



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 46 TO PROVISIONAL OPERATING LICENSE NO. DPR-13

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE UNIT NO. 1

DOCKET NO. 50-206

INTRODUCTION

As required by 10 CFR 50.55a(g), Southern California Edison Company (the licensee) has updated the Inservice Inspection and Testing Program for the San Onofre Unit 1 facility to the requirements of the 1974 Edition through Summer 1975 Addenda of Section XI ASME Boiler and Pressure Vessel Code (B&PVC). Based on information submitted by letters to the Commission from the licensee, dated September 28, 1977, May 26, 1978 and September 4, 1979, and meetings held on June 26 and 27, 1978, the program has been revised for compliance with the regulations. By application dated June 24, 1977, the licensee submitted proposed Technical Specifications for the inservice inspection and testing requirements for ASME Code Class 1, 2 and 3 components. This Safety Evaluation only encompasses the inservice inspection portion of the proposed technical specification change. We will issue a separate evaluation to complete our action for the pump and valve testing portion of the application.

Evaluation of those requirements which the licensee has determined to be impractical for implementation at the facility and for which the licensee has requested relief are discussed below:

I. INSERVICE INSPECTION

A. Class 1 Components

1. Relief is requested from the repair requirements of Articles IWA-4000 and IWB-4000. Repairs will be conducted in accordance with Article IWA-4000 of the 1977 Edition, addenda thru Summer 1978 of Section XI.

Code Requirements

The repair requirements are contained in Articles IWA-4000 and IWB-4000. In some cases the rules of ASME B&PVC Section III are invoked. In the event repairs not addressed in these articles are required, the repairs may be made in accordance with the requirement of the original construction code.

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Licensee Basis for Relief Request

The repair rules of the 1974 Edition and addenda thru Summer 1975 are ambiguous and lack definition. These rules do not sufficiently define such items as: pressure testing requirements following repairs by welding, the role of the Authorized Inspector in the repair program, and welder qualifications. These rules do not take into consideration the causes of failure and the suitability of the welding repair procedures. These rules were not developed for plants, like San Onofre Unit 1, which were designed per codes other than Section III of the ASME B&PVC.

In contrast, the repair rules of the 1977 Edition and Addenda through Summer 1978 define in detail: pressure testing requirements, notification of an Authorized Inspection Agency, and welder qualification records. These rules have provisions for incorporating original design requirements and construction codes. The use of Section III of the ASME B&PVC is explained. Finally, the rules require a complete repair program including evaluation of failure causes and the suitability of repair procedures. This recent code presents clear well-defined repair requirements which meet the intent of the 1974 Edition and Addenda thru Summer 1975.

Evaluation

The repair rules of the 1977 Edition and Addenda through Summer 1978 of Section XI are significantly improved when compared to those of the 1974 Edition through Summer 1975 Addenda. Use of the 1977 Edition through Summer 1978 Addenda for repairs of the pressure retaining boundary of components would therefore constitute an improvement in the licensee's inspection program provided piping, pump, and valve repairs that do not penetrate through the pressure boundary are not exempted from the hydrostatic pressure test as allowed by IWA-440(b)(3). The staff concludes that relief may be granted as requested with the exception stated above.

2. Request to delay examination of the reactor vessel integrity welded support lugs to the end of the inspection interval. (Item B1.12, Examination Category B-H)

Code Requirement

At least 25% of the required volumetric examination shall have been completed by the expiration of one-third of the inspection interval (with credit for no more than 33-1/3% if additional examinations are completed) and at least 50% shall have been completed by the expiration of two-thirds of the inspection interval (with credit for no more than 66-2/3%). The remaining required examinations shall be completed by the end of the inspection interval.

