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Originating Document: DCP No. 95-11258-6/UFSAR CN#2026 Rev. No. 0

NOTE: Attach 10CFR50.59 Screening Form or License Compliance Review Form to this USQE.

NOTE: Use additional sheets as necessary to provide the bases.

A.1 I Does the subject of this evaluation increase the probability of occurrence of an accident previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The replacement fitting (split nut) performs the same function, exhibits similar material strengths as the original fitting and was hydro tested at 5000 psig. It fulfills the design function of the existing compression nut. Therefore, this change does not increase the probability of occurrence of an accident previously evaluated in the SAR.

II Does the subject of this evaluation increase the consequences of an accident previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The effects of the failure of the split nut is bounded by the Small Break LOCA analysis. Therefore, this change does not increase the consequences of an accident previously evaluated in the Safety Analysis Report.

III Does the subject of this evaluation increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The fitting is located in the RCB in Room No. 3. There is no other equipment important to safety in this area. Therefore, this change does not increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report.

IV Does the subject of this evaluation increase the consequences of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: There is no other equipment important to safety in the area. The effect of the split nut failure is bounded by the Small Break LOCA. Therefore, this change does not increase the consequences of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report.

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A.2 I Does the subject of the evaluation create the possibility of an accident of a different type than any previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The replacement fitting is located in the same area and performs the same function as the original fitting. Small Break LOCA is still the only bounding accident. Since no new equipment has been introduced into this system/area, this change does not create the possibility of an accident of a different type than any previously evaluated in the Safety Analysis Report.

II Does the subject of this evaluation create the possibility of a different type of malfunction than any previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The replacement fitting is located in the same area, exhibits similar material strengths, and performs the same function as the original fitting. Failure of the split nut compression fitting will not impact other safety-related equipment from performing it's function. Therefore, this change does not create the possibility of a different type of malfunction than any previously evaluated in the Safety Analysis Report.

A.3 I Does the subject of this evaluation reduce the margin of safety as defined in the basis for any Technical Specification?

☐ YES ☒ NO

Bases: No Technical Specification applies for this condition.

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SAFETY EVALUATION SUMMARY

DESCRIPTION OF CHANGE

DCP 95-11258-6 proposes to replace damaged original compression nuts in the Incore Neutron Flux Monitoring System Bottom Mounted Instrument (BMI) thimble guide tubes with an alternate split nut design. During 1RE06 several of the compression nuts were found galled and could not be repaired.

The split nut design performs the same function as the original compression nut. Instead of being made as a single cylindrical compression nut (Ref. Figure 1), the alternate nut design consists of two half cylindrical pieces fastened together by two allen head bolts (Ref. Figure 2). This design allows the compression function to be performed without the disassembly of the thimble tube for installation.

The use of the alternate split nut design, is considered a change to the facility as described in the Safety Analysis Report (SAR). A drawing of the seal table configuration which shows the original compression nuts design was transmitted to the NRC as part of WCAP-11862 (ref. letter ST-HL-AE-2737 dated July 18, 1988). In addition, UFSAR Table 3.2.B-2, Equipment Codes and Classification List Westinghouse Supplied Non-fluid System Components, lists the guide tube as ASME Section III, Class 1. However, the split nut is not an ASME III Class 1 component and was not fabricated from ASME material as allowed by ASME XI. Therefore, this table needs to be revised to reflect the use of non ASME component and material as shown in UFSAR CN 2026. In addition, this change provides for the ASME Section XI exemption for the flux thimble tubing, flux thimble fitting and flux thimble guide tubing.

INCORE FLUX MONITORING SYSTEM COMPONENTS AND FUNCTION

The Incore Neutron Flux Monitoring system provides information on neutron flux distribution . This system utilizes a drive and transfer system to position movable neutron detectors in the core to measure the neutron flux distribution throughout the core. The core neutron flux information is used to confirm the reactor core design parameters, calculate hot channel factors, determine the three dimensional fission power distribution in the core, calculate fuel burnup and calibrate the Excore Nuclear Instrumentation System. The system provides data acquisition only and performs no operational plant control.

