

ARIZONA NUCLEAR POWER PROJECT
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3
DOCKET NOS. 50-528/529/530

SAFETY EVALUATION REPORT SUPPLEMENT

5.2.4 Reactor Coolant Pressure Boundary Inservice Inspection and Testing

This evaluation provides additional conclusions to information in this section of NUREG-0857 and Supplements 1, 3, 9 and 11 which address the definition of examination requirements and the evaluation of compliance with 10 CFR 50.55a(g).

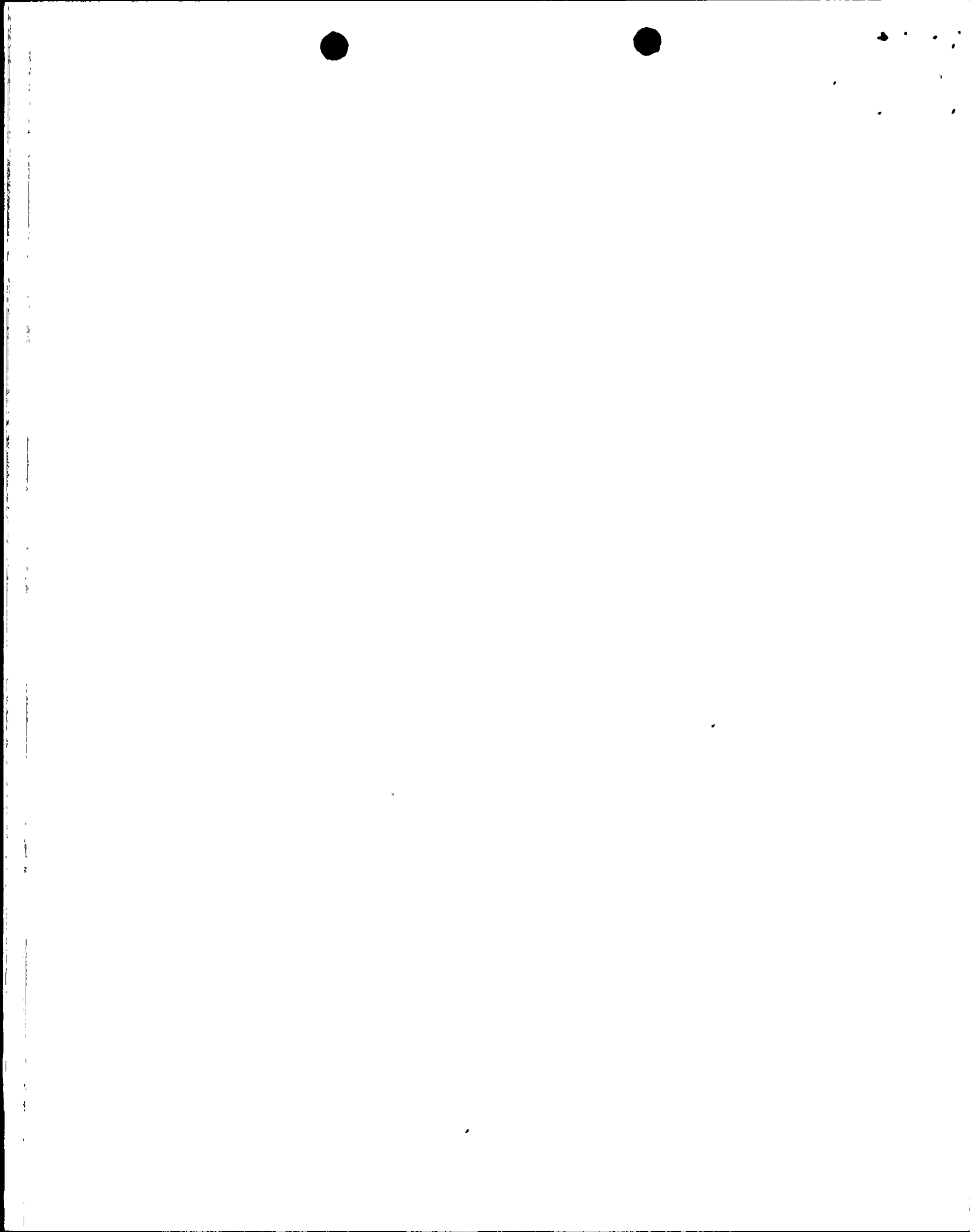
5.2.4.1 Evaluation of Compliance for Palo Verde Units 1, 2 and 3
With 10 CFR 50.55a(g)

5.2.4.1.1 Inservice Inspection Programs

In a letter dated August 26, 1985, the Arizona Nuclear Power Project (the licensee) submitted the Unit 1 inservice inspection (ISI) program for review and approval. In SSER 9 the staff reached a preliminary conclusion that the sample of welds and component supports selected by the licensee for inservice examination during the initial 10-year inspection interval exceeds the requirements of ASME Section XI, 1980 Edition including Addenda through Winter 1981. The licensee submitted the ISI programs for Units 2 and 3 in letters dated July 17, 1986 and March 11, 1987, respectively. The licensee provided additional information related to all three programs on August 7, 1987. The objective of this evaluation is to report the staff's conclusions regarding the inservice inspection at PVNGS 1-3 as described in the referenced letters.

