation levels that are indicated in the Control Room. Assuming the leakage was large enough to affect those parameters, the leakage would be detected within one shift.

A through-wall leak in the section of the line located in the Reactor Building (outside the Drywell) would be readily detected by roving Operators as a steam plume, water dripping from equipment, an increase in the Reactor Building temperature, and/or radiation alarms.

Corrective actions would be based upon the location and severity of the leak. This may include a plant shutdown to perform a Drywell entry.

(c) Discuss how the operator distinguishes various leakage sources such as the normal leakage from the RPV passing through the seal rings, in-line leakage from the closed valves, bolt connections, or leakage from the degraded pipe wall.

Response

Leakage from the RPV through the seal rings is not considered normal and is not expected to occur.

Operators are trained to identify leakage from plant components and their indications that may be present. All identified leaks are promptly investigated to determine their source. The source of the leakage may not always be readily identified by the Operator. There may be situations where insulation removal is necessary or scaffolding is required.

Leakage from this specific line, regardless of its origin, would be promptly investigated.

(d) Discuss the location of pressure instrument PI-2-101 and operation of pressure switch PS-2-102.

Response

Pressure instrument PI-101 is located on Reactor Building elevation 280' on Rack 25-5. This instrument is readily accessible to Operators.

Pressure switch PS-102 is set at approximately 613 psig. Upon exceeding this setpoint, an alarm is actuated in the Control Room on Panel CRP 9-4. Further actions for this alarm are discussed in the response for 5.a above.

(e) Discuss whether there is an alarm in the control room that would notify the operator when the pressure in the leakoff line increases. Discuss the pressure setpoint that would initiate the alarm and any reset function.

Response

When the setpoint of approximately 613 psig for pressure switch PS-102 is exceeded, an alarm is actuated in the Control Room on Panel CRP 9-4. The pressure at which the alarm resets is unknown since the calibration procedure (RP 4399) does not require that this value be recorded.

(f) If RPV head flange leakage causes pressurization of the leakoff lines and the lines depressurize after the alarm pressure level is tripped, describe the procedures to manage and monitor the situation and corrective actions.

Response

Upon actuation of the alarm in the Control Room, alarm response procedure ARS 21002 will be entered. Note that even if the alarm immediately clears, there will still be indication In the Control Room that the alarm had actuated. As discussed in the response to 5.a above, the first action is to have an Operator verify the condition by observing pressure indicator PI-101. The alarm response procedure does not provide exacting direction for this scenario which assumes the pressure indicator PI-101 indicates 0 psig. However, plant operations personnel are trained to consider all options that would provide those indications and alarms. It would be considered that either the pressure switch had failed or a line rupture had occurred.

Continuing through the alarm response procedure, the Operator will continue to monitor the pressure indicator for a subsequent pressure rise. Control Room Personnel will monitor Drywell sump leakage for evidence of leakage.

A functional test of the pressure switch per procedure RP 4399 would likely occur also.

If the leak occurred in the Drywell, the leak would manifest itself as an increase in unidentified Drywell leakage (sump volume), Drywell temperature, and/or Drywell radiation levels. If the leak occurred in the Reactor Building (outside the Drywell), it would be identified as a steam plume, water dripping from equipment, an increase in the Reactor Building temperature, and/or radiation alarms.

Corrective actions would be based on the location and severity of the leak and may include a plant shutdown to perform a Drywell entry.

(g) It appears that N14 tap connects the opening past the seal ring directly to pressure switch PS-102 without any intermediate valves or sensors. Describe operation using the N14 tap and any actions to place it in service or isolate pressure from tap N13. Describe how the operator determines that leakoff comes from the N14 tap and not from the N13 tap.

Response

N14 tap does not connect to pressure switch PS-102. The N14 line is separate from the line originating from N13. In order for the N14 line to become pressurized, both the inner and outer seal rings need to fail. If the N14 line becomes pressurized, the inner seal has failed and would pressurize the N13 line.

It is possible to use the N14 line for providing a low pressure seal beyond the outer seal ring. This line would then be monitored for leakage past the outer seal ring. Drywell entry would be required to install the required equipment and instrumentation.

(h) The P&ID shows a specification change after normally closed valve FCV-2-21. Discuss the specification change.

