Idaho
National
Engineering
Laboratory

Managed
by the U.S.
Department
of Energy

EGG-ESM-7965
November 1980

# TECHNICAL EVALUATION REPORT

TECHNICAL EVALUATION REPORT ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN: PORTLAND GENERAL ELECTRIC COMPANY, TROJAN NUCLEAR PLANT, DOCKET NUMBER 50-344

B. W. Brown
J. D. Mudlin

EG&G Idaho

Work performed under
DOE Contract
No. DE-AC07-76ID01570

Prepared for the
U.S. NUCLEAR REGULATORY COMMISSION

EGG-ESM-7965

# TECHNICAL EVALUATION REPORT ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN: PORTLAND GENERAL ELECTRIC COMPANY, TROJAN NUCLEAR PLANT, DOCKET NUMBER 50-344

B. W. Brown
J. D. Mudlin

Published November 1990

Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for:

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
under
DOE Contract No. DE-AC07-76ID01570
FIN No. D6022 (Project 5)

## ABSTRACT

This report presents the results of the evaluation of the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection (ISI) Program, through Revision 1, and Plan, Revision 0, submitted September 29, 1989, including the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements that the Licensee has determined to be impractical. The Trojan Nuclear Plant Second 10-Year Interval ISI Program Plan is evaluated in Section 2 of this report for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The requests for relief are evaluated in Section 3 of this report.



This work was funded under:

U.S. Nuclear Regulatory Commission
FIN No. D6022, Project 5
Operating Reactor Licensing Issues Program,
Review of ISI for ASME Code Class 1, 2, and 3 Components

## SUMMARY

The Licensee, Portland General Electric Company, has prepared the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 1, and Plan, Revision 0, to meet the requirements of the 1983 Edition, Summer 1983 Addenda of the ASME Code Section XI except that the extent of examination for Class 1 piping welds has been determined by the 1974 Edition, Summer 1975 Addenda as permitted by 10 CFR 50.55a(b) and the extent of examination for Class 2 piping welds has been determined by the 1986 Edition. The second 10-year interval began May 20, 1986 and ends May 19, 1996.

The information in the Trojan Nuclear Plant Second 10-Year Interval ISI Program, Revision 0, submitted November 14, 1986, was reviewed. Included in the review were the requests for relief from the ASME Code Section XI requirements that the Licensee has determined to be impractical. As a result of this review, a request for additional information was prepared describing the information and/or clarification required from the Licensee in order to complete the review. In a letter dated September 29, 1989, the Licensee submitted Revision 1 of the ISI Program and Revision 0 of the ISI Long-Term Plan. Included in this submittal are responses to the NRC's August 15, 1988 request for additional information, all requests for relief from the Section XI requirements that the Licensee has determined to be impractical for the second 10-year inspection interval, and an upgrade to the 1986 Edition of the ASME Code Section XI for the exemption, selection, and examination criteria for Class 2 piping welds. The Licensee provided additional information in letters dated January 17, 1990 and March 9, 1990.

Based on the review of the Trojan Nuclear Plant Second 10-Year Interval ISI Program, through Revision 1, and Plan, Revision 0, the Licensee's responses to the Nuclear Regulatory Commission's requests for additional information, and the recommendations for granting relief from the ISI examination requirements that have been determined to be impractical, it is concluded that the Trojan Nuclear Plant Second 10-Year Interval ISI Program, Revision 1, and Plan, Revision 0, are acceptable and in compliance with 10 CFR 50.55a(g)(4).

CONTENTS

ABSTRACT ..... ii

SUMMARY ..... iii

1. INTRODUCTION ..... 1

2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN ..... 4

2.1 Documents Evaluated ..... 4

2.2 Compliance with Code Requirements ..... 4

2.2.1 Compliance with Applicable Code Editions ..... 4

2.2.2 Acceptability of the Examination Sample ..... 5

2.2.3 Exclusion Criteria ..... 5

2.2.4 Augmented Examination Commitments ..... 5

2.3 Conclusions ..... 6

3. EVALUATION OF RELIEF REQUESTS ..... 7

3.1 Class 1 Components ..... 7

3.1.1 Reactor Pressure Vessel ..... 7

3.1.1.1 Request for Relief No. RR-A1, Examination Category B-A, Items B1.21 and B1.22, Reactor Pressure Vessel Circumferential and Meridional Head Welds ..... 7

3.1.2 Pressurizer ..... 9

3.1.2.1 Request for Relief No. RR-A4, Examination Category B-H, Item B8.20, Pressurizer Vessel Skirt Weld ..... 9

3.1.3 Heat Exchangers and Steam Generators ..... 12

3.1.3.1 Request for Relief No. RR-A2, Examination Category B-D, Item B3.140, Nozzle Inner Radius Sections on Steam Generators ..... 12

3.1.4 Piping Pressure Boundary (No relief requests)

3.1.5 Pump Pressure Boundary ..... 15

3.1.5.1 Request for Relief No. RR-A5, Examination Categories B-L-1 and B-L-2, Items B12.10 and B12.20, Class 1 Pressure Retaining Welds in Pump Casings and Internal Surfaces of Pump Casings ..... 15

3.1.6 Valve Pressure Boundary (No relief requests)

3.1.7 General (No relief requests)

3.2 Class 2 Components ..... 18

3.2.1 Pressure Vessels ..... 18

3.2.1.1 Request for Relief No. RR-B1, Examination Category C-B, Items C2.21 and C2.22, Class 2 Nozzle-to-Vessel Welds and Nozzle Inside Radius Sections in the RHR Heat Exchangers ..... 18

3.2.2 Piping ..... 21

3.2.2.1 Request for Relief No. RR-B2, Examination Categories C-F-1 and C-F-2, Class 2 Containment Penetration Flued Head Welds ..... 21

3.2.3 Pumps (No relief requests)

3.2.4 Valves (No relief requests)

3.2.5 General (No relief requests)

3.3 Class 3 Components (No relief requests)

3.4 Pressure Tests ..... 23

3.4.1 Class 1 System Pressure Tests ..... 23

3.4.1.1 Request for Relief No. RR-A3, Examination Category B-E, Item B4.13, Visual Examination of Reactor Pressure Vessel Partial Penetration Welds in Instrumentation Nozzles During Hydrostatic Testing ..... 23

3.4.2 Class 2 System Pressure Tests ..... 25

3.4.2.1 Request for Relief No. RR-B3, Hydrostatic Tests of Class 2 Piping That Cannot Be Isolated from Class 1 Piping ..... 25

3.4.2.2 Request for Relief No. RR-B4, Hydrostatic Tests of Class 2 Piping That Cannot Be Isolated from Class 1 Piping ..... 28

3.4.3 Class 3 System Pressure Tests (No relief requests)

3.4.4 General ..... 31

3.4.4.1 Request for Relief No. RR-B5, Scheduling of Class 2 and Class 3 Hydrostatic Tests ..... 31

3.5 General (No relief requests)

4. CONCLUSION ..... 33

5. REFERENCES ..... 35

TECHNICAL EVALUATION REPORT ON THE
SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN:
PORTLAND GENERAL ELECTRIC COMPANY,
TROJAN NUCLEAR PLANT,
DOCKET NUMBER 50-344

## 1. INTRODUCTION

Throughout the service life of a water-cooled nuclear power facility, 10 CFR 50.55a(g)(4) (Reference 1) requires that components (including supports) that are classified as American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, Class 2, and Class 3 meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," (Reference 2) to the extent practical within the limitations of design, geometry, and materials of construction of the components. This section of the regulations also requires that inservice examinations of components and system pressure tests conducted during successive 120-month inspection intervals shall comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein. The components (including supports) may meet requirements set forth in subsequent editions and addenda of this Code which are incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein. The Licensee, Portland General Electric Company, has prepared the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 1, and Plan, Revision 0, to meet the requirements of the 1983 Edition, Summer 1983 Addenda of the ASME Code Section XI except that the extent of examination for Class 1 piping welds has been determined by the 1974 Edition, Summer 1975 Addenda as permitted by 10 CFR 50.55a(b) and the extent of examination for Class 2 piping welds has been determined by the 1986 Edition. The second 10-year interval began May 20, 1986 and ends May 19, 1996.