Paragraph 10 CFR 50.55a(g)(4)(i) requires that inservice inspection of components during the initial 120-month inspection interval comply with the requirements of the latest edition and addenda of the ASME Section XI referenced in 10 CFR 50.55a(b) on the date 12 months prior to the date of issuance of the operating license, subject to the limitations and modifications listed therein. Pursuant to this requirement the PVNGS 1-2 programs are based on ASME Section XI 1980 Edition including Addenda through Winter 1981 (80E81W). Considering the OL issuance date for PVNGS 3, the ISI program must be based on ASME Section XI 1983 Edition including Addenda through Summer 1983 (83E83S). In the letter dated March 11, 1987 the licensee requested approval (Relief Request No. 5) to use the 80E81W Code at PVNGS 3 during the initial inspection interval. The licensee compared the provisions of the 83E83S Code with the 80E81W and found no significant differences in the program scope. To provide consistency for all three units, the licensee submitted the PVNGS 3 ISI program based on ASME Section XI 80E81W.

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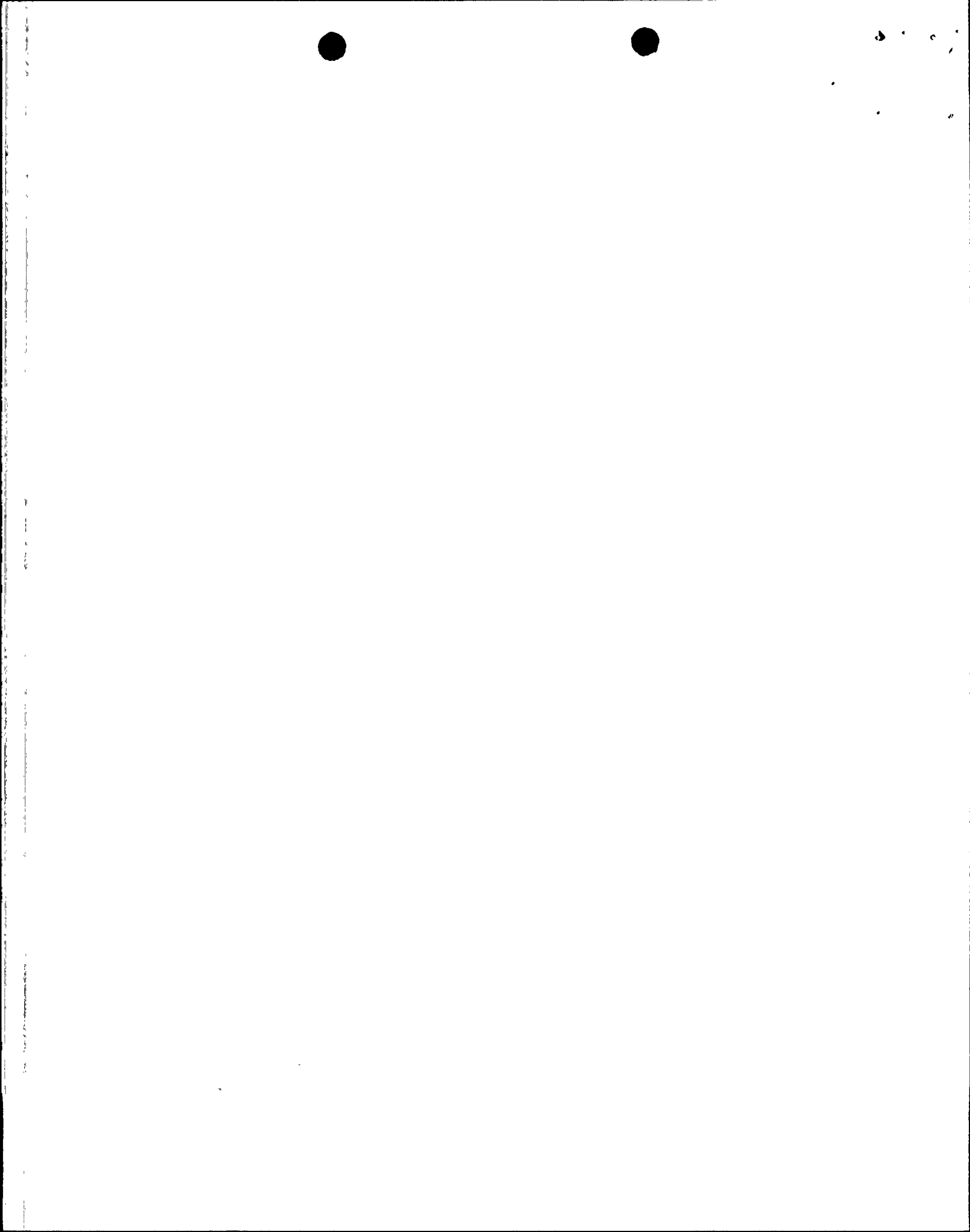
The staff has addressed this issue at other plant sites with multiple units. Although each inservice inspection program is independent, it is desirable from the licensee's perspective to use a common document. When the Commission references national standards in 10 CFR 50.55a(b), a specific evaluation determines that an inservice inspection program based on any of the referenced documents will provide an acceptable level of quality and safety. The staff has approved the use of the same Code at a plant site provided that the licensee establishes a common start date for the initial inspection interval. The applicable common standard was determined by the ASME Code referenced in the regulation 12 months prior to the average OL issuance date for the multiple units. The effective date for incorporation by reference of ASME Section XI 83E83S is October 28, 1985. The average OL issuance date for PVNGS is before October 28, 1986. Therefore, the staff concludes that the 80E81W Code may be used for PVNGS 3 as requested provided that the licensee establishes a common start date for PVNGS based on the average date of commercial service in accordance with ASME Section XI subparagraph IWA-2400(b).