The Movable Fission Chamber detectors are inserted into the core through removable (during refueling only) thimbles which are inserted into the reactor core through BMI Thimble Guide Tubes which extend from the bottom of the reactor vessel through concrete shield to a thimble seal plate (table). The BMI Thimble Guide Tubes are essentially extensions of the reactor vessel, with the thimbles allowing insertion of the movable fission chamber detectors.

The detector thimbles are closed at the reactor end and serve as a pressure barrier between RCS pressure (2500 psig design) and the atmosphere. Mechanical seals between the thimbles and the BMI Thimble Guide Tubes provide the pressure barrier between the thumble and the thimble tube.

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SAFETY EVALUATION SUMMARY

The BMI Thimble Guide Tubing consists of heavy walled tubes extending from the seal table to the socket welds at the RPV bottom head penetrations. Fifty-eight Guide Tube are provided in the bottom of the reactor vessel. Each tube is a series of 3 shorter sections joined with socket welds at 2 couplings. The pressure boundary is maintained at the seal table by compression type fittings. (see Figure. 1)

In the normal operation, the detector is routed through a 5-path transfer device to the associated 10-path transfer device. The ten-path transfer device directs the detector into one of ten specific positions in the core. Once the detector reaches the top of the specified position inside the fuel assembly, it is energized and withdrawn to map the flux profile through the assembly.

If a reactor coolant leak should develop in any of the incore thimbles, it will be detected by the leak detection system, abnormal radiation levels within the incore room, or difficulty of detector insertion. The leak detection system consists of a drain header connecting the 10-path transfer devices, a pressure switch, drainage solenoid valve, an alarm light and reset push-button mounted on the distribution panel in the control room. When liquid collects in a 10-path transfer device due to a leak, the water level will rise in the drain header and thus actuate the pressure switch.

Manual isolation valves and magnetic ball check valves are installed between the seal plate and the 10-path transfer devices on each thimble. During normal operation the ball check valve is held closed by an installed magnet. The moveable detector forces the ball away from the magnet into a pocket, allowing free passage of the detector. When the detector is retracted, the magnet pulls the ball back onto the valve seat, closing it. (Ref. UFSAR Section 7.7.1.9)

GENERAL DESIGN REQUIREMENTS AND PARAMETERS ANALYSIS

The BMI Thimble Guide Tubing is classified as ASME Class 1. The jurisdictional boundaries of the BMI Thimble Guide Tubing are the compression type swagelock fittings attached to the tubing end at the seal table, and on the socket weld at the Reactor Pressure Vessel (RPV) bottom head penetration on the other end. (Ref. W E-SPEC. 955165. Rev. 1)

The BMI Thimble Guide Tubing is designed and analyzed for the temperature and pressure transients for the normal, upset, emergency, faulted, and test conditions. The Anchor Displacement Effect of the Operating Basis Earthquake (OBE) are considered an Upset Condition. The Anchor Displacement Effect of the Safe Shutdown Earthquake and a Loss-of-Coolant Accident (LOCA) are considered a Faulted Condition.

A review of the stress report for the incore flux monitor thimble tubes shows that the seismic response from the original analysis is still bounding. An analysis of the additional weight from the alternate design split nut effect on the tubing was performed. The results show that an additional split nut weight of approximately 70 pounds is required to affect the seismic response to unacceptable levels, and the actual split nut weighs much less (Ref. Calc 0090-1-00014WN, Appendix A; DCN 96-03713).

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SAFETY EVALUATION SUMMARY

The alternate split nut design is bounded by the ultimate bursting pressure of the tubing. The vendor performed destructive pressure test on the tubing material to a pressure of 16,600 psig. The HL&P analysis shows that the split nut design can withstand the internal water pressure load of 16,600 psig. (This is based on actual tested yield strength of 52 ksi. At F837 Minimum yield of 26 ksi, first yield would occur at 9000 psi, which still provides a large margin compared to system design pressure.) Since the maximum design pressure of the Reactor Coolant System is 2485 psig, adequate margin exists. (Ref. Calc. 0090-1-00014WN, Appendix A; DCN 96-03713).

