10 CFR 50.55a

CP&L
A Progress Energy Company

Serial: RNP-RA/01-0054

MAR 2 1 2001

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

REQUEST FOR RELIEF REGARDING SURFACE
EXAMINATION OF REACTOR PRESSURE VESSEL
NOZZLE-TO-SAFE END WELDS (RELIEF REQUEST NO. 32)

Ladies and Gentlemen:

In accordance with 10 CFR 50.55a(g)(6)(i), H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, requests relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, 1986 Edition with no Addenda, Table IWB-2500-1, Examination Category B-F, "Pressure Retaining Dissimilar Metal Welds," Item B5.10, which requires volumetric and surface examination of Reactor Pressure Vessel (RPV) nozzle-to-safe end welds.

In this regard, please find attached the supporting details and technical information associated with HBRSEP, Unit No. 2, Relief Request No. 32.

The requested relief would authorize a VT-2 visual examination in Modes 5 or 6 of the accessible portion of the RPV nozzle-to-safe end welds in lieu of the code-required surface examination. The proposed alternative VT-2 visual examination, in conjunction with the code-required ultrasonic examinations of the inner diameter lower one-third weld volume, provide assurance of Reactor Coolant System piping integrity while utilizing examination techniques that are commensurate with the personnel hazards and physical limitations associated with the RPV nozzle-to-safe end welds.

The code-required examination is deemed impractical on the basis that excessive personnel hazards are associated with this surface examination, including high area radiation doses, elevated ambient temperatures, and a significantly confined work area. In addition, the required examination area involves RPV nozzle-to-safe end welds that have accessibility limited to approximately the top one-third of the weld outside diameter.

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The need for this relief was discussed in a teleconference with the NRC staff on March 12, 2001.

HBRSEP, Unit No. 2, is currently in the Third Ten-Year Inservice Inspection (ISI) Interval, which began on February 19, 1992. The ISI Program Plan for this interval implements the 1986 Edition of Section XI of the ASME B&PV Code, with the exception of piping weld examinations for Class 1, Examination Category B-J, which are determined by the requirements of the 1974 Edition, through Summer 1975 Addenda, as allowed by 10 CFR 50.55a.

The requested relief, if approved, will be implemented during the HBRSEP, Unit No. 2, Third Ten-Year ISI Interval and will be needed for upcoming Refueling Outage (RO) - 20, which is scheduled to begin in April 2001. Approval of this relief on or before April 7, 2001, would allow adequate time for the necessary ISI program revisions in support of implementation of this relief request.

If you have any questions regarding this matter, please contact Mr. H. K. Chernoff.

Sincerely,

for B. L. Fletcher III
Manager - Regulatory Affairs

CTB/ctb

Attachments:

I. Request For Relief Regarding Surface Examination of Reactor Pressure Vessel Nozzle-to-Safe End Welds (Relief Request No. 32)
II. Diagram of Access Area to Reactor Pressure Vessel Nozzle-to-Safe End Welds
III. Diagrams of Reactor Pressure Vessel Nozzle-to-Safe End Welds
IV. Photographs of Access Area Mock-Up for Reactor Pressure Vessel Nozzle-to-Safe End Welds

c: Mr. L. A. Reyes, NRC, Region II
Mr. R. Subbaratnam, NRC, NRR
NRC Resident Inspector

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR RELIEF REGARDING SURFACE EXAMINATION OF REACTOR PRESSURE VESSEL NOZZLE-TO-SAFE END WELDS (RELIEF REQUEST NO. 32)

Components for Which Relief is Requested

The components applicable to this relief request are the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Reactor Pressure Vessel (RPV) nozzle-to-safe end welds. These are dissimilar metal welds on the hot and cold leg piping of each Reactor Coolant System (RCS) loop, i.e., RPV inlet and outlet piping. The affected welds are uniquely identified as follows:

Weld Identification Number	Location
CPL-107/1DM	"A" Hot Leg
CPL-107/14DM	"A" Cold Leg
CPL-107A/1DM	"B" Hot Leg
CPL-107A/14DM	"B" Cold Leg
CPL-107B/1DM	"C" Hot Leg
CPL-107B/14DM	"C" Cold Leg

Code Examination Requirements

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 1986 Edition with no Addenda, Table IWB-2500-1, Examination Category B-F, "Pressure Retaining Dissimilar Metal Welds," Item B5.10, requires volumetric and surface examination of RPV nozzle-to-safe end welds. Table IWB-2500-1 further notes that for RPV nozzle safe ends "the examinations may be performed coincident with the vessel nozzle examinations required by Examination Category B-D."

Requested Relief

HBRSEP, Unit No. 2, requests relief from the code-required surface examination for RPV nozzle-to-safe end welds. As delineated within the ASME B&PV Code, Section XI, 1986 Edition with no Addenda, Table IWB-2500-1, Examination Category B-F, "Pressure Retaining Dissimilar Metal Welds", Item B5.10, volumetric and surface examination of RPV nozzle-to-safe end welds are required once during each inspection interval.

This relief is requested for and will be implemented in the Third Ten-Year Inservice Inspection (ISI) Interval, which began on February 19, 1992.

Basis for Requested Relief

This relief is requested pursuant to 10 CFR 50.55a(g)(6)(i) on the basis that allowing the proposed alternative examinations in lieu of code requirements will not endanger public health and safety, and that compliance with the referenced code requirements is impractical. Public health and safety will be assured based upon the technical sufficiency of the proposed alternative examinations. The code-required examinations are deemed impractical on the basis that excessive personnel hazards are associated with these surface examinations, and that the required examination areas have limited accessibility.