The ISI programs for PVNGS 1-3 are essentially the same. Therefore, the staff's evaluation relates to all units unless otherwise specified; predicated upon the licensee meeting the condition to adjust the interval start date. The licensee describes the ASME Code Class 1, 2 and 3 components and their supports selected for examination based on ASME Section XI requirements. Summary tables compare the examination sample with the total number of items. The plant system, reference drawing, component identification, line size and method of nondestructive examination are described. Isometric and boundary drawings were provided to show the distribution of the components selected for examination and pressure tests. In accordance with paragraph 10CFR50.55a(b)(2)(iv)(A), the extent of examination of Class 2 piping welds for the PVNGS safety injection system (RHR, ECCS, and CHR systems) was determined in accordance with the 1974 Edition through and including the Summer 1975 Addenda of ASME Section XI.

The licensee took a conservative approach to the visual examination of component supports that exceeds the Code requirements. All supports on Class 1, 2 and 3 systems (or portions of systems) required to be examined in ASME Section XI subcategory IWB, IWC, or IWD are scheduled for examination. The multiple loop philosophy (examining only 1 loop) of IWF-2510(b) was not utilized. In addition, numerous restraints that are not actually required to be examined by ASME Section XI were included.

The ISI programs also includes additional examinations which are not required by ASME Section XI, such as the following:

- 1) Surveillance requirements for the reactor coolant pump flywheels defined in the Technical Specification.
- 2) Commitments to perform inspections based on IE Bulletins 79-13, 80-27, 82-02 and 82-09.
- 3) Augmented examination of high energy fluid system piping.
- 4) Augmented examination of the residual head removal (RHR), emergency core cooling (ECC) and containment heat removal (CHR) systems.



Based on the review of the foregoing information, the staff determined that the ASME Code Class 1, 2 and 3 welds selected by the licensee for examination exceed the requirements of the regulations, and therefore, the staff concludes that the examination sample is acceptable.

5.2.4.1.2 Evaluation of Relief Requests

The licensee requested written relief from requirements that the licensee determined to be impractical to perform in accordance with 10 CFR 50.55a(g) (5)(iii). The staff has evaluated these issues in the following paragraphs.

A. Nozzle Inside Radius Sections, Examination Category, B-D and C-B, ASME Code Class 1 and 2 (Relief Request No. 2)

Code Requirement

A volumetric examination is required of the nozzle inside radius section of the pressurizer, steam generator and shut-down cooling heat exchanger.