As required by 10 CFR 50.55a(g)(5), if the licensee determines that certain Code examination requirements are impractical and requests relief from them, the licensee shall submit information and justifications to the Nuclear Regulatory Commission (NRC) to support that determination. Pursuant to 10 CFR 50.55a(g)(6), the NRC will evaluate the licensee's determinations that Code requirements are impractical; alternatively, pursuant to 10 CFR 50.55a(a)(3), the licensee must demonstrate that either (i) the proposed alternatives would provide an acceptable level of quality and safety or that (ii) code compliance would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety. The NRC may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The information in the Trojan Nuclear Plant Second 10-Year Interval ISI Program, Revision 0 (Reference 3), submitted November 14, 1986, was reviewed, including the requests for relief from the ASME Code Section XI requirements that the Licensee has determined to be impractical. The review of the ISI Program Plan was performed using the Standard Review Plans of NUREG-0800 (Reference 4), Section 5.2.4, "Reactor Coolant Boundary Inservice Inspections and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components."

In a letter dated August 15, 1988 (Reference 5), the NRC requested additional information that was required in order to complete the review of the ISI Program. The Licensee's October 7, 1988 submittal (Reference 6) provided a partial response to the NRC request for additional information. In this submittal, the Licensee stated that an extensive revision to the ISI Program had been initiated. The responses to the NRC's requests referred extensively to the information in the proposed revision. The Licensee stated that submittal of the revision to the NRC was scheduled for November 30, 1988. In letters dated November 30, 1988 (Reference 7), January 31, 1989 (Reference 8), and August 25, 1989 (Reference 9), the Licensee delayed the revised ISI Program. In a letter dated

September 29, 1989 (Reference 10), the Licensee submitted Revision 1 of the ISI Program and Revision 0 of the ISI Long-Term Plan. Included in this submittal were responses to the NRC's August 15, 1988 request for additional information, all requests for relief from the Section XI requirements that the Licensee has determined to be impractical for the second 10-year inspection interval, and an upgrade to the 1986 Edition of the ASME Code Section XI for the exemption, selection, and examination criteria for Class 2 piping welds. The Licensee provided additional information in a submittal dated January 17, 1990 (Reference 11).

The NRC requested additional information needed to complete the review by letter dated January 30, 1990 (Reference 12). The Licensee provided responses to the request for additional information in a letter dated March 9, 1990 (Reference 13).

The Trojan Nuclear Plant Second 10-Year Interval ISI Program and Plan are evaluated in Section 2 of this report for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during the NRC's previous reviews.

The requests for relief are evaluated in Section 3 of this report. Unless otherwise stated, references to the Code refer to the ASME Code, Section XI, 1983 Edition, Summer 1983 Addenda. Specific inservice test (IST) programs for pumps and valves are being evaluated in other reports.

## 2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN

This evaluation consisted of a review of the applicable program documents to determine whether or not they are in compliance with the Code requirements and any license conditions pertinent to ISI activities. This section describes the submittals reviewed and the results of the review.

### 2.1 Documents Evaluated

Review has been completed on the following information provided by the Licensee:

(a) Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Program, Revision 0, submitted November 14, 1986.

(b) Letter, dated October 7, 1988, partial response to the NRC request for additional information.

(c) Letter, dated September 29, 1989, final response to the NRC's August 15, 1988 request for additional information and submittal of Revision 1 of ISI Program and Revision 0 of ISI Plan.

(d) Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Program, Revision 1, submitted September 29, 1989.

(e) Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Plan, Revision 0, submitted September 29, 1989.

(f) Letter, dated January 17, 1990, providing additional information in response to a telephone conference call.

(g) Letter, dated March 9, 1990, response to the NRC request for additional information needed to complete the review.

### 2.2 Compliance with Code Requirements

#### 2.2.1 Compliance with Applicable Code Editions

The Inservice Inspection Program Plan shall be based on the Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). Based on the starting date of May 20, 1986 for the second 10-year interval, the Code applicable to the second 10-year inspection

interval ISI program is the 1983 Edition, Summer 1983 Addenda. As stated in Section 1 of this report, the Licensee has written the Trojan Nuclear Plant Second 10-Year Interval ISI Program, Revision 1, and Plan, Revision 0, to meet the requirements of the 1983 Edition, Summer 1983 Addenda of the ASME Code Section XI except that the extent of examination for Class 1 piping welds has been determined by the 1974 Edition, Summer 1975 Addenda as permitted by 10 CFR 50.55a(b) and the extent of examination for Class 2 piping welds has been determined by the 1986 Edition. The 1986 Edition is referenced in 10 CFR 50.55a(b) and, in accordance with 10 CFR 50.55a(g)(4)(iv), may be used.

2.2.2 Acceptability of the Examination Sample

Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). Sample size and weld selection have been implemented in accordance with the Code and appear to be correct.

2.2.3 Exclusion Criteria

The criteria used to exclude components from examination shall be consistent with Paragraphs IWB-1220, IWC-1220, IWC-1230, IWD-1220, and 10 CFR 50.55a(b). The exclusion criteria have been applied by the Licensee in accordance with the Code as discussed in the ISI Program and appear to be correct.

2.2.4 Augmented Examination Commitments

The following items in the ISI Program have been added as augmented requirements or are required by Trojan Technical Specifications in addition to the requirements specified in ASME Code Section XI:

(a) Reactor pressure vessel examinations will be performed in accordance with NRC Regulatory Guide 1.150, "Ultrasonic Testing

of Reactor Vessel Welds During Preservice and Inservice Examinations," Revision 2 (Reference 14).

(b) The reactor coolant pump motor flywheels are to be examined in accordance with the requirements of NRC Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," (Reference 15). Flywheels will be ultrasonically examined in place, using the access provided by the gauge holes through the flywheels. Surface examinations will not be performed as accessible surfaces of the flywheels are painted.

(c) Steam generator tubes are to be examined by eddy current in accordance with the requirements of Technical Specification 4.4.5, per Section XI, Paragraph IWB-2413.

(d) Inservice inspection will be conducted to the extent practical on each of the Class 2 main steam welds located between the containment penetration and the second main steam valve located in the main steam support structure.