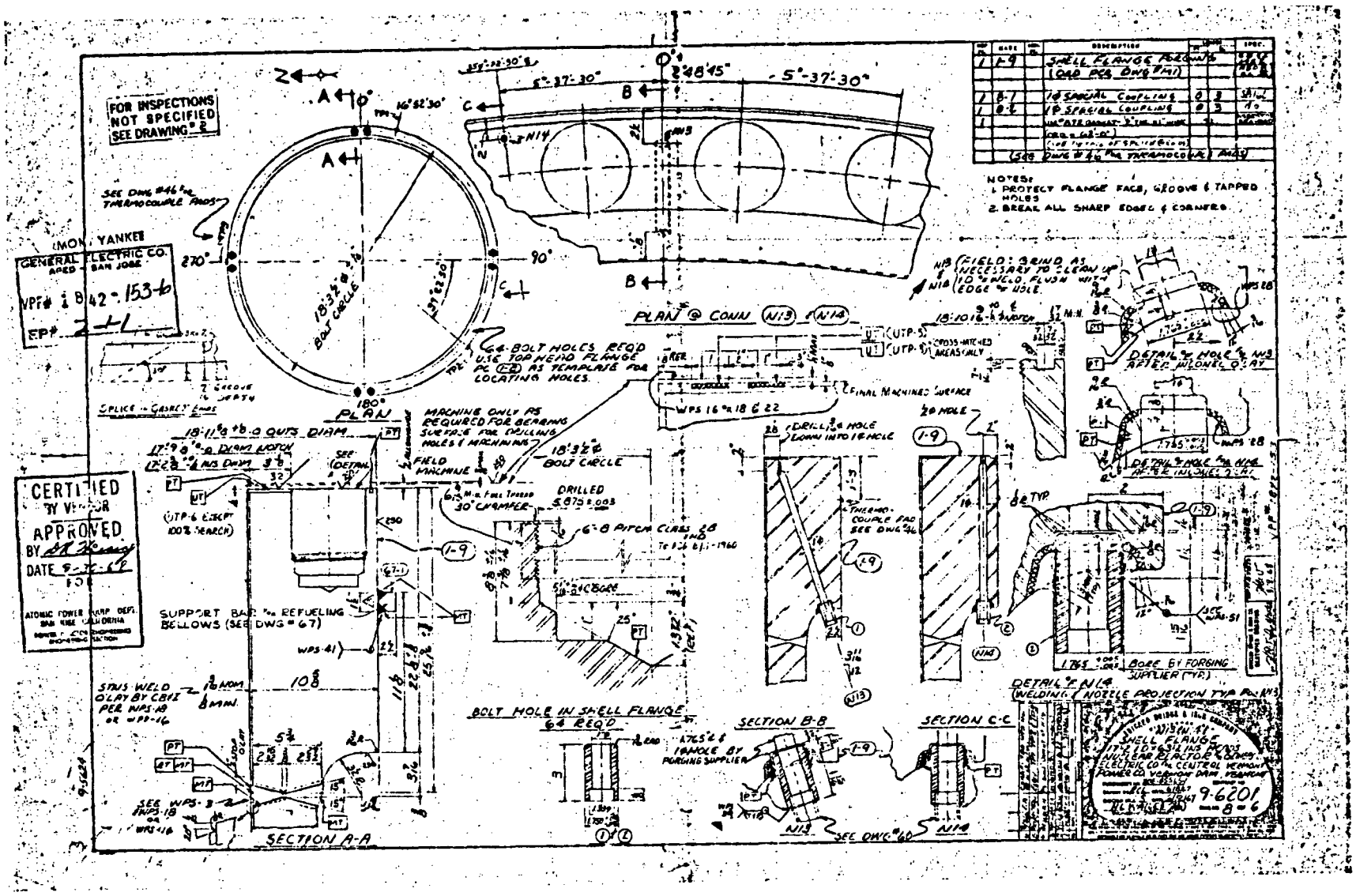
Response

The piping downstream of valve FCV-21 changes to non-ASME class carbon steel piping.