Licensee Basis for Relief Request

The reactor vessel support lugs are accessible for examination only from the inside of the vessel. There is less than twelve inches clearance around the outside of the vessel. A drawing showing the details of the reactor vessel support lug-to-vessel weld has been provided(1). To examine from the inside of the vessel, it is necessary to remove the core barrel and install a remotely operated reactor vessel inspection tool. This is done once at the end of the inspection interval. This vessel was manufactured in accordance with the rules of Section VIII of the Code, 1959 Edition. The welds were originally magnetic particle examined. The three lugs were examined from the inside of the vessel in 1976 using the ultrasonic technique and were found acceptable. Based on the satisfactory condition of these welds after more than nine years of operation and undue hardship imposed by requiring core barrel removal more frequently than once per ten years, relief is requested from this code requirement.

Evaluation

The design and inaccessibility of the reactor vessel support lugs prevent the performance of volumetric examination at the frequency required without removing the core barrel. Removal of the core barrel in order to examine these welds at the required frequency places an undue burden on the licensee in light of the facts that these welds were recently examined with acceptable results obtained and that there exists no history of failure of support lugs of this design. Because of the support lugs design and examinations performed to provide assurance of the continued structural integrity of the attachment welds and adjacent base metal, the staff concludes that relief from the examination frequency as requested may be granted.

3. Request relief from examination of the reactor vessel cladding at the frequency required by the Code (Item B1.14, Examination Category B-I-1).

Code Requirement

At least 25% of the required examination shall have been completed by the expiration of one-third of the inspection interval (with credit for no more than 33-1/3% if additional examinations are completed) and at least 50% shall have been completed by the expiration of two-thirds of the inspection interval (with credit for no more than 66-2/3%). The remaining required examinations shall be completed by the end of the inspection interval.

(1) May 26, 1978 Letter from K. P. Baskin to K. R. Goller

Licensee Basis for Relief Request

The six patches on the vessel are accessible for examination only when the core barrel is removed. To examine from the inside of the vessel, it is necessary to remove the core barrel. This is done once at the end of the inspection interval. These clad patches were visually examined in 1976 and found acceptable. Based on the satisfactory condition of the cladding after more than nine years of operation, the undue hardship imposed by requiring core barrel removal more frequently than once per ten years, and current industry practice (the reactor vessel clad examinations are not included in Section XI requirements subsequent to the Summer 1976 addendum), relief is requested from this code requirement.

Evaluation

Removal of fuel and the core barrel each inspection period in order to perform the visual examination of the vessel cladding patches imposes an undue hardship on the licensee without a compensating gain in safety. A recent visual examination of the vessel cladding, after nine years of plant operation, showed the cladding to be acceptable. Extending the frequency required for cladding inspection will not reduce the assurance that the cladding integrity is maintained during plant operation. The staff therefore concludes that relief from the inspection requirement may be granted as requested.

4. Request relief from volumetric examination of the dollar plate weld in the closure head. A visual examination will be performed during pressure tests at refueling intervals. (Item B1.2, Examination Category B-B).

Code Requirement

The examinations performed during each inspection interval shall cover at least 10% of the length of each longitudinal shell weld and meridional head weld and 5% of the length of each circumferential shell weld and head weld.

Licensee Basis for Relief Request

The dollar plate weld in the closure head is totally inaccessible due to the control rod drive penetration locations. A drawing showing the location of the dollar plate weld has been provided⁽¹⁾. Based on over nine years of satisfactory operation and verification of structural integrity provided by the proposed alternate visual examination during pressure tests at refueling intervals, relief from Code requirement is requested.

(1) May 26, 1978 Letter from K. P. Baskin to K. R. Goller

Evaluation

The design of the closure head and control rod drive penetration locations prevent volumetric examination of the dollar plate weld. As an alternate and continuing inspection of the weld, the licensee has proposed to visually inspect this weld during pressure tests performed during refueling intervals. Other welds on the closure head are examined to code requirements and are subject to additional examinations if unacceptable indications are revealed. The staff concludes that visual inspection of the dollar plate weld during pressure test at each refueling outage and acceptable results from volumetric examination of other closure head welds will provide an acceptable level of safety and assurance of the closure head structural integrity. Relief from the volumetric examination requirement may be granted.