(e) A 7.5% sample of Class 2 containment spray system piping welds is scheduled for surface and volumetric examinations.

## 2.3 Conclusions

Based on the review of the documents listed above, it is concluded that the Trojan Nuclear Plant Second 10-Year Interval ISI Program, Revision 1, and Plan, Revision 0, are acceptable and in compliance with 10 CFR 50.55a(g)(4).

## 3. EVALUATION OF RELIEF REQUESTS

The requests for relief from the ASME Code requirements that the Licensee has determined to be impractical for the second 10-year inspection interval are evaluated in the following sections.

### 3.1 Class 1 Components

#### 3.1.1 Reactor Pressure Vessel

##### 3.1.1.1 Request for Relief No. RR-A1, Examination Category B-A, Items B1.21 and B1.22, Reactor Pressure Vessel Circumferential and Meridional Head Welds

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-A, Items B1.21 and B1.22 require a 100% volumetric examination of the accessible length of one circumferential and one meridional weld, respectively, of the reactor pressure vessel (RPV) head as defined by Figure IWB-2500-3.

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric examination of one meridional closure head weld and one circumferential closure head weld.

Licensee's Proposed Alternative Examination: None. The Licensee states that the area will be subject to VT-2 visual examination for evidence of leakage during the performance of the system pressure test performed after each refueling outage.

Licensee's Basis for Requesting Relief: The Licensee states that the closure head peel segment (meridional) to disc (circumferential) weld is completely enclosed within the pattern of CRDM penetrations inside the shroud structure. The Licensee further states that it is physically impossible to access the required examination volume or to obtain a creditable volumetric examination.

Evaluation: The sketch provided in the relief request shows that the RPV circumferential closure head weld is completely enclosed within the CRDM penetrations inside the shroud structure and completely inaccessible for volumetric examination. The sketch also shows that the RPV meridional closure head welds are partially enclosed within the CRDM penetrations inside the shroud structure and partially inaccessible for volumetric examination. The reactor vessel design, therefore, makes the Code-required volumetric examinations of the RPV circumferential closure head weld and portions of the RPV meridional closure head welds impractical to perform. Removal of the obstructions for the sole purpose of inspection is a major effort (installation of inspection platform, installation of staging for CRDM removal, CRDM removal and replacement, head shield and ventilation shroud removal and replacement, weld preparation and inspection, etc.) and would result in personnel receiving excessive radiation exposure. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

The Licensee has stated that the area will be subject to VT-2 visual examination for evidence of leakage during the performance of the system pressure test performed after each refueling outage. However, since the RPV meridional closure head welds are partially accessible for examination, volumetric examination of the accessible portions of all of the meridional closure head welds should be performed in lieu of the Code requirement for examination of the circumferential and meridional closure head welds. This examination will provide adequate assurance that unallowable inservice flaws have not developed or that they will be detected and removed or repaired prior to the return of the reactor vessel to service.

Conclusions: The volumetric examination of the RPV circumferential closure head weld and portions of the RPV

meridional closure head welds is impractical to perform to the extent required by Section XI of the ASME Code because the RPV circumferential closure head weld is completely enclosed within the CRDM penetrations inside the shroud structure and the RPV meridional closure head welds are partially enclosed within the CRDM penetrations inside the shroud structure. Imposition of the specific Code requirement on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in public health and safety. However, since the RPV meridional closure head welds are partially accessible for examination, volumetric examination of the accessible portions of all of the meridional closure head welds should be performed. This limited volumetric examination will provide reasonable assurance that the structural integrity of the reactor vessel closure head is maintained. Therefore, it is concluded that public health and safety will not be endangered by allowing a partial volumetric examination to be performed in lieu of the Code requirement. It is recommended that relief be granted provided that the accessible portions of all of the RPV meridional closure head welds are volumetrically examined.

3.1.2 Pressurizer

3.1.2.1 Request for Relief No. RR-A4, Examination Category B-H, Item B8.20, Pressurizer Vessel Skirt Weld

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-H, Item B8.20 requires a 100% volumetric or surface examination, as applicable, of pressurizer integrally welded attachments as defined by Figures IWB-2500-13, -14, and -15.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume and surface of the pressurizer vessel skirt weld.

Licensee's Proposed Alternative Examination: A surface examination supplemented by a best effort ultrasonic examination will be performed from the outer face (area A-B) of the pressurizer integrally welded skirt attachment each inspection interval.

Licensee's Basis for Requesting Relief: The Licensee states that neither method can be performed to fully satisfy Code requirements. The pressurizer skirt weld is designed such that it prohibits sufficient access to areas identified as "C-D" for surface examination and limits ultrasonic techniques to only a portion of the examination area.

The skirt attachment weld is completely concealed by a pattern of electric heater cable penetrations inside the pressurizer support structure, and blanketed with insulation. The geometric configuration of the support attachment and the restricted accessibility are such that only a very limited examination of the base material can be obtained. It is likely that a postulated failure of an attachment weld of this configuration would be in the area identified as A-B, and it is unlikely to affect the integrity of the pressure retaining boundary of the vessel. The radiation levels at examination area C-D are estimated to be between 4 and 5 R/hr.

Trojan's position on ALARA and the configuration of the weld area make full coverage ultrasonic and surface examination impractical.

Evaluation: As shown in the sketch attached to the Licensee's relief request, the weld configuration is such that a full volumetric examination cannot be performed from the outside surface of the pressurizer skirt. Due to the presence of heater cable penetrations inside the pressurizer support structure, sufficient access is not provided for surface and volumetric examinations of the weld from inside the support

structure. Based on the design of the pressurizer support skirt attachment, the surface and volumetric examinations of the subject weld are impractical to perform to the extent required by the Code. To perform these examinations from the inside of the pressurizer support structure, the heater cable penetrations would have to be removed and replaced and personnel would receive excessive radiation exposure. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

Because the Code requires either a surface or a volumetric examination and the Licensee will be performing the limited surface examination supplemented by a best effort ultrasonic examination from the outer surface of the weld, the proposed alternative examination will provide assurance that unallowable inservice flaws have not developed in the pressurizer support skirt weld or that they will be detected and dispositioned appropriately.

Conclusions: The surface and volumetric examinations of the pressurizer support skirt weld are impractical to perform at Trojan to the extent required by Section XI of the ASME Code because of the weld configuration and the presence of heater cable penetrations inside the pressurizer support structure. Imposition of the requirement on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed alternative. The proposed alternative examination will provide assurance of the continued inservice structural integrity. Therefore, it is concluded that public health and safety will not be endangered by allowing the alternative examination to be performed in lieu of the Code requirement. It is recommended that relief be granted as requested.

### 3.1.3 Heat Exchangers and Steam Generators

#### 3.1.3.1 Request for Relief No. RR-A2, Examination Category B-D, Item B3.140, Nozzle Inner Radius Sections on Steam Generators

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.140 requires a 100% volumetric examination of the nozzle inner radius sections on steam generators as defined by Figures IWB-2500-7(a) through (d).

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric examination of the nozzle inner radius sections on primary inlet and outlet nozzles on the steam generators (E-201A, B, C, D).