Enclosure 1

Vermont Yankee Nuclear Power Station

Reactor Pressure Vessel Head Flange Leak-Off Lines Piping and Instrumentation Diagram; Drawing 5920-00327 and Drawing 5920-02051



5920-327 R 5

DATE REC 1/16

VERMONT YANKEE NUCL. PWR. CORP.
VERMONT YANKEE NUCL. PWR. STA.
VERNON, VERMONT

P.O. NY-70-5103 ITEM

A	DRAWING REVIEW	REVIEWED WITHOUT COMMENTS *	1	✓
		REVIEWED WITH COMMENTS AS NOTED *	2	
		NOT APPLICABLE *	3	
		NO COMMENTS, NO PRINT RETURNED	4	
		NOT FOR INSTALLATION	5	
B	PROCEED WITH FABRICATION	NO FURTHER REPRODUCIBLE REQUIRED	4	✓
		RESUBMIT REVISED REPRODUCIBLE — SEE NOTE BELOW IF CHECKED HERE ☐	5	
		RESUBMIT CLOTH OR MYLAR REPRODUCIBLE AS SHIPPED	6	
		DO NOT PROCEED WITH FABRICATION RESUBMIT REVISED REPRODUCIBLE	7	

* PRINT INCLUDED

NOTE:

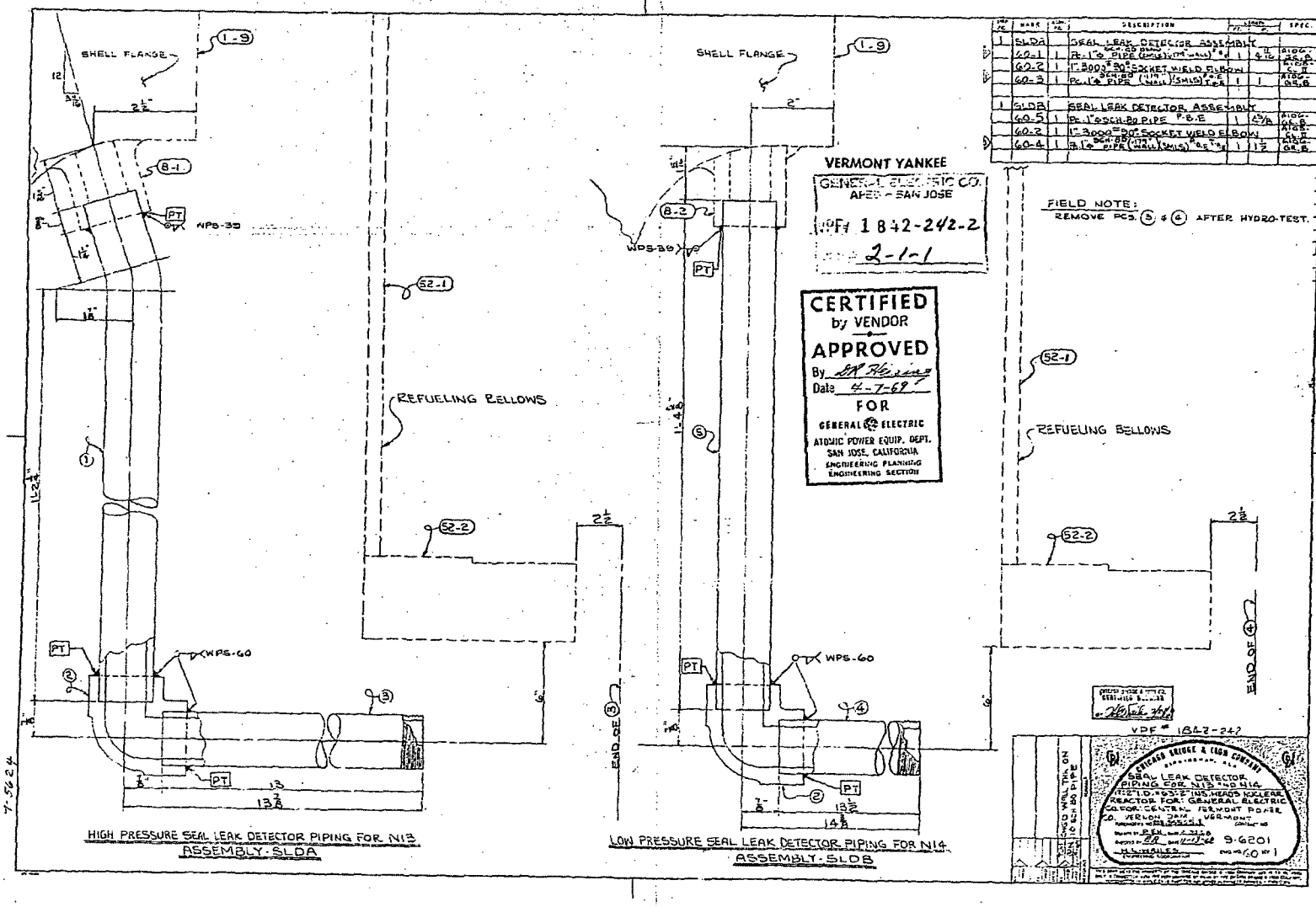
SHELL FLANGE

(2-1)