5. Relief is requested from surface examination of the lower 270 degrees of the following Class 1, Category B-F.

Weld Designation

<u>Nozzle to Safe End Table B-1.6</u>	<u>Safe End to Pipe Table B-4.1</u>	<u>Loop</u>
A-1 A-18	A-2 A-17	A
B-1 B-18	B-2 B-17	B
C-1 C-18	C-2 C-17	C

Code Requirement

Volumetric and surface examinations shall be made of the circumference of 100% of the nozzle-to-safe end welds.

Licensee Basis for Relief Request

Only the top 90° (approximately) segment of each reactor vessel-to-safe end weld and safe-end-to-piping welds are accessible for surface examination. The remaining portion of each weld is not accessible due to physical interference with the reactor cavity shield tanks and the lack of access space to the lower portion of the nozzle (three inch clearance). Drawings showing the physical location and limited access to these welds have been provided⁽¹⁾. These welds are examined volumetrically 100% in accordance with the Code.

(1) May 26, 1978 Letter from K. P. Baskin to K. R. Goller

Evaluation

Because of the close proximity of the shield tanks to the nozzles, access to perform 100% surface examination of the welds is extremely limited. The licensee has attempted to visually examine the lower portion of these welds indirectly by use of mirrors without success. The nozzle welds will be examined 100% volumetrically and a surface examination will be performed on approximately one-quarter of each weld. The staff finds that the examinations which will be performed will provide adequate assurance of the nozzle structural integrity and concludes that relief from 100% surface examination may be granted.

6. Relief is requested from volumetric examination of the surge line nozzle connection weld #5013-7 and nozzle section. Visual examination will be performed during pressure tests of the reactor coolant system. (Item B2.2, Examination Category B-D).

Code Requirement

Weld and nozzle section shall be volumetrically examined.

Licensee Basis for Relief Request

The surge line nozzle connection and surge nozzle section welds are not accessible due to interference from the pressurizer heaters. The heaters and associated cabling do not permit scanning of the nozzle area. See drawing showing the heater interference⁽¹⁾. A feasible alternate examination method is to visually examine the area during the leak test of the reactor coolant system. Since the weld is completely inaccessible the alternate examination proposed is a reasonable alternative.

Evaluation

The inaccessibility of the surge line nozzle-to-pressurizer attachment weld prevents volumetric examination of the weld and radiused section. Visual examination of the weld is the only feasible examination which can be performed at this time. The licensee has committed to visually examine the area during the leak test of the reactor coolant system, which will be performed prior to startup following each refueling outage. The staff concludes that the frequency of visual examination of this weld will provide adequate assurance of its structural integrity and that relief from the volumetric examination requirement may be granted.

(1) May 26, 1978 Letter from K. P. Baskin to K. R. Goller

7. Relief is requested from examination of the Class 1, Category B-J reactor coolant piping welds as follows:

<u>Weld Designation</u> <u>Table B-4.5</u>	<u>Loop</u>
A-3	A
A-15	A
A-16	A
B-3	B
B-15	B
B-16	B
C-3	C
C-15	C
C-16	C

Visual examination will be performed during reactor coolant system pressure tests.

Code Requirement

The volumetric examinations performed during each inspection interval shall cover all of the area of 25% of the circumferential joints including the adjoining one foot sections of longitudinal joints and 25% of the pipe branch connection joints.

Licensee Basis for Relief Request

Three circumferential welds in each reactor coolant loop are completely encased in concrete. No credit is taken for these welds when calculating the 25% area requirement. These welds shall be checked for signs of leakage when the system is pressure tested.

Evaluation

The welds listed are encased in concrete and cannot be examined volumetrically or visually. The areas surrounding the coolant pipes penetrating the concrete will be visually inspected for signs of leakage when the coolant system is pressure tested. The licensee is not taking credit for these welds as part of the 25% total of primary system welds to be examined during the inspection period. The staff has determined that the welds selected as part of the 25% sample of primary system welds should contain those welds nearest the welds encased in concrete. The condition of these welds would most likely represent the condition of the welds encased in concrete. The staff concludes that relief from the examination requirement will not significantly decrease the level of safety of the plant because of the alternate examinations which will be performed and therefore the relief may be granted.