Licensee's Proposed Alternative Examination: The Licensee states that Trojan will investigate nozzle inside radius section examination techniques in an effort to implement an examination technique providing meaningful results. Until that time, the nozzle inside radius section will be visually examined from the manway opening using manual or remote techniques each time steam generator ISI tube examinations are performed.

Licensee's Basis for Requesting Relief: There are four steam generators of the vertical shell and U-tube evaporator type at the Trojan Nuclear Plant. The portions of each steam generator which contain reactor coolant pressure are Class 1, and the portions which contain the steam generating system are Class 2.

The Class 1 portion of each steam generator consists of the hemispherical bottom head with inlet and outlet nozzles, a vertical partition plate for dividing the inlet and outlet chambers, a tube sheet, and inverted U-tubes. Manways are provided in the bottom hemispherical head for access to both sides of the partitioned head.

The bottom head is cast with the nozzles that are of the integrally cast type; therefore, there are no nozzle-to-head welds. The reactor coolant inlet and outlet nozzles are tapered with an inside radius section.

A meaningful examination of the inside radius section of the complex configuration, heavy wall, integrally cast steam generator nozzle is considered impractical. The status of industry examinations performed to date do not reinforce a positive position for presently available examination techniques. Where a "best effort" examination might be considered, it is inappropriate to apply nozzle inside radius examination techniques which have not been proven effective in detecting defects of the required examination volume. Surface examination of the inside radius section is considered physically impractical based on general radiation levels (at 18 inches) of 15 to 30 R/hr, gamma plus beta, and the cladding on the inside radius section.

Evaluation: The steam generator nozzle sections at Trojan were not designed for external examination of the inside radius using ultrasonic methods. The component geometry and the as-cast surface of the steam generator heads, along with the excessively long test metal distance that results in high ultrasonic attenuation, preclude the volumetric examination of the nozzle inside radius section from being performed from the external surface. The steam generator nozzle design, therefore, makes the Code-required examination impractical to perform. In order to examine the nozzle inside radius sections in accordance with the requirements, the steam generator nozzles, and thus the steam generators, would have to be redesigned, fabricated, and installed. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement. Surface examination is not practical to perform because of the rough surface of the as-welded cladding and because inspection personnel would receive excessive radiation exposure.

Portland General Electric Company's proposed alternative is to perform a visual examination of the nozzle inside radius sections from the manway opening using manual or remote techniques each time steam generator ISI tube examinations are performed. This examination will provide reasonable assurance that the steam generator nozzle inner radius sections have not developed unallowable inservice flaws or that unallowable inservice flaws will be detected and removed or repaired prior to the return of the steam generators to service.

Conclusions: The volumetric examination required by Section XI of the ASME Code for the nozzle inside radius sections in the steam generators is impractical to perform at Trojan because of the component geometry and the as-cast surface of the steam generator heads, along with the excessively long test metal distance that results in high ultrasonic attenuation. Imposition of the requirements on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed alternative. The proposed alternative examination will provide assurance that structural integrity of the steam generator nozzles is maintained. Therefore, it is concluded that public health and safety will not be endangered by allowing the alternative examination to be performed in lieu of the Code requirement. It is recommended that relief be granted as requested.

3.1.4 Piping Pressure Boundary (No relief requests)

3.1.5 Pump Pressure Boundary

3.1.5.1 Request for Relief No. RR-A5, Examination Categories B-L-1 and B-L-2, Items B12.10 and B12.20, Class 1 Pressure Retaining Welds in Pump Casings and Internal Surfaces of Pump Casings

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-L-1, Item B12.10 requires a 100% volumetric examination of the Class 1 pressure retaining welds in pump casings as defined by Figure IWB-2500-16. Examination Category B-L-2, Item B12.20 requires a 100% VT-3 visual examination of the internal surfaces of Class 1 pump casings. The examinations are limited to welds in at least one pump in each group of pumps performing similar functions in the system. The visual examination of the internal surfaces may be performed on the same pump selected for volumetric examination of the welds.

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric examination of the pump casing weld and the VT-3 visual examination of the internal surfaces of the pump casing of the reactor coolant pumps (P-201A, B, C, D).

Licensee's Proposed Alternative Examination: The Licensee states that the examinations will be performed when pump disassembly is required for maintenance. However, a surface examination of the pump casing weld outside diameter will be performed as a minimum at the end of the inspection interval should disassembly of a pump extend beyond this interval. The Licensee further states that delay of the required examinations will not affect Plant operation or safety.

Licensee's Basis for Requesting Relief: The Licensee states that this Code examination requirement necessitates the disassembly of the reactor coolant pump to satisfy visual and

volumetric examination requirements. Based on review of results from a number of pump casing examinations, no potentially degrading service-induced flaws have been found. The inappropriate balance of possible flaw detection and enormous impact on expenditures of Plant manpower does not justify a pump disassembly solely for examination purposes. Also, the potential for substantial expenditures of man-rem, in the order of 150 to 200 man-rem, are considered impractical and not in keeping with ALARA. The design and construction of the pump casings minimize any potential for failure in the areas which require inspection by the Code. In addition, the pumps are routinely monitored for vibration, bearing temperature, seal flow, and seal flow temperatures by the Plant Preventative Maintenance Program. The reactor coolant system (RCS) is monitored continuously for leakage during operation. A visual inspection is performed prior to startup after refueling.

Evaluation: The examination requirement for internal surfaces of pumps necessitates complete disassembly of the pump. The disassembly of the reactor coolant pumps for the sole purpose of visual examination of the casing internal surfaces and volumetric examination of the pump casing weld is a major effort and requires many manhours from skilled maintenance and inspection personnel. In order to examine the internal surfaces and casing weld of a reactor coolant pump in accordance with the requirements, complete disassembly of the pump would be required which, in addition to the possibility of damage to the pump, would result in personnel receiving excessive radiation exposure. Therefore, the Code requirement is impractical. The visual examination is performed to determine if unanticipated severe degradation of the casing is occurring due to phenomena such as erosion, corrosion, or cracking. However, previous experience during examination of similar pumps at other plants has not shown any significant degradation of pump casings. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

Portland General Electric Company's proposed alternative is as follows: (a) VT-3 visual examination of the internal surfaces of the pumps will be performed whenever the internal surfaces are made accessible due to disassembly for maintenance, (b) Code-required volumetric examination of the pump casing weld will be performed whenever the weld is exposed due to disassembly of the pump, and (c) surface examination of a pump casing weld outside diameter will be performed as a minimum at the end of the inspection interval should the pump not be disassembled during this interval.

Later editions and addenda of the ASME Code (1988 Addenda) have eliminated disassembly of pumps for the sole purpose of performing examinations of the internal surfaces and state that the internal surface visual examination requirement is only applicable to pumps that are disassembled for reasons such as maintenance, repair, or volumetric examination. Therefore, the concept of visual examination of the internal surfaces of the pump casing, if the pump is disassembled for maintenance, is acceptable. Since no major problems have been reported in the industry with regard to pump casings, the Licensee's proposal will provide adequate assurance of the continued inservice structural integrity.