REVIEWED BY	DATE	DRW. DIV.	DAYS TO COMMENT
S.R.	6/10/70	M	15

THE FOREGOING SHALL IN NO WAY RELIEVE CONTRACTOR FROM ENTIRE RESPONSIBILITY FOR ENGINEERING, DESIGN, WORKMANSHIP, MATERIAL AND ALL OTHER LIABILITY UNDER THE CONTRACT.

EBASCO SERVICES INCORPORATED
AGENT
2 RECTOR ST., NEW YORK, N.Y. 10006



SHEET NO.	MARK	ASM. NO.	DESCRIPTION	QTY.	WEIGHT	SPEC.
1	SLDA		SEAL LEAK DETECTOR ASSEMBLY			
	60-1	1	PC. 1"Ø SCH. 80 PIPE (WELD END) (THIN WALL) P.B.E	1	4 1/16	ASTM-A106-GR.B
	60-2	1	1" 3000# 90° SOCKET WELD ELBOW SCH. 80 (THIN WALL) P.B.E			ASTM-A105-GR.B
	60-3	1	PC. 1"Ø PIPE (THIN WALL) (SMLS) P.B.E	1	1	ASTM-A106-GR.B
1	SLDB		SEAL LEAK DETECTOR ASSEMBLY			
	60-5	1	PC. 1"Ø SCH. 80 PIPE P.B.E	1	4 3/16	ASTM-A106-GR.B
	60-2	1	1" 3000# 90° SOCKET WELD ELBOW SCH. 80 (THIN WALL) P.B.E			ASTM-A105-GR.B
	60-4	1	PC. 1"Ø PIPE (THIN WALL) (SMLS) P.B.E	1	1 1/2	ASTM-A106-GR.B

DIST.	DESIGN	N.C.	C
1	MECH.	O	V
	CONC. HYD.		
1	ARCH. STR.	O	V
	SWYD. STR.		
	ELEC.		
	HVAC		
	PLUMBING		
	ENGINEERING		
2	MECH.	O	V
	CONC. HYD.		
	ARCH. STR.		
	ELEC.		
	HVAC		
	BLDG. ENG.		
	INSTR.		
	WTR. T.		
	STRESS		
	SHIELDING		
	RADWASTE		
STD DIST			
FOR INFO ONLY			

5920-2051R/1 DATE/REC 4-7-69

VERMONT YANKEE NUCL. PWR. CORP.
VERMONT YANKEE NUCL. PWR. STA.
VERNON, VERMONT

P.O. NY-706102 ITEM

A DRAWING REVIEW	REVIEWED WITHOUT COMMENTS *	1	✓
	REVIEWED WITH COMMENTS AS NOTED *	2	
	NOT APPLICABLE *	3	
	NO COMMENTS. NO PRINT RETURNED	4	
	NOT FOR INSTALLATION	5	
B PROCEED WITH FABRICATION	NO FURTHER REPRODUCIBLE REQUIRED -	4	✓
	RESUBMIT REVISED REPRODUCIBLE — SEE NOTE BELOW IF CHECKED HERE ☐	5	
	RESUBMIT CLOTH OR MYLAR REPRODUCIBLE AS SHIPPED	6	
	DO NOT PROCEED WITH FABRICATION RESUBMIT REVISED REPRODUCIBLE	7	

* PRINT INCLUDED

NOTE:
REAC. SEAL LEAK DETECTOR PIPING FOR N13 & N14 (2-1)

REVIEWED BY	DATE	ORIG. DIV.	DATE TO CONTRACT
[illegible]	4/7/70	[illegible]	21

THE FOREGOING SHALL IN NO WAY RELIEVE CONTRACTOR FROM ENTIRE RESPONSIBILITY FOR ENGINEERING, DESIGN, WORKMANSHIP, MATERIAL AND ALL OTHER LIABILITY UNDER THE CONTRACT.