Code Relief Request

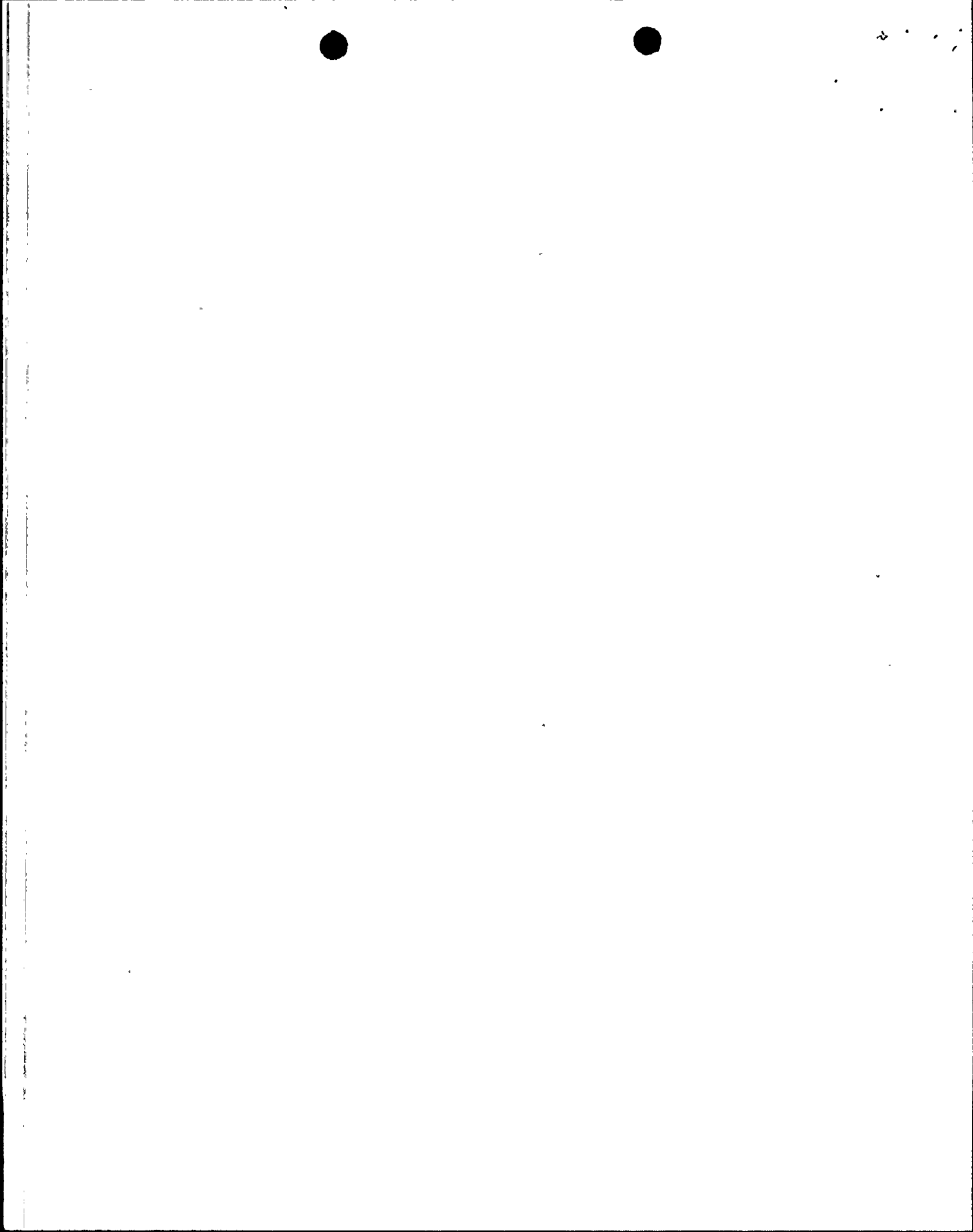
The licensee will perform the volumetric examination of the steam generator feedwater nozzles and the pressurizer spray nozzles to the extent practical as an alternative program. The licensee requests relief from performing the required volumetric examination on all other nozzles.

Reason For Request

The volumetric examinations of the nozzle inside radius sections on the referenced vessels (other than those identified under Alternative Examination) will not be performed. For nozzles that do not experienced a temperature gradient in a cycling environment that could possibly induce a thermal fatigue mechanism, there is no technical basis for performing these examinations. The industry has evidence that problems can arise in inner radius areas but they have all been associated with the cyclic temperature gradients, and generally in an extremely high cyclic environments. In addition, the unique geometries, large metal paths, compound angles, etc, that have been encountered while performing an ultrasonic examination of the inner radius sections have essentially prevented a Code required or recommended method from being prepared and/or referenced in ASME Section XI. These examinations also require extremely large amounts of time, effort, expense, and radiation exposure (expected to be as high as 1 to 4 man REM per nozzle).

Staff Evaluation

The examination of the nozzle inside radius section of vessels is technically feasible. The licensee has selected for examination nozzles with an operating environment that could induce a thermal fatigue mechanism. However, ASME Section XI contains a representative sample of components that are required to be examined in order to detect unanticipated service-induced degradation. The staff has no technical basis for considering the elimination of the required examination, therefore, the licensee's request is denied.