ASME Code Case N-481 states alternatives to the volumetric examination requirement for cast austenitic pump casings. It appears that the code case will be approved in Revision 9 of NRC Regulatory Guide 1.147, pending final review and evaluation by the NRC staff, for generic use with the stipulation that surface examination of the pump casing weld outside diameter be performed if the pump has not been disassembled during the interval. Since the Licensee's proposed alternative examination includes surface examination of the pump casing weld outside diameter at the end of the inspection interval should the pump not be disassembled during this interval, the supplemental requirement will be met. However, in addition to

the Licensee's commitments, any other requirements listed in Code Case N-481 should also be met and, if the pumps have not been disassembled, the Licensee should report this fact in the ISI Summary Report at the end of the interval.

Conclusions: The disassembly of a pump for the sole purpose of inspections required by Section XI of the ASME Code is impractical to perform at Trojan because this activity, in addition to the possibility of damage to the pump, would result in personnel receiving excessive radiation exposure. Imposition of the requirements on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed examination. Therefore, it is concluded that public health and safety will not be endangered by allowing the proposed examination to be performed in lieu of the Code requirement. It is recommended that relief be granted provided that the requirements listed in ASME Code Case N-481 are also met and, if the pump has not been disassembled, this fact should be reported by the Licensee in the ISI Summary Report at the end of the interval.

3.1.6 Valve Pressure Boundary (No relief requests)

3.1.7 General (No relief requests)

3.2 Class 2 Components

3.2.1 Pressure Vessels

3.2.1.1 Request for Relief No. RR-B1, Examination Category C-B, Items C2.21 and C2.22, Class 2 Nozzle-to-Vessel Welds and Nozzle Inside Radius Sections in the RHR Heat Exchangers

Code Requirement: Section XI, Table IWC-2500-1, Examination Category C-B, Item C2.21 requires both 100% volumetric and

surface examinations of the nozzle-to-shell (or head) welds in nozzles without reinforcing plate in Class 2 vessels greater than 1/2-inch nominal wall thickness as defined by Figure IWC-2500-4(a) or (b). Item C2.22 requires a 100% volumetric examination of the nozzle inside radius sections in nozzles without a reinforcing plate in Class 2 vessels greater than 1/2-inch nominal wall thickness as defined by Figure IWC-2500-4(a) or (b).

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume of the two RHR heat exchanger nozzle-to-vessel welds and nozzle inside radius sections.

Licensee's Proposed Alternative Examination: None. The Licensee states that the subject welds will receive a volumetric examination on the accessible portions and the 100% Code-required surface examination. A volumetric examination of the inside radius section will be performed to the maximum extent possible.

Licensee's Basis for Requesting Relief: The Licensee states that access for ultrasonic examination of the nozzle-to-vessel weld and inside radius is limited to approximately 75% of the total required volume by adjacent vessel supports and the tubesheet flange.

Evaluation: The drawings provided with the relief request show that the Code-required volume of the RHR heat exchanger nozzle-to-vessel welds and nozzle inside radius sections is partially inaccessible for examination due to adjacent vessel supports and the tubesheet flange. The RHR heat exchanger design, therefore, makes the volumetric examination of the nozzle-to-vessel welds and nozzle inside radius sections impractical to perform to the extent required by the Code. The heat exchangers would require redesign in order to complete the

Code-required examinations. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

Portland General Electric Company has stated that a significant percentage (approximately 75%) of the Code-required volume can be examined. The Licensee's proposed examination is to perform the Code-required surface examination and the volumetric examination of the accessible portions of the nozzle-to-vessel welds and the volumetric examination of the nozzle inside radius sections to the maximum extent practical. The limited volumetric examination and Code-required surface examination of the nozzle-to-vessel welds and the limited volumetric examination of the nozzle inside radius sections will provide assurance that unallowable inservice flaws have not developed in the nozzle-to-vessel welds and nozzle inside radius sections or that they will be detected and dispositioned appropriately prior to the return of the RHR heat exchangers to service.

Conclusions: The volumetric examination of the RHR heat exchanger nozzle-to-vessel welds and nozzle inside radius sections is impractical to perform at Trojan to the extent required by Section XI of the ASME Code because of the close proximity of adjacent vessel supports and the tubesheet flange. Imposition of the requirements on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed examination. The proposed examination will provide assurance that structural integrity of the RHR heat exchanger is maintained. Therefore, it is concluded that public health and safety will not be endangered by allowing the limited volumetric examination to be performed in lieu of the Code requirement. It is recommended that relief be granted as requested.

## 3.2.2 Piping

### 3.2.2.1 Request for Relief No. RR-B2, Examination Categories C-F-1 and C-F-2, Class 2 Containment Penetration Flued Head Welds

Code Requirement: Section XI, Table IWC-2500-1, Examination Categories C-F-1 and C-F-2 require both 100% volumetric and surface examinations of Class 2 circumferential piping welds as defined by Figure IWC-2500-7.

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric and surface examinations of containment penetration flued head welds located inside penetrations P-11, P-44, P-45, P-46, P-47, P-63, P-70 (C-F-1), P-28, P-29, P-30, P-31, P-32, P-33, P-34, and P-35 (C-F-2).

Licensee's Proposed Alternative Examination: None.

Licensee's Basis for Requesting Relief: The Licensee states that, due to the design of the containment penetration assemblies, the pressure retaining pipe weld installed in the penetration guard piping is inaccessible for examination.

Evaluation: The sketch provided with the relief request shows that the subject welds are inside the containment penetrations and are inaccessible for examination. The containment penetration assembly design, therefore, makes the Code-required volumetric and surface examinations impractical to perform. The containment penetration assemblies would require redesign and refabrication in order to complete the Code-required examinations. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

However, in order to provide reasonable assurance of the continued inservice structural integrity, the first weld outside containment should receive the volumetric and surface examinations (thus, maintaining sample size) and, although these containment penetration welds cannot be viewed directly, a visual examination for evidence of leakage should be conducted in the vicinity of these welds when the hydrostatic pressure tests are performed.

Conclusions: The volumetric and surface examinations required by Section XI of the ASME Code for the subject welds are impractical to perform at Trojan because the welds are located inside containment penetrations. Imposition of the requirements on Portland General Electric Company would cause a burden that would not be compensated by an increase in public health and safety. In order to provide a reasonable assurance that structural integrity of the piping is maintained, it is recommended that relief be granted provided that (a) the first weld outside containment receives volumetric and surface examinations, and (b) a visual examination for evidence of leakage is conducted in the vicinity of these welds when the hydrostatic pressure tests are performed.

3.2.3 Pumps (No relief requests)

3.2.4 Valves (No relief requests)

3.2.5 General (No relief requests)

3.3 Class 3 Components (No relief requests)

## 3.4 Pressure Tests

### 3.4.1 Class 1 System Pressure Tests

#### 3.4.1.1 Request for Relief No. RR-A3, Examination Category B-E, Item B4.13, Visual Examination of Reactor Pressure Vessel Partial Penetration Welds in Instrumentation Nozzles During Hydrostatic Testing

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-E, Item B4.13 requires a 100% VT-2 visual examination of the external surfaces of 25% of the partial penetration welds in Class 1 vessel instrumentation nozzles for evidence of leakage during conduct of the system hydrostatic pressure test.