8. Request relief from surface examination requirements of branch pipe connection welds #6006-1, #6007-1 and #6008-1. Visual examination will be conducted during reactor coolant system pressure tests. (Item B4.7, Examination Category B-J).

Code Requirement

Surface examinations performed during each inspection interval shall cover all of the area of 25% of the pipe branch connection joints.

Licensee Basis for Relief Request

A concrete sleeve prevents volumetric or surface examination of these welds. The plant design precludes any examination except visual conducted during hydrotests. Welds on either side of this weld are examined per the Code. These welds are not part of the 25% area needed to satisfy the Code.

Evaluation

Inaccessibility of these welds prevents examination as required by the Code. Examination of the welds on each side of the inaccessible welds and visual examination of the areas around these welds will serve as an acceptable alternative for determining their structural integrity. The staff concludes that relief from the surface examination requirement may be granted.

9. Request relief from volumetric examination of reactor coolant pump casing welds, designated as A-1, 2, and 3, B-5.6, and reactor coolant pump supports, designated as A-1, 2, and 3, B-1, 2, and 3, and C-1, 2, and 3 in Table B-5.4. (Item B5.6, Examination Category B-L-1 and Item B5.4, Examination Category B-K-1)

Code Requirement

The volumetric examinations performed during each inspection interval shall cover 25% of the integrally welded supports and 100% of the pressure retaining welds in at least one pump in each group of pumps performing similar functions.

Licensee Basis for Relief Request

The pumps are cast stainless steel components. Therefore, meaningful ultrasonic or surface examination are not possible. The metal is approximately seven inches or greater in thickness. Therefore, it is not possible to examine by x-ray since a portable unit of sufficient source strength is not currently available.

Since ultrasonic techniques are not possible, and radiographic techniques are not currently available, relief is requested based on surface examinations of the support welds and visual examinations of the casing welds in lieu of the volumetric examination required by the Code.

Evaluation

Because of the pumps' design and materials of construction, it is presently impractical to volumetrically examine the reactor coolant pump casing welds and obtain meaningful results. The licensee is presently committed to perform system leakage tests prior to plant startup following a refueling outage and to monitor system leakage during plant operation. We have determined that the pressure tests and leakage monitoring provide adequate assurance of the pumps casing structural integrity because defects of major significance would result in detectable leakage during the pressure test or plant operation.

Volumetric examination of the supports is also impractical because of the materials and geometry. The licensee has proposed surface examination for the support welds. The staff has determined that inservice flaws at the support-to-pump area would most likely appear at the surface initially and that the proposed surface examination would provide assurance of the support structural integrity. The staff concludes that relief from the volumetric examination requirements may be granted as requested.

B. Class 2 Components

- 1.* Request relief from volumetric examination of feedwater piping welds PBP-201, PBP-205 and PBP-209. (Item C2.1, Examination Category C-G) (Note: These welds are also inspected per the Augmented ISI program for high energy lines outside containment)

Code Requirement

Volumetric examination of 100% of the weld.

Licensee Basis for Relief Request

Feedwater welds 201, 205 and 209 are the welds joining the three feedwater lines to each of their respective containment penetrations. These welds cannot be ultrasonically tested due to their geometric configuration since each of these welds is a fillet weld joining the process line to the containment penetration. The physical construction of this type of weld precludes a meaningful ultrasonic examination due to numerous and interfering reflections obtained during examination. These conflicting reflectors obfuscate the examination results and render them inconclusive. Surface examination is proposed as an alternate examination method.

*Licensee's requested relief Item A.10.

Evaluation

The weld design and geometry prevents a meaningful volumetric examination from being performed. These welds are fillet welds attaching the feedwater piping to containment penetrations and are more susceptible to surface generated flaws because of loading conditions at this location. These welds are also examined at a frequency greater than the Code requires because of augmented inspection requirements. The staff concludes that the proposed surface examination of these welds and the increased frequency of examinations will provide assurance of the structural integrity of these welds. Relief from the volumetric examination may be granted as requested.