As an operating plant South Texas Project falls under the jurisdiction of ASME Section XI (specifically; the 1983 Edition and Summer of 1983 Addenda). The replacement rules of the ASME Section XI, Code Paragraph IWA 7400.(d), provide an exemption for piping components 1-inch or less as follows: "piping, valves, and fittings 1 in. nominal pipe size and less, except that materials and primary stress levels shall be consistent with the requirements of the applicable Construction Code. Detailed stress analysis and consideration of secondary stress is not required." This exemption is further clarified in ASME Section XI Interpretations XI-1-89-04 which states that regardless of the Code of Construction the following requirements are exempted under Section IWA-7400: (a) procurement from Material Manufacturers or Material Suppliers; (b) Material Certification or Certificate of Compliance; (c) third party inspection; (d) procurement from a Certificate Holder and then stamping, and (e) Section XI pressure testing. Interpretation XI-1-83-86R states that weld repair programs, welding and brazing personnel qualification, NDE requirements and for items in IWA 7400(d) the installation requirements of IWA 4600 are not required. This interpretation also clarifies that instrument tubing is included in the 1-inch and less exemption. Using this exemption, the split nut assemblies, flux tubing, fittings and flux thimble guide tubing are not required to meet the Code of Construction requirements for this replacement, except that the materials and primary stress levels shall be consistent with the Construction Code.

The replacement material for the split nut is ASTM A479 type 316,316L which was purchased under P.O. QS0004758. This item was supplied as Safety-Related Quality Class 4 Material with a CMTR. The fastener material is ASTM F837 condition CW which was purchased under P.O. RS-9360. This item was supplied as Safety-Related Quality Class 4 Material with a Certificate of Conformance. Site tensile tests of 3 cap screws from the lot of material had yield strengths above 45,000 psi and ultimate tensile strengths above 120,000 psi. The material strength of the caps screws and split nut assemblies has been demonstrated to be consistent with Code of Construction materials.

This arrangement was pressure tested at 5,000 psi with no leakage. This is two times the design pressure. DCN 96-03713 to the stress report (0090-1-00014WN, Appendix A) shows that the primary stress levels are consistent with the original design. Therefore, the requirements of ASME Section XI are satisfied.

ACCIDENT ANALYSIS

The failure of the split nut is bounded by the Small Break LOCA (SBLOCA) accident analysis. The failure of the split nut would result in a line break of only 0.480 inches. The accident analysis for less then 1 inch SBLOCA is bounding. Since the split nut performs the same function as the original compression nut no impact to the accident analysis exists.

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Originating Document: DCP No. 95-11258/UFSAR CN#2026 Rev. No. 0

B. 1. X All of the above questions were answered No; therefore, the originating document does not involve an Unreviewed Safety Question.

2. _____ One or more of the above questions was marked YES; therefore, the originating document involves an Unreviewed Safety Question. The originating document, as presented, shall NOT be implemented without prior approval by the NRC. Provide a recommendation for disposition of the Unreviewed Safety Question below. Refer to 0PGP05-ZN-0004 for processing licensing amendments. Further processing of this form to the PORC, Plant Manager and NSRB is not required. Notify Procedure Control that the evaluation involved an Unreviewed Safety Question so that Procedure Control can close the USQE number.

RECOMMENDED DISPOSITION:
Approve the proposed design change and UFSAR revision since no Unreviewed safety question exists.

PREPARED BY: Lewis Allen / [signature] NSSS ORIGINATOR CIVIL — 6/5/96 Date

REVIEWED BY: JB Cotham [signature] QUALIFIED REVIEWER — 6/5/96 Date

APPROVED BY: S.E. Thomas [signature] DEPARTMENT MANAGER — 6/5/96 Date

PORC MEETING NO. 96-054 — 6/5/96 Date

APPROVED BY: [signature] PLANT MANAGER — 6/5/96 Date

REMARKS:

FIGURE 1
ORIGINAL DESIGN

115		THIMBLE GUIDE TUBE	1612E5A06A
117		SEAL PLATE	1462F85H01
119		SPLIT SEAL CAP	1682C18H01
120		SEAL INSERTION TOOL	1598C62G01
123		SEAL FITTING	8245C02G01
124		NUT WREMCH	5318663H01
125		REDUCER UNION 1/8 x .383 PART "SS-WHO-6-0002	
126		C-WASHER	5365C48H01
127		FREEZE BOX ASST	8781023G01
129		SEAL WASHER REMOVER	1598C64H01
29	M2	CAP 1/8" UNIT (SEE NOTE 8)	
35	B	PLASTIC BOOT CATALOG NO. 316 FIT-221 3/4 BLACK	
131	K	SLEEVE & NUT - *6AN	
132		FERRULE	
133		UNION .500 x *6AN-THRU "SS-7-0-6-0002	
134		FITTING BODY	5365C41H01
135		FITTING ADAPTER	5365C39H01
136	J	O-RING	7IKF84552
137	J	ELASTRATOR	7IKF84551

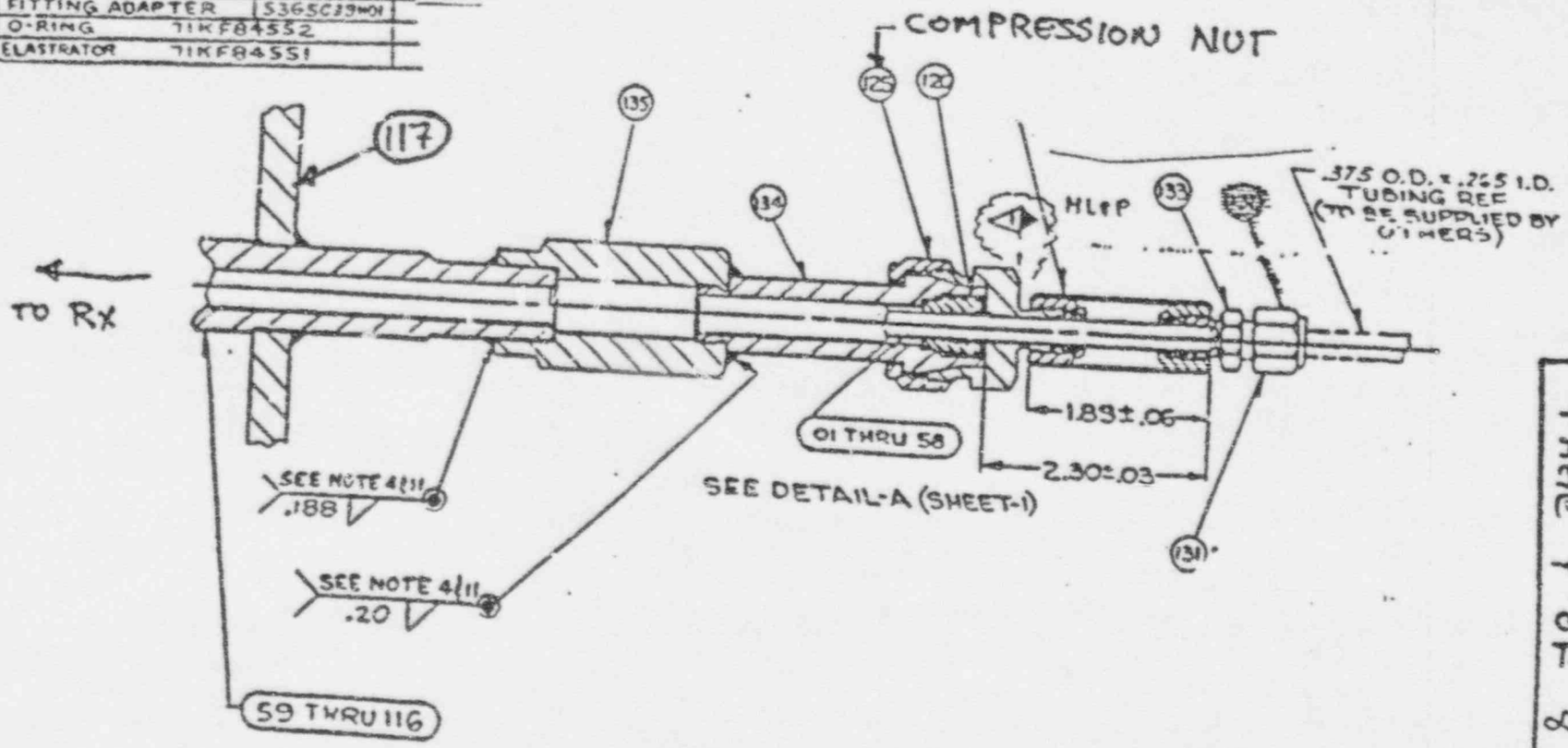

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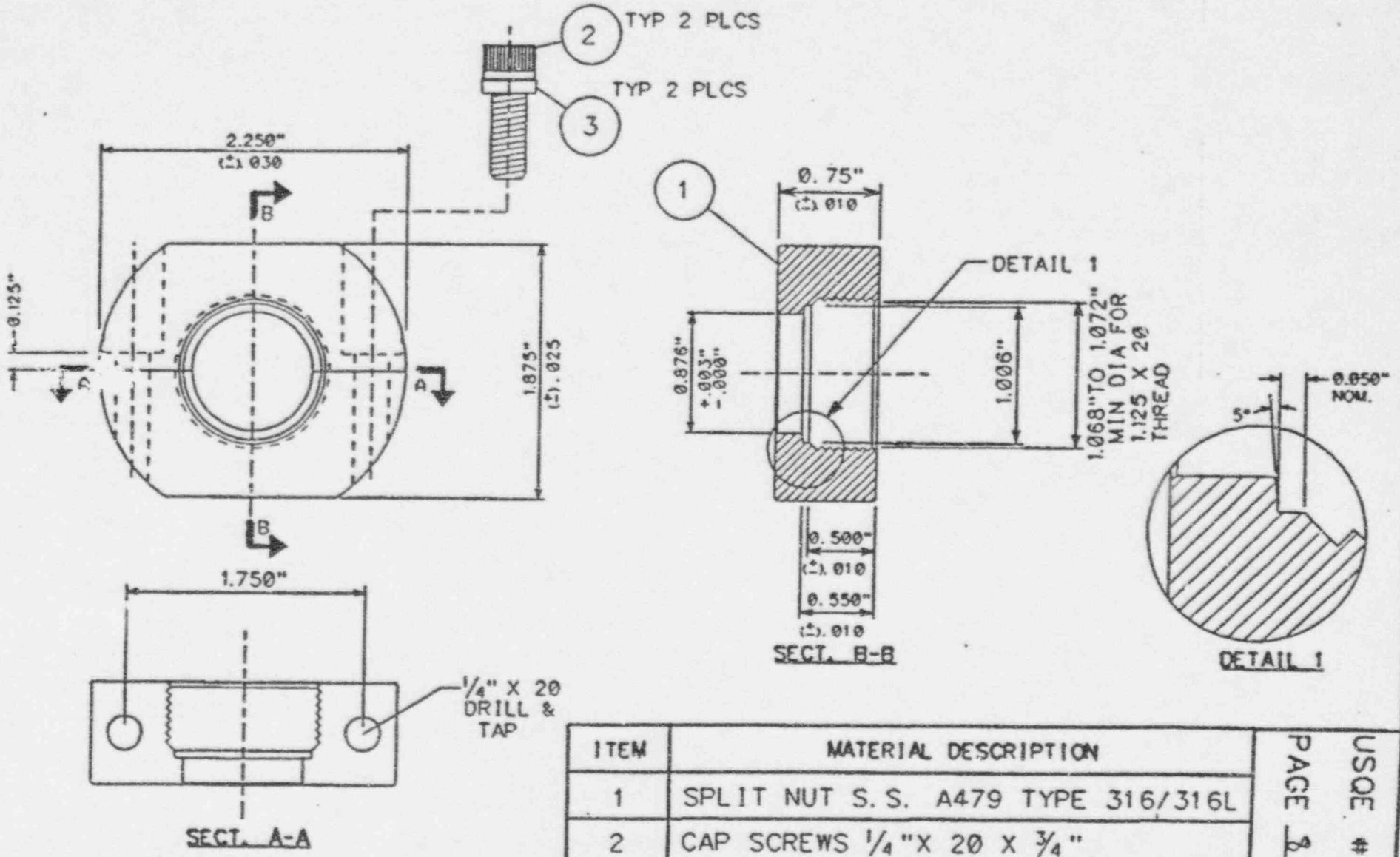
FIGURE 2