Licensee's Code Relief Request: Relief is requested from performing the Code-required VT-2 visual examination of the reactor pressure vessel inner and outer seal monitoring tube penetrations.

Licensee's Proposed Alternative Examination: None. The Licensee states that, although direct visual examination is impractical, area examinations are performed under the vessel during each system pressure test.

Licensee's Basis for Requesting Relief: The RPV closure head is sealed to the vessel by two O-rings. The vessel flange has two penetrations for closure head seal leakage monitoring. The inner monitoring tube detects leakage across the outer O-ring seal. Each of these 1-inch nominal pipe size tubes is connected by a partial penetration weld on the vessel flange gasket seal surface, which is weld overlaid with 5/32-inch-thick stainless steel. These welds are outside the pressure boundary for normal operation and will only be pressurized if the closure seals leak.

Volumetric (ultrasonic), surface, or visual examination of the welds cannot be performed due to geometric configuration and inaccessibility. Hydrostatic pressure testing of the welds is not feasible due to their location outside of the pressure retaining O-ring seals on the vessel flange. These welds will only be pressurized in the event of the loss of integrity of the seals. Failure of both the O-ring seals and the tube welds is considered unlikely. Loss of coolant due to complete severance of a monitoring tube can be made up by normal charging methods.

Evaluation: As shown in the drawing attached to the Licensee's relief request, the design of these monitoring tubes is such that the subject welds are inaccessible for the Code-required VT-2 visual examination during the hydrostatic test. Extensive modifications would be required in order to meet the Code requirement. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement. Although the external surfaces of these welds are inaccessible for direct VT-2 visual examination, leakage can be detected by examination of the surrounding area, including floor areas or equipment surfaces located underneath the vessel, for evidence of leakage during the system pressure tests. Therefore, reasonable assurance of the continued inservice structural integrity is provided and public safety is not jeopardized.

Conclusions: The VT-2 visual examination required by Section XI of the ASME Code for the subject welds is impractical to perform because the welds are inaccessible. Imposition of the requirement on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed examination. The proposed examination will provide reasonable assurance that structural integrity of the monitoring tubes is maintained. Therefore, it is concluded

that public health and safety will not be endangered by allowing the proposed examination to be performed in lieu of the Code requirement. It is recommended that relief be granted as requested.

### 3.4.2 Class 2 System Pressure Tests

#### 3.4.2.1 Request for Relief No. RR-B3, Hydrostatic Tests of Class 2 Piping That Cannot Be Isolated from Class 1 Piping

Code Requirement: Section XI, Table IWC-2500-1, Examination Category C-H, Item C7.40 requires that a VT-2 visual examination be performed during a hydrostatic test in accordance with paragraph IWC-5222. Paragraph IWC-5222(a) requires that the system hydrostatic test pressure shall be at least 1.10 times the system pressure for systems with Design Temperature of 200°F or less, and at least 1.25 times the system pressure for systems with Design Temperature above 200°F. The system pressure shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested. For systems (or portions of systems) not provided with safety or relief valves, the system design pressure shall be substituted for the system pressure.

Licensee's Code Relief Request: Relief is requested from the hydrostatic testing requirements of IWC-5222(a) for the following Class 2 piping that cannot be isolated from Class 1 piping:

(1) Reactor Coolant System

(a) Reactor coolant loop flow meter elbow taps for flow transmitters FT-414, -415, -416, -424, -425, -426, -434, -435, -436, -444, -445, and -446.
(b) Reactor coolant loop resistance temperature detector (RTD) system vent and drain lines (3/4-inch RC-2501R-17).

(c) RTD system return instrument lines for Flow Indicator Switches FIS-417, -427, -437, and -447.
(d) Reactor coolant loop sampling lines from Loop 1 to manually operated Globe Valve SS648 and from Loop 3 to manually operated Globe Valve SS649 (3/4-inch RC-2501R-30 and CCB-2).
(e) Reactor vessel inner and outer seal monitoring tube piping to manually operated Globe Valves 8069A and 8069B (3/4-inch RC-2501R-15).
(f) Pressurizer spray control valve bypass lines (3/4-inch RC-2501R-4).
(g) Pressurizer instrument lines for Level Transmitters LT-459, -460, -461, and -462 and Pressure Transmitters PT-455, -456, -457, -458, -467A, and -467B.
(h) Pressurizer steam sampling line from the pressurizer power-operated relief valve piping to manually operated Globe Valves 8078 and 8094 (3/4-inch RC-2501R-29).
(i) Pressurizer liquid sampling line from the pressurizer to manually operated Globe Valve 8080 (3/4-inch RC-2501R-29).
(j) Pressurizer safety valve seal water drain lines to manually operated Globe Valve 8093 (3/4-inch RC-2501R-29).

(2) Chemical and Volume Control

(a) Reactor coolant pump (RCP) seal bypass lines from Flow Orifices FO-1957, -1958, -1959, and -1960 to air-operated Globe Valve CV-8142 (3/4-inch CS-2501R-28).
(b) RCP seal leakoff lines from the RCP to air-operated Globe Valves CV-8141A, B, C, and D (2-inch CS-2501R-28).
(c) RCP seal injection and seal bypass vent and drain lines from the Class 1 piping to manually operated Globe Valves 8363A, B, C, and D and 8364A, B, C, and D.
(d) 3-inch CS-2501R-5 between 8378B and CV-8146.
(e) 3-inch CS-2501R-4 between 8393 and 3-inch CS-2501R-5.
(f) 3-inch CS-2501R-6 between 8379B and CV-8147.
(g) 2-inch CS-2501R-28 between 8352A, B, C, D and 8350A, B, C, D.

(3) Residual Heat Removal System

RHR instrument sensing lines for Pressure Transmitters PT-403 and -405.

(4) Safety Injection System

(a) Accumulator discharge test line connections (3/4-inch SI-2501R-22) from the Class 1 piping to air-operated Globe Valves CV-8877A, B, C, and D and CV-8879A, B, C, and D.

(b) Boron Injection Tank T-207 discharge to the RCS cold-legs test line connections (1-inch SI-2501R-23) from the Class 1 piping to air-operated globe valve CV-8882.

(c) SIS pumps P-203A and P-203B discharge to the RCS loops hot-legs test line connection (3/4-inch SI-2501R-22) from the Class 1 piping to air-operated Globe Valves CV-8889A, B, C, and D.

Licensee's Proposed Alternative Examination: The Licensee states that visual examination for evidence of leakage will be conducted on the identified portions of these systems at hydrostatic test pressures in accordance with the requirements of IWB-5222 for the adjoining Class 1 systems.

Licensee's Basis for Requesting Relief: The Licensee states that the subject Class 2 piping cannot be isolated from Class 1 piping. The subject lines are Class 2 penetrations into a Class 1 pressure boundary without an isolation valve or other means for isolating the Class 2 system from the Class 1 system for hydrostatic testing.

Evaluation: As shown in the drawings provided in the Licensee's January 17, 1990 submittal, the design of the subject systems does not permit pressurizing the subject portions of Class 2 piping without overpressurizing the adjacent Class 1 piping. The system design, therefore, makes the Code-required hydrostatic test impractical to perform. Extensive modifications to these systems would be required in order to meet the Code requirement. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

Although the proposed alternative test pressure (Class 1 hydrostatic test pressure) is lower than the Code-required Class 2 hydrostatic test pressure, the alternative test pressure is greater than the operating pressure of the subject piping. Therefore, the proposed alternative test will provide reasonable assurance of the continued inservice structural integrity.