Examination Category B-D and C-B nozzle inside radius sections were required to be examined during the preservice inspection. Limitations to examination were identified during the preservice inspection and were addressed by the staff in the referenced SER supplements. Based on the conclusions described above, the licensee must examine the nozzle inside radius sections required by ASME Section XI to the extent practical.

B. Component Supports and Integral Attachments, Examination Category F-A, F-B, F-C, D-A, D-B and D-C, ASME Code Class 1, 2, and 3 (Relief Request 3)

Code Requirement

A visual examination (VT-3) is required of the mechanical or welded attachments to the pressure retaining component.

Code Relief Request

The licensee requests relief from removing insulation to perform examinations.

Reason For Request

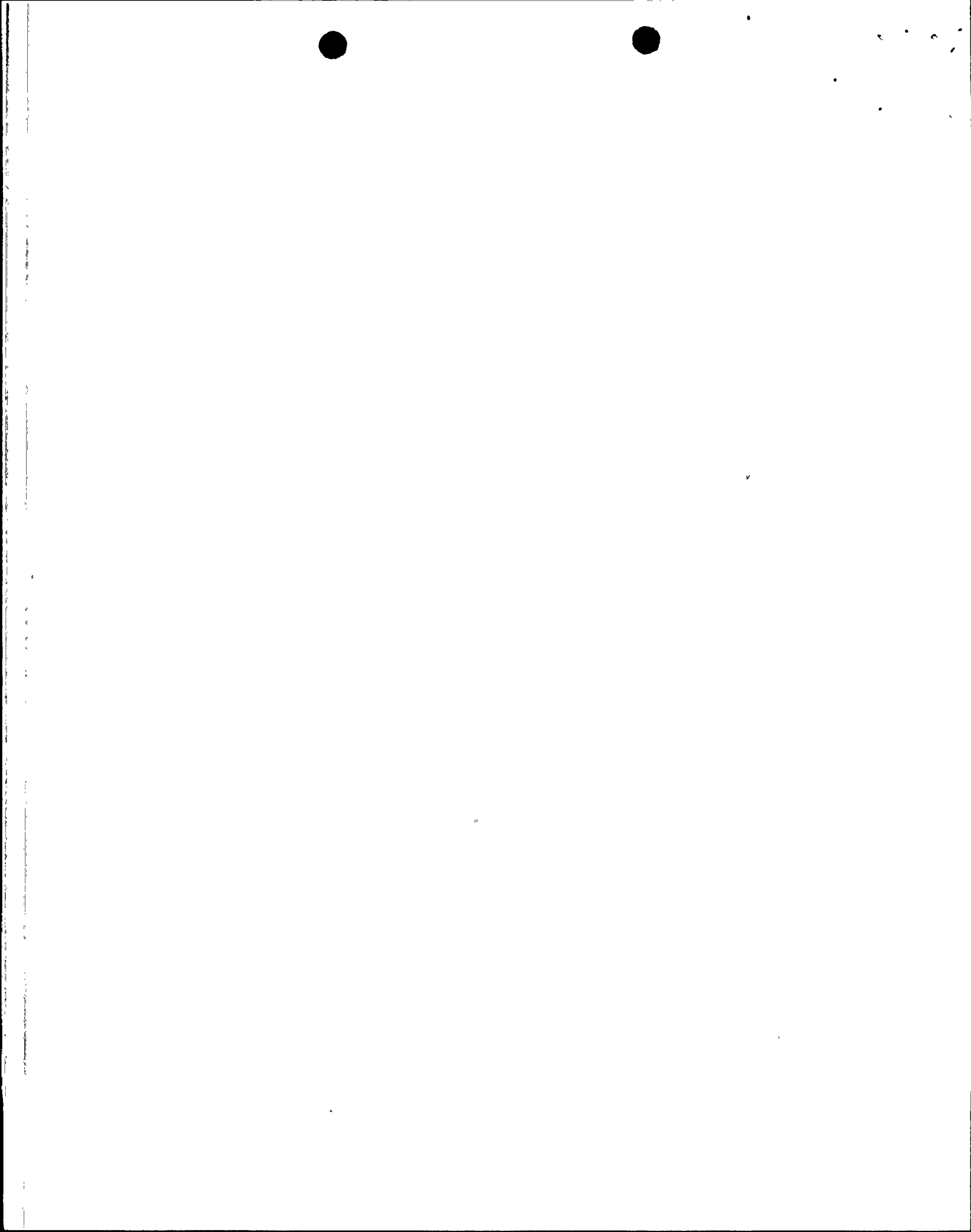
The visual examinations of the mechanical or welded attachments will be performed without removal of insulation. It has been our experience that any loss of support capability or adequate restraint can usually be detected through the examination of uninsulated portions of the support, the accessible portions of the attachments through the insulation gaps, and or the surrounding insulation.