- 2.* Request relief from examination of the elbow-to-pipe weld #737-16A.
(Item C2.1, Examination Category C-G)

Code Requirement

All welds at structural discontinuities shall be 100% volumetrically examined during the 40 year period.

Licensee Basis for Requesting Relief

This weld is completely inaccessible due to being encased in the concrete shield wall. Similar welds on either side of this weld are examined in accordance with the Code.

Evaluation

This weld cannot be examined because it is encased in concrete. The licensee has proposed to examine the welds on both sides of the encased weld to the requirements of the Code. The staff finds that the proposed alternative will provide evidence of the general condition of the inaccessible weld and concludes that relief from the examination requirements may be granted.

C.** Ultrasonic Examination of Class 1 & 2 Components

Relief is requested from Article 5 of Section V requiring investigation of all indications which produce a response greater than 20% of the reference level. In lieu of this requirement it is proposed that:

- a. All indications at or above 50% DAC shall be recorded.
- b. All indications 100% DAC or greater shall be recorded and evaluated in accordance with the rules of Section XI.
- c. Indications 20% DAC or greater which are interpreted to be a crack shall be identified and evaluated to the rules of Section XI.

Code Requirement

Ultrasonic examination shall be conducted in accordance with the provision of Appendix I. Where Appendix I is not applicable, the provisions of Article 5 of Section V shall apply.

* Licensee's requested relief Item A.11.

** Licensee's requested relief Item A.12.

Licensee Basis for Relief Request

Evaluation of indications at 20% of the reference level increases the number of indications which have to be evaluated by a very significant amount. To evaluate and record the numerous indications would require examination personnel to stay longer periods of time in radiation areas. The Summer 1978 Addendum to ASME Section XI currently requires recording indications at 50% of DAC. Thus, the proposed alternative is consistent with current industry practice.

Evaluation

Recording and evaluating indications at 25% DAC is impractical for the following reasons:

1. The welded joints in nuclear piping frequently contain Code allowable wall thickness differences (12% of nominal thickness) as well as some weld drop-through, counterbore taper, crown height, etc. These conditions generated an extremely large number of geometric reflectors which produce UT indications greater than 20% DAC.
2. Weld metal in stainless steel piping contains reflectors due to the metallurgical structure which produce a large number of UT indications.
3. All examination personnel experience radiation exposure during inservice examinations. The Section V requirement to record and evaluate UT indications at the 20% DAC places an unnecessary burden on the limited number of experienced and qualified examiners available to the owner.

The staff agrees that the licensee's alternate examination procedure is adequate to ensure detection of cracks warranting evaluation. The staff, therefore, grants relief from the 25% evaluation criteria outlined in the Code.

II. TECHNICAL SPECIFICATIONS

The changes to the Technical Specifications for the inservice inspection portion requested in the licensee's June 24, 1977, Proposed Change No. 60, conform to the sample Technical Specifications enclosed with our letter to the licensee dated April 22, 1976. The revised Technical Specifications require all inservice inspections to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR Part 50, Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to Section 50.55a(g)(6)(i), defined in Part I of this Safety Evaluation. We, therefore, find the changes to the Technical Specifications to be acceptable.

III. SUMMARY

The licensee has submitted information to support his determination that certain requirements of the 1974 Edition through Summer 1975 Addenda of the ASME Section XI Code are impractical to implement at the San Onofre Unit 1 facility. We have evaluated the licensee's bases for his determinations and find that relief from the specific Code requirements may be granted as requested with the exception for relief request I.A.1. Based on our evaluation, we conclude that granting relief from certain requirements is authorized by law, will not endanger life or property or the common defense and security and is otherwise in the public interest considering the burden on the licensee that could result if the requirements were imposed. We conclude that the updated Inservice Inspection Program (excluding pumps and valves) meets the requirements of 10 CFR 50.55a(g) and that the proposed changes to the Technical Specifications are acceptable.

ENVIRONMENTAL CONSIDERATION

We have determined that this amendment and granting of the relief do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment and the relief involve actions which are insignificant from the standpoint of environmental impact, and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these actions.

CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: September 26, 1979