Conclusions: The hydrostatic test required by Section XI of the ASME Code for the subject Class 2 piping is impractical to perform at Trojan because the subject Class 2 piping cannot be isolated from the adjacent Class 1 piping. Imposition of the requirements on Portland General Electric Company would cause a burden that would not be compensated significantly by an increase in safety above that provided by the proposed alternative, which will provide assurance that structural integrity of the subject piping is maintained. Therefore, it is concluded that public health and safety will not be endangered by allowing the alternative test to be performed in lieu of the Code requirements. It is recommended that relief be granted as requested.

3.4.2.2 Request for Relief No. RR-B4, Hydrostatic Tests of Class 2 Piping That Cannot Be Isolated from Class 1 Piping

Code Requirement: Section XI, Table IWC-2500-1, Examination Category C-H, Item C7.40 requires a VT-2 visual examination performed during a hydrostatic test in accordance with paragraph IWC-5222. Paragraph IWC-5222(a) requires that the system hydrostatic test pressure shall be at least 1.10 times the system pressure for systems with Design Temperature of 200°F or less, and at least 1.25 times the system pressure for systems with Design Temperature above 200°F. The system pressure shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested. For systems (or portions of systems) not provided with safety or relief valves, the system design pressure shall be substituted for the system pressure.

Licensee's Code Relief Request: Relief is requested from the hydrostatic testing requirements of IWC-5222(a) for the following Class 2 piping that cannot be isolated from Class 1 piping:

(1) Chemical and Volume Control System

(a) Normal charging line and bypass line (3-inch CS-2501R-5 and 3/4-inch CS-2501R-4) from air-operated Globe Valve CV-8146 and manually operated Globe Valve CV-8392 to Check Valve 8378B.
(b) Alternate charging line (3-inch CS-2501R-6) from air-operated Globe Valve CV-8147 to Check Valve 8379B.
(c) RCP seal injection lines (2-inch CS-2501R-28) from manually operated Globe Valves 8352A, B, C, and D to Check Valves 8350A, B, C, and D.

(2) Residual Heat Removal System

(a) RHR return to the RCS cold legs (8-inch SI-2501R-31) from motor-operated Gate Valve MO-8809A and CV-8890A to Check Valves 8818A and B, and from motor-operated Gate Valve MO-8809B and CV-8890B to Check Valves 8818C and D.
(b) RHR discharge header to RCS Loops 2 and 4 (3/4-inch and 19-inch RH-2501R-19) from motor-operated Globe Valve MO-8703 and air-operated Globe Valve CV-8825 to Check Valves 8736A and B.

(3) Safety Injection System

(a) Boron injection tank T-207 discharge piping to the RCS loops cold legs (3-inch SI-2501R-3), and the test connection piping (3/4-inch SI-2501R-23 and 1-inch SI-2501R-3) from motor-operated valves MO-8801A, and B, and air-operated valve CV-8843 to check valve 8815.
(b) Safety injection pumps P-203A and P-203B discharge to the RCS loops hot legs (2-inch and 4-inch SI-2501R-1), and the test connection piping (3/4-inch SI-2501R-22 and 1-inch SI-2501R-23) from motor-operated valves MO-8802A and B and air-operated valves CV-8824 and CV-8881 to check valves 8905A, B, C, and D.
(c) Safety injection pump discharge to the RCS loops cold legs (2-inch and 4-inch SI-2501R-1), and the test connection piping (3/4-inch SI-2501R-1) from motor-operated valve MO-8835 and test connection valve CV-8823 to check valves 8819A, B, C, and D.

Licensee's Proposed Alternative Examination: The Licensee states that the visual examination for evidence of leakage will be conducted on the subject portions of these systems at hydrostatic test pressures in accordance with the requirements of IWB-5222 for the adjoining Class 1 systems.

Licensee's Basis for Requesting Relief: The Licensee states that pressurizing the lines to the hydrostatic test pressure required by IWC-5000 would require pressurizing the RCS in excess of that required by IWB-5000 due to the flow direction of the check valve from the Class 2 system to the Class 1 system. Pressurizing the RCS to the Class 2 requirements is undesirable because of the limitations on the hydrostatic test pressure and the number of hydrostatic test cycles incorporated into the design of the system components (most notably the reactor vessel and fuel assemblies).

Evaluation: As shown in the drawings provided in the Licensee's January 17, 1990 submittal, the design of the subject systems does not permit pressurizing the subject portions of Class 2 piping without overpressurizing the adjacent Class 1 piping. The system design, therefore, makes the Code-required hydrostatic test impractical to perform. Extensive modifications to these systems would be required in order to meet the Code requirement. The increase in plant safety would not compensate for the burden placed on the Licensee that would result from imposition of the requirement.

Although the proposed alternative test pressure (Class 1 hydrostatic test pressure) is lower than the Code-required Class 2 hydrostatic test pressure, the alternative test pressure is greater than the operating pressure of the subject piping. Therefore, the proposed alternative test will provide reasonable assurance of the continued inservice structural integrity.

Conclusions: The hydrostatic test required by Section XI of the ASME Code for the subject Class 2 piping is impractical to perform at Trojan because the subject Class 2 piping is unisolatable from adjacent Class 1 piping. Imposition of the requirement on Portland General Electric Company would cause a burden that would not be compensated significantly by an

increase in safety above that provided by the proposed alternative. The proposed alternative test will provide assurance that structural integrity of the subject piping is maintained. Therefore, it is concluded that public health and safety will not be endangered by allowing the alternative test to be performed in lieu of the Code requirement. It is recommended that relief be granted as requested.

3.4.3 Class 3 System Pressure Tests (No relief requests)

3.4.4 General

3.4.4.1 Request for Relief No. RR-B5, Scheduling of Class 2 and Class 3 Hydrostatic Tests

Code Requirement: Section XI, Table IWC-2500-1, Examination Category C-H, Note 5, and Examination Categories D-A, D-B, and D-C, Note 2, require that system hydrostatic tests be conducted at or near the end of the inspection interval or during the same inspection period of each inspection interval when using Inspection Program B.

Licensee's Code Relief Request: Relief is requested from scheduling Class 2 hydrostatic tests in accordance with Note 5 of Table IWC-2500-1, Examination Category C-H and from scheduling Class 3 hydrostatic tests in accordance with Note 2 of Table IWD-2500-1, Examination Categories D-A, D-B, and D-C.

Licensee's Proposed Alternative Examination: The Licensee proposes to change the current sequence of hydrostatic pressure tests from the end of the inspection interval to a distribution of tests throughout the inspection interval. After hydrostatic pressure test sequencing, subsequent interval tests will be performed in accordance with the ten-year frequency dictated by the ASME Section XI Code.

Licensee's Basis for Requesting Relief: The Licensee states that scheduling flexibility will allow more efficient performance of tests to support plant modifications and outages without subsequent duplication of testing at the end of the interval. This will help maintain radiation exposure as low as reasonably achievable and demonstrate the continued integrity of the various systems in the ISI Program throughout the interval.