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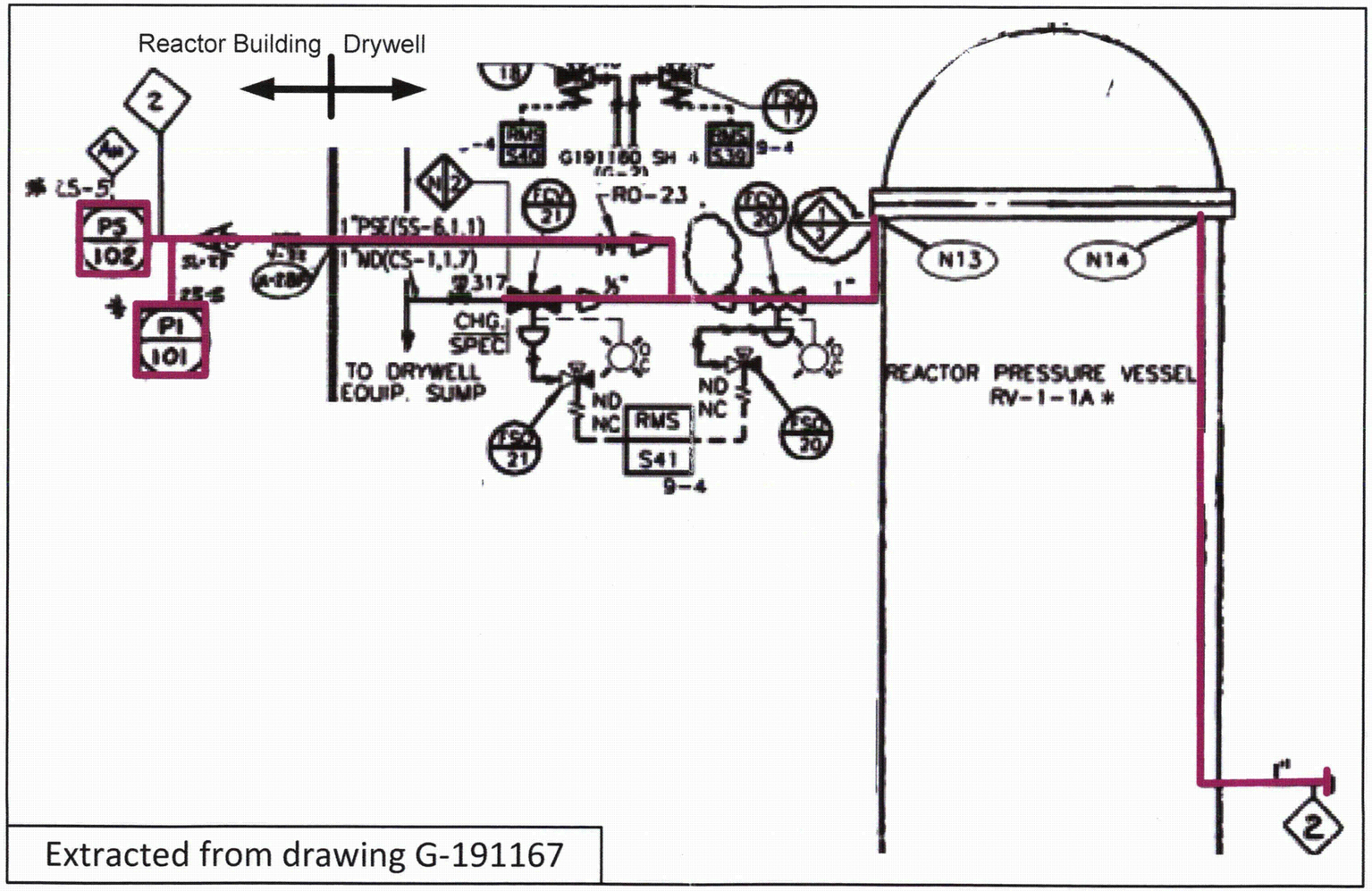
Piping and Instrumentation Diagram for the RPV Head Flange Leak Detection Piping



Extracted from drawing G-191167