ITEM	MATERIAL DESCRIPTION
1	SPLIT NUT S. S. A479 TYPE 316/316L
2	CAP SCREWS 1/4"X 20 X 3/4"
	BIN # 583-849
3	LOCKWASHER BIN # 501-45595

INCORE THIMBLE SPLIT NUT

UNIT 1

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[X] UNIT #1 [X] UFSAR CN [X] DESIGN CHANGE [ ] OTHER _____

[ ] UNIT #2

[ ] BOTH

ORIGINATING DOCUMENT NO. DCP 95-11258-6 and UFSAR CN #2026 REV. NO. Supp 0

DESCRIPTION OF CHANGE

PROVIDE OPTION OF USING A SPLIT NUT DESIGN FOR THE HIGH PRESSURE FITTING FOR THE BMI FLUX THIMBLE

PRELIMINARY SCREENING

	YES	NO
1. Does the proposed change represent a change to the Plant Technical Specifications?	[ ]	[X]
2. Is an Unreviewed Safety Question known to be associated with the subject change?	[ ]	[X]

NOTE: If "YES" to either questions 1 or 2 refer to 0PGP05-ZN-0004.

Does the proposed change represent:

3. A change to only correct a typographical, editorial or drafting error?	[ ]	[X]
4. A change which is identical to and addressed in its entirety by an existing approved 10CFR50.59 Screening/USQE or NRC approved licensing submittal?	[ ]	[X]
5. A spare or replacement part/component change with an equivalent part/component? (See Section 2.3 for a definition of equivalent)	[ ]	[X]
6. A configuration change within existing design specifications?	[ ]	[X]

If all answers to the above questions are "NO" perform the final screening and mark N/A in the approval blocks below.
If the answer to any question (3) through (6) is "YES" a final screening is not necessary.
Sign approval blocks below and discard pages 2 and 3.
Provide a justification and references if any of items (3) through (6) is answered "YES".

Prepared by: NA _____ Originator _____ Date

Approved by: NA _____ Qualified Reviewer _____ Date

Originating Document No. DCP 95-11258-6 and UFSAR CN #2026 Rev. No. Supp 0

FINAL SCREENING

In response to the questions below, if the change involves something that is not described in the SAR and is not part of the licensing basis, the "NO" is appropriate. However, this decision must be clearly documented with adequate technical justification for each question and the sections reviewed of applicable documents and applicable attributes reviewed should be indicated. The listing of attributes and documents for 10CFR50.59 screening can be found in Addendum 5.

Inter-discipline Coordination Required? If "yes", obtain appropriate concurrence. ☒ YES ☐ NO

☐ Risk and Reliability Analysis ☐ Thermal Hydraulics ☐ Reactor Engr. _____

☒ Civil [signature] 6-5-96 ☒ Mech [signature] 6-5-96 ☐ Elect _____ ☐ EQ _____ ☐ Other _____

	YES	NO
1. Does the subject of this review involve a change to the facility as described in the Safety Analysis Report?	☒	☐

SEE PAGE 4

	YES	NO
2. Does the subject of this review involve a change to the procedures as described in the Safety Analysis Report? Refer to 0PAP01-ZA-0103.	☐	☒

SEE PAGE 4

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	YES	NO
3. Does the subject of this review propose the conduct of test or experiments not described in the Safety Analysis Report?	☐	☒

SEE PAGE 4

	YES	NO
4. Does the proposed change affect conditions or bases assumed in the Safety Analysis Report or safety-related functions of equipment/systems, even though the proposed change does not entail any physical change in existing structures, systems, or procedures as described in the SAR?	☐	☒

SEE PAGE 4

If any answer is affirmative, complete the screening form and perform an Unreviewed Safety Question Evaluation.

If all answers are negative, no Unreviewed Safety Question Evaluation is required.