Alternative Examinations

The mechanical and welded attachments will be visually examined to the extent practical. The insulation will be removed from around the support attachment for further examinations whenever the mechanical connections can not be examined or whenever an abnormality is detected.

Staff Evaluation

The requirements of ASME Section XI implicitly assume that insulation will be removed, as necessary, to perform volumetric and surface examinations. Removal of insulation generally is not required to perform visual examinations unless the results of inservice inspections detect unacceptable conditions that require corrective measures. The objective of the VT-3 visual examinations required for the subject examination categories is to determine the general mechanical and structural conditions of components and their supports, such as the presence of loose parts, debris, or abnormal corrosion products, wear, erosion, corrosion, and the loss of integrity at bolted or welded connections.



The staff's interpretation is that the ASME Council did not intend that insulation be removed to conduct VT-3 visual examinations. The requirements of ASME Section XI does not require removal of insulation that would result in a violation of the Technical Specification, such as solid fire-resistant foam assemblies or insulation located at fire stops. For component supports, subparagraph IWF-1300(e) contains the following definition "Where the mechanical connection of a non-integral support is buried within the component insulation, the support boundary may extend from the surface of the component insulation provided the support either carries the weight of the component or serves as a structural restraint in compression."

The licensee submitted this request to obtain the staff's interpretation of the Code requirements. The staff determined that the ASME Council intended that licensee perform an analysis of the component supports subject to examination and use the provisions of IWF-1300(e) to exclude the majority of components. The staff has evaluated the licensee's conservative program for the examination of component supports, and determined that this program is an acceptable alternative to an analysis based on IWF-1300(e). Therefore, the staff concludes that relief may be granted as requested for the licensee to examine the support components and integral attachments without removal of insulation.

C. Recertification by Examination of Level III Personnel
(Relief Request No.4)

Code Requirement

All Level III personnel shall be recertified by examination on a triannual basis in accordance with ASME Section XI subparagraph IWA-2300(a)(1).

Code Relief Request

The licensee requests relief to recertify all Level III personnel by examination every five years.