Evaluation: The Licensee has committed to scheduling the hydrostatic tests such that the elapsed time between each system hydrostatic test will not exceed ten years. Since the intent of the Code requirement will be met, the proposed alternative provides an acceptable level of quality and safety.

Conclusions: Based on the above evaluation, it is concluded that the Licensee's proposed scheduling of hydrostatic pressure tests meets the intent of the Code requirements. Therefore, public health and safety will not be endangered by allowing the alternative scheduling in lieu of the Code requirement. Pursuant to 10 CFR 50.55a(a)(3), it is recommended that relief be granted as requested.

3.5 General (No relief requests)

## 4. CONCLUSION

Pursuant to 10 CFR 50.55a(g)(6) or, alternatively, 10 CFR 50.55a(a)(3), it has been determined that certain Section XI required inservice examinations cannot be performed to the extent required by the Code. In all cases for which relief is requested, the Licensee has demonstrated that specific Section XI requirements are impractical or that alternative examinations should be performed.

This technical evaluation has not identified any practical method by which the Licensee can meet all the specific inservice inspection requirements of Section XI of the ASME Code for the existing Trojan Nuclear Plant facility. Requiring compliance with all the exact Section XI required inspections would require redesign of a significant number of plant systems, sufficient replacement components to be obtained, installation of the new components, and a baseline examination of these components. Even after the redesign efforts, complete compliance with the Section XI examination requirements probably could not be achieved. Therefore, it is concluded that the public interest is not served by imposing certain provisions of Section XI of the ASME Code that have been determined to be impractical. Pursuant to 10 CFR 50.55a(g)(6), relief is allowed from these requirements which are impractical to implement, or alternatively, pursuant to 10 CFR 50.55a(a)(3), alternatives to the Code-required examinations may be granted provided that either (i) the proposed alternative provides an acceptable level of quality and safety or that (ii) Code compliance would result in hardship or unusual difficulty without a compensating increase in safety. Relief may be granted only if granting the relief will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The development of new or improved examination techniques should continue to be monitored. As improvements in these areas are achieved, the Licensee should incorporate these techniques in the ISI program plan examination requirements.

Based on the review of the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Program, through Revision 1, and Plan, Revision 0, the Licensee's responses to the NRC's requests for additional information, and the recommendations for granting relief from the ISI examination requirements that have been determined to be impractical, it is concluded that the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Program, through Revision 1, and Plan, Revision 0, are acceptable and in compliance with 10 CFR 50.55a(g)(4).

# 5. REFERENCES


1. Code of Federal Regulations, Volume 10, Part 50.

2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Division 1:

   1974 Edition through Summer 1975 Addenda
   1983 Edition through Summer 1983 Addenda
   1986 Edition

3. Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection Program, Revision 0, submitted November 14, 1986.

4. NUREG-0800, Standard Review Plans, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspection and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components," July 1981.

5. Letter, dated August 15, 1988, T. L. Chan (NRC) to D. W. Cockfield [Portland General Electric Company (PGE)], request for additional information on the ISI Program.

6. Letter, dated October 7, 1988, D. W. Cockfield (PGE) to NRC, partial response to the NRC request for additior information.

7. Letter, dated November 30, 1988, D. W. ockfield (PGE) to NRC, submittal of ISI Program revision delay d to January 31, 1989.

8. Letter, dated January 31, 1989, D. W. Cockfield (PGE) to NRC, submittal of ISI Program revision delayed to August 25, 1989.

9. Letter, dated August 25, 1989, D. W. Cockfield (PGE) to NRC, submittal of ISI Program revision delayed to September 29, 1989.

10. Letter, dated September 29, 1989, D. W. Cockfield (PGE) to NRC, final response to the NRC's August 15, 1988 request for additional information and submittal of Revision 1 of ISI Program and Revision 0 of ISI Plan.

11. Letter, dated January 17, 1990, D. W. Cockfield (PGE) to NRC, providing additional information.

12. Letter, dated January 30, 1990, R. Bevan (NRC) to D. W. Cockfield (PGE), request for additional information required in order to complete the review of the ISI Program.

13. Letter, dated March 9, 1990, D. W. Cockfield (PGE) to NRC, providing responses to the NRC request for additional information.

14. NRC Regulatory Guide 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," Revision 2, February 1983.

15. NRC Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," Revision 1, August 1985.

NRC FORM 335 (2-89) NRCM 1102 3201 3202

U.S. NUCLEAR REGULATORY COMMISSION

# BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

EGG-ESM-7965

2. TITLE AND SUBTITLE

Technical Evaluation Report on the Second 10-Year Interval Inservice Inspection Program Plan: Portland General Electric Company, Trojan Nuclear Plant, Docket Number 50-344

3. DATE REPORT PUBLISHED

MONTH: November YEAR: 1990

4. FIN OR GRANT NUMBER

FIN-D6022 (Proj. 5)

5. AUTHOR(S)

B.W. Brown, J.D. Mudlin

6. TYPE OF REPORT

Technical

7. PERIOD COVERED (Inclusive Dates)

8. PERFORMING ORGANIZATION – NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, ID 83415-2209

9. SPONSORING ORGANIZATION – NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Materials and Chemical Engineering Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

This report presents the results of the evaluation of the Trojan Nuclear Plant Second 10-Year Interval Inservice Inspection (ISI) Program, through Revision 1, and Plan, Revision 0, submitted September 29, 1989, including the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements that the Licensee has determined to be impractical. The Trojan Nuclear Plant Second 10-Year Interval ISI Program Plan is evaluated in Section 2 of this report for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The requests for relief are evaluated in Section 3 of this report.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

13. AVAILABILITY STATEMENT

Unlimited

14. SECURITY CLASSIFICATION

(This Page)

Unclassified

(This Report)

Unclassified

15. NUMBER OF PAGES

16. PRICE

ATTACHMENT 2

SALP INPUT

| | |
|---|---|
| LICENSEE: | Portland General Electric Company |
| FACILITY NAME: | Trojan Nuclear Plant |
| DOCKET NO.: | 50-344 |
| TAC NO.: | 63974 |
| LICENSING ACTIVITY: | Review and Evaluation of Ten-Year ISI Program |
| REVIEWERS: | George Johnson / INEL |

SUMMARY OF REVIEW

The licensee submitted the Second Ten-Year Interval Inservice Inspection Program for the Trojan Nuclear Plant to the NRC for review and evaluation. The program was reviewed for compliance with the 1983 Edition through Summer 1983 Addenda of Section XI of the ASME Code, 10 CFR 50.55a (g), Technical Specification 4.0.5, and any prior commitments relative to the Inservice Inspection Program made by the licensee.

NARRATIVE DISCUSSION OF LICENSEE PERFORMANCE - FUNCTION AREA MAINTENANCE/SURVEILLANCE

The Plan submitted and the additional information provided indicated that the licensee understands the regulations and the purpose of the Section XI Code. The staff's review concluded that the program plan was in compliance with the regulations, Code, and Technical Specifications and was therefore acceptable.

RATING: Category 2

AUTHOR: George Johnson

DATE: 12/05/90