Prepare by: WE SCHULZ W E Schulz 6-5-96
Originator Date

Approved by: JB Cotham J B Cotham 6/5/96
Qualified Reviewer Date

Documents Reviewed:

UFSAR Section 7.7.1.9.2 and references to Section 7.7
Technical Specifications 3/4.2.4; 3/4.3.3.2; 3/4.3.4.6.2
Safety Evaluation Report (SER) Section 3.9.2.3 and Supp. 1-7
Letter to NRC, ST-HL-AE-2737 dated July 18, 1988

DESCRIPTION OF CHANGE

The BMI flux thimbles have a high pressure seal to provide the pressure boundary for the Reactor Coolant System. This seal is a mechanical fitting (reducer union) which joins the guide tube stub to the flux thimble adjacent to the seal plate. During 1RE06, nuts which are part of this fitting were found to be galled at two of the thimble locations. This thread damage could not be repaired.

Since replacement of the nuts would be an involved evolution including a freeze seal and additional welding, it was decided to use an alternate design of a split nut to replace the original damaged nut. Installation of the split nut would be much easier and result in less personnel exposure. DCP 95-11258-6 describes the split nut and provides the technical justification for its use.

The thimble at location H11 had to be shortened in order to install a new reducer union fitting along with the split nut. The thimbles at locations G12 and R8 were also shortened during the installation of the high pressure seal.

1. Does the subject of this review involve a change to the facility as described in the Safety Analysis Report?

Shortening (repositioning) of the thimbles has been described to the NRC in the letters which are given as references to UFSAR Section 7.7. This is not a change to the faclity as described in the SAR.

The high pressure seal fitting details are not given in the UFSAR. However, a drawing showing the seal was part of a presentation to the NRC in May 1988. This drawing was included in WCAP-11862 which was transmitted to the NRC by letter ST-HL-AE-2737 dated July 18, 1988. Thus the change to allow the use of a split nut is considered a change to the facility.

The material selection for the split nut is also considered a change to the facility. UFSAR Table 3.2.8-2 states that the thimble fittings shall be ASME Class 2. However, the split nut does not use ASME III Class 2 material. This exception is allowed under ASME XI. UFSAR Change Notice CN # 2026 has been prepared to revise Table 3.2.8-2 to state that the original design was ASME III Class 2 but that subsequent repairs and replacements under ASME XI are exempt from this except for material properties and stress levels.

Thus this Question is answered YES and USQE # 96-0027 has been prepared to evaluate it.

2. This DCP and UFSAR CN do not involve any changes to procedures described in the SAR.

3. This DCP and UFSAR CN do not involve any tests or experiments.

4. Does this change affect conditions or bases assumed in the SAR or safety related functions of equipment / systems?

The applicable Technical Specifications are 3/4.2.4 and 3/4.3.3.2 for flux mapping and 3/4.3.4.6.2 for RCS leakage. The bases for TS 3/4.2.4 mentions 8 specific thimbles that are needed for the four pairs of symmetric thimble locations that are used to confirm the Quadrant Power Tilt Ratio. None of these is impacted by this change. The shortening of thimbles G12; H11; and R8 does not adversely impact the flux mapping function of the Incore Instrumentation system. These thimbles have not been shortened before and can be shortened up to 6 inches before there would be a concern about the flux mapping. The pressure retaining ability of the thimbles is still maintained.

The safety function of the BMI thimbles is to maintain the integrity of the Reactor Coolant System (RCS) pressure boundary. As demonstrated in DCN 96-03713, the split nut will function the same as the original nut. DCN 96-03713 also shows that the seismic qualification of the guide tube stub and thimble fittings retain sufficient margin. The use of non-ASME III Class 2 material is acceptable per ASME XI as detailed in USQE 96-0027 prepared for the DCP 95-11258-6 and UFSAR CN #2026.

Thus the safety function of the BMI flux thimbles is still met. This change does not affect any other safety related equipment or systems.

As discussed above there is no impact on any safety related functions. The thimbles continue to maintain their function and maintain the integrity of the RCS pressure boundary. There are no changes which would impact the Technical Specifications.