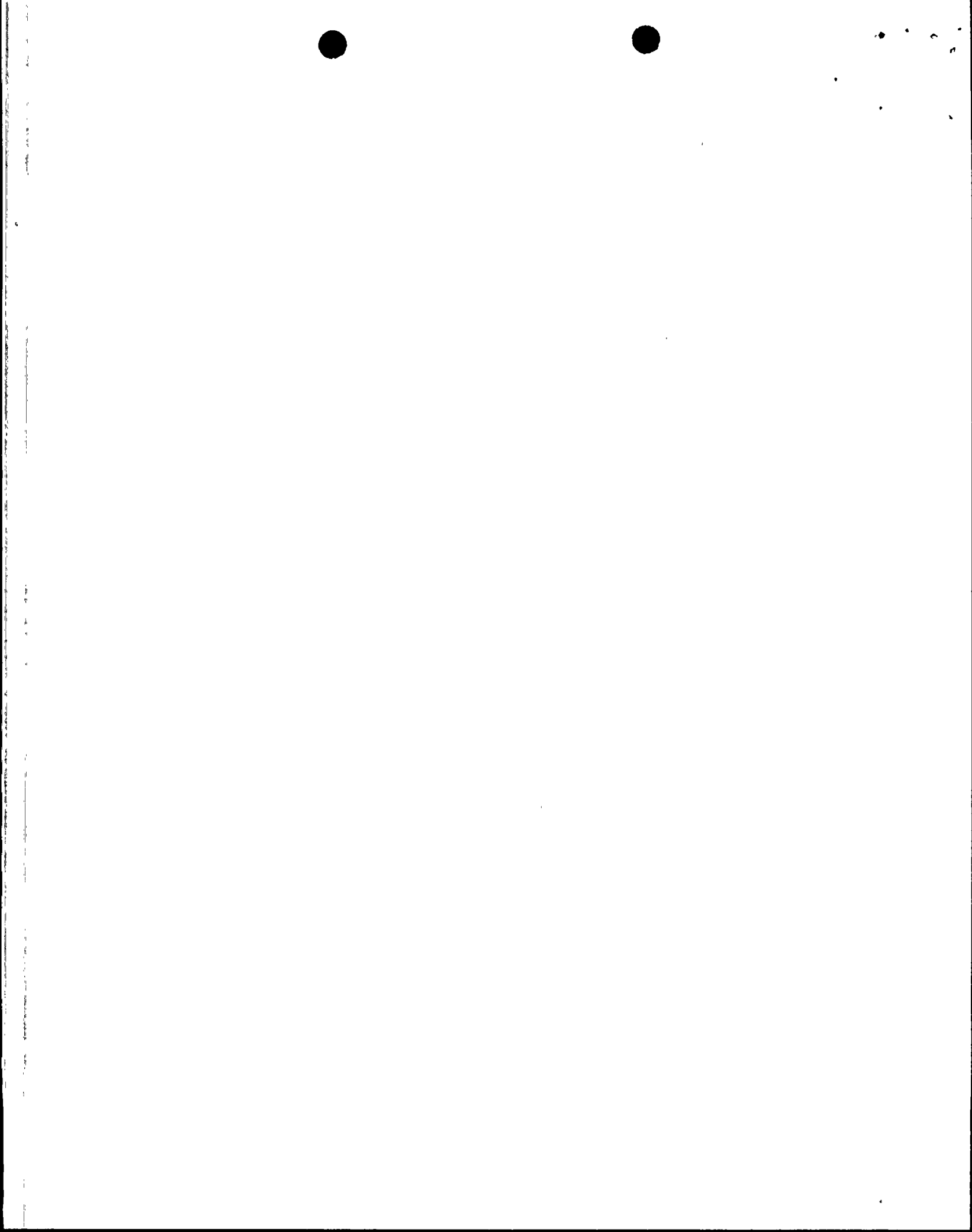
Reason for Relief

ASME Section XI 1983 Edition including Addenda through Summary 1983, the latest Code referenced in 10 CFR 50.55a(b), requires that all Level III personnel be recertified by examination every 5 years.

Staff Evaluation

Paragraph 10 CFR 50.55a(g)(4)(iv) states:

Inservice examinations of components, tests of pumps and valves and system pressure tests, may meet the requirements set forth in subsequent editions and addenda that are incorporated by referenced in paragraph (b) of this section, subject to the limitations and modifications listed in paragraph (b) of this section and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met.



The licensee proposes to use provisions from a later approved ASME Code. The staff has determined that the licensee's proposal conforms with the requirements of the regulation that "all related requirements of the respective editions or addenda are met" and, therefore, is acceptable. Therefore, the staff concludes that relief may be granted as requested for the licensee to recertify all Level III personnel by examination every 5 years.

D. Snubber Surveillance Requirements (Relief Request No. 1)

Code-Requirement

IWF 5400 of Section XI requires functional testing of snubbers by sampling and provides an acceptable sampling plan consisting of a 10% initial sample.

Code Relief Request

The licensee requests relief to perform inservice functional testing on snubbers following alternative requirements according to the sampling plan in the Technical Specifications.

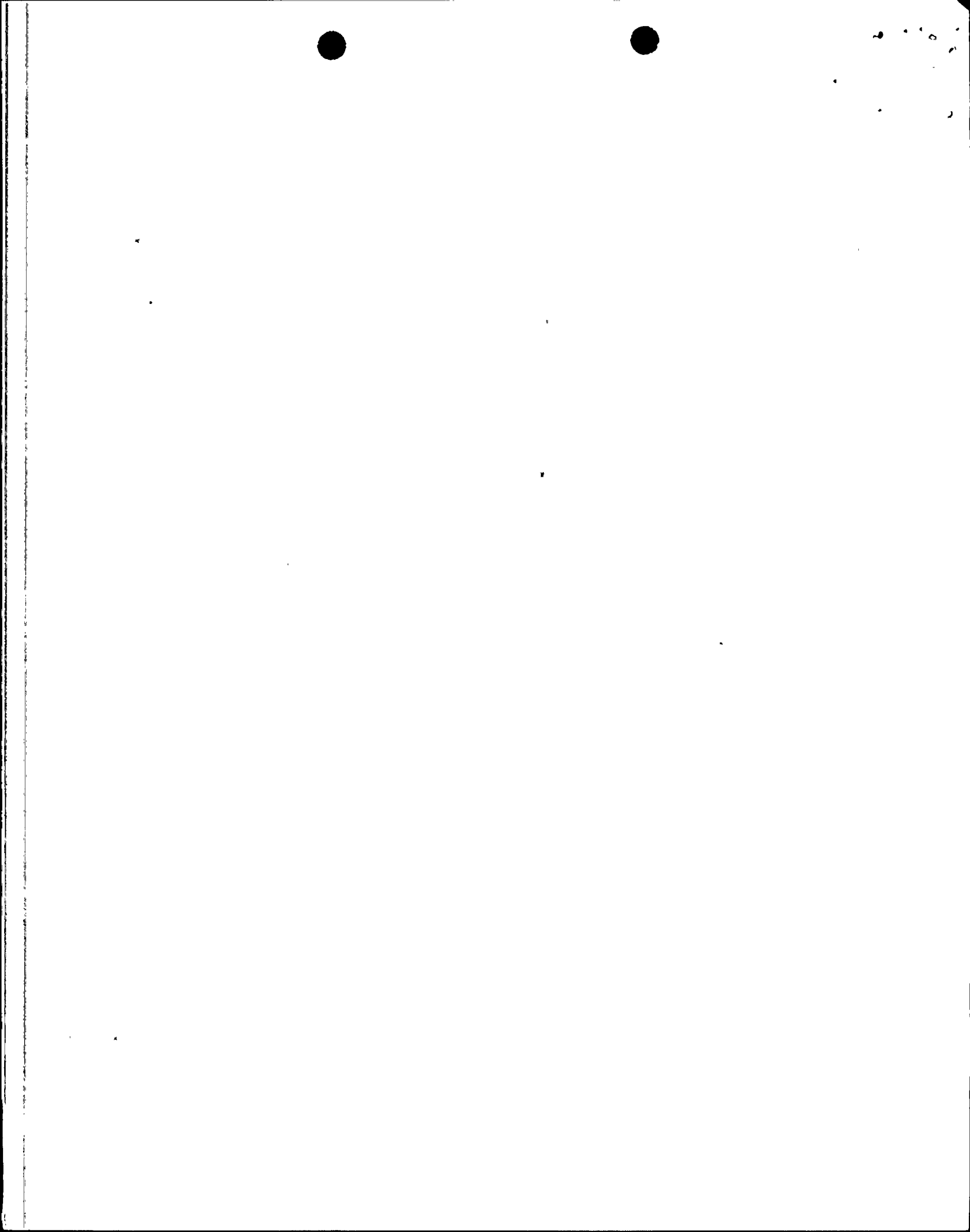
Reason For Request

The licensee's plan coincides with one of the three acceptable approaches in the Standard Technical Specifications. IWF is awaiting a complete revision of the snubber surveillance requirements being prepared by the Working Group of the ASME O&M 4 Committee.

Staff Evaluation

The ASME O&M 4 Committee has adopted two additional sampling plans which, when incorporated in Section XI, will be used at the licensees' option. Both plans, which were developed by the NRC staff on a statistical basis of 90% operability at 95% confidence level, fully meet the intent of Section XI and are currently permitted to be used by licensees whose plant Technical Specification are consistent with the Standard Technical Specifications. The PVNGS licensee proposes to use these plans as an alternative to the Section XI requirements through use of the plant Technical Specifications.

Since the PVNGS Technical Specifications are consistent with the Standard Technical Specifications, the alternative requirements proposed by the licensee to follow the plant Technical Specifications on snubber inservice functional testing in lieu of the requirements of IWF-5400, fulfill the intent of Section XI and therefore, are acceptable.



E. Accessibility

Each of the programs contain a Section 3.3 which states:

"The preservice examinations were performed with examination techniques, both automated and manual, similar to those planned for use for Inservice Inspection. The examination limitations noted during the preservice examinations were documented in requests for relief submitted with the preservice examination program. There have been no additional limitations noted during the formulation of this program.

All items that are scheduled for examination will be examined to the extent practical. In addition, any limitations that are noted during the examinations will be documented in the summary reports that are prepared after each outage."

The staff evaluated the limitations to examinations recorded during the preservice inspection in the referenced SER supplements. Although the number of welds examined during the preservice inspection was greater than the requirement for the initial ISI interval, the method of examination may be different. The licensee may use the summary reports to document the inspection results. The staff does not routinely evaluate data sheets and summary reports of individual examinations to establish compliance with specific ASME Code requirements. Therefore, the licensee is still responsible for identifying impractical Code requirements associated with the inservice inspection program and providing a supporting technical justification.

5.2.4.1.3 Conclusions

Paragraph 10 CFR 50.55a(g)(4) requires that components (including supports) which are classified as ASME Code Class 1, 2 and 3 meet the requirements, except design and access provisions and preservice requirements, set forth in applicable editions of ASME Section XI to the extent practical within the limitations of design, geometry and materials of construction of the components. Pursuant to 10 CFR 50.55a(g)(5)(iii) the licensee determined that conformance with certain code requirements are impractical for his facility and submitted supporting information. The staff concludes that relief may be granted for the issues described in Relief Requests Numbers 1,3, 4, and 5, subject to the conditions described in this evaluation. The staff also concludes that the Inservice Inspection Programs submitted for PVNGS 1-3 are acceptable and in compliance with 10 CFR 50.55a(g)(4).

6.6 Inservice Inspection of Class 2 and 3 Components

The staff evaluation of the inservice inspection of Class 2 and 3 components is included in the above evaluation.