Public Health and Safety

Previous examination history supports the proposed alternative examinations in lieu of the surface examinations specified for Examination Category B-F, Item B5.10. The table below summarizes the examinations completed during the Second Ten-Year ISI interval. No rejectable indications were identified during these examinations.

Weld Identification Number	1984 Examinations	1990 Examinations
CPL-107/1DM	Volumetric and Surface	Volumetric
CPL-107/14DM		Volumetric and Surface
CPL-107A/1DM	Volumetric and Surface	Volumetric
CPL-107A/14DM		Volumetric and Surface
CPL-107B/1DM	Volumetric and Surface	Volumetric
CPL-107B/14DM		Volumetric and Surface

The primary initiator for cracking of RPV nozzle-to-safe end welds is the synergistic affect of primary water chemistry and residual stresses. Since this combination is confined to the inner weld diameter, ultrasonic examination of the inner diameter lower one-third weld volume is capable of detecting inner diameter defects in both the axial and circumferential directions. This results in a high degree of confidence in the ability to detect primary water stress corrosion cracking (PWSCC) utilizing inner diameter ultrasonic techniques.

Performance of the code-required surface examination is intended to indicate the presence of surface discontinuities and may be conducted by either a magnetic particle or liquid penetrant method. Linear indications that exceed the allowable linear surface flaw standards are required to be recorded. The proposed alternative examinations are the performance of VT-2 visual examinations during Modes 5 or 6 to inspect in accordance with IWA-5240, "Visual Examination," for evidence of leakage, including emphasis on areas of discoloration or residue on surfaces examined. These alternative examinations, combined with the examination history provided above and the volumetric examinations performed from the inner weld diameter, provide adequate assurance regarding the condition and integrity of RPV nozzle-to-safe end welds.

Personnel Hazards

Significant personnel hazards are associated with surface examination of the RPV nozzle-to-safe end welds that are not commensurate with the benefits gained from performing such examinations. As indicated by the diagrams provided within Attachment II and the photographs shown within Attachment IV, the locations where these examinations are performed are physically confining and have limited accessibility. Personnel preparing for and performing these surface examinations are required to wear personnel protective equipment, which includes anti-contamination clothing and respiratory protection. Elevated ambient temperatures in the area of these surface examinations, combined with the required use of personnel protective equipment in this physically confined area, create the potential for heat stress and exhaustion. These aspects of limited accessibility, personnel protective equipment, and elevated ambient temperatures result in a work environment where high radiation doses may be expected and an increased potential for personnel injury exists. Retrieval of an injured or impaired individual from the access area would be complex and physically difficult, and would involve additional risk and radiation exposure by rescue personnel.

Detailed dose assessments have been performed to determine whether performance of the code-required surface examination is consistent with the principal of "as low as reasonably achievable" (ALARA) as defined within 10 CFR 20.1003. These dose assessments assume an area dose rate of 600 mRem/hour. For performance of the code-required surface examination, time estimates have been developed to encompass accessing the areas of interest, removing insulation, preparing examination surfaces, performing examinations, and restoring areas to their operational configurations. Actual performance of these surface examinations can require as many as five entries into the examination area for each of the six affected welds. These time estimates, combined with the assumed area dose rate of 600 mRem/hour, result in an exposure estimate of approximately 7.5 Rem for surface examinations of the six affected welds. A similar dose estimate has been prepared to encompass the alternative examinations proposed in lieu of the code-required surface examination. This dose estimate models work

activities that would be performed to complete the proposed alternative examinations. The exposure estimate for the proposed alternative examinations is approximately 4 Rem. Therefore, relief from the code-required surface examination results in an estimated dose savings of approximately 3.5 Rem and a reduction in the time that personnel would have to be in this physically challenging work environment.

Accessibility

As indicated by the diagrams provided within Attachment II and the photographs shown within Attachment IV, the design of the HBRSEP, Unit No. 2, reactor cavity significantly limits access to the RPV nozzle-to-safe end welds. Access to the sides and undersides of the affected welds are not available. The weld area accessible for the code-required surface examination is approximately the top one-third of the weld outside diameter. A limited surface examination of the top one-third of the affected welds would not provide a level of safety commensurate with the personnel hazards associated with performance of such an examination.

Availability of Alternative Examination Techniques

HBRSEP, Unit No. 2, Relief Request No. 18, authorized use of ultrasonic techniques to detect outer diameter surface-connected flaws from the inner diameter of the RCS loop piping. This relief was approved pending a successful performance demonstration of an ultrasonic technique capable of detecting outer diameter surface-connected flaws from the inside diameter, and on the basis that this technique be demonstrated using a calibration standard without machined notches or defects.

During February 2001, HBRSEP, Unit No. 2, in conjunction with a vendor and the Electric Power Research Institute (EPRI), conducted a performance evaluation of this ultrasonic technique on the full weld volume and the heat-affected zones using a mock-up typical of the HBRSEP, Unit No. 2, cold leg safe end-to-elbow configuration. This attempt was not successful in detecting actual cracks due to attenuation in the cast material. Additional attempts to detect outer diameter surface-connected flaws using such a mock-up were only partially successful in detecting the flaws selected for this performance demonstration, and also recorded overcalls in "clean" areas of the weld. Efforts to size some of the detected flaws utilizing this ultrasonic technique produced significant inaccuracies. This is significant recognizing that the mock-up had optimum conditions for ultrasonic examination.

The performance evaluation associated with this ultrasonic technique has resulted in the conclusion that using an inner diameter ultrasonic examination to detect outer diameter surface-connected flaws is not currently a viable alternative to the code-required surface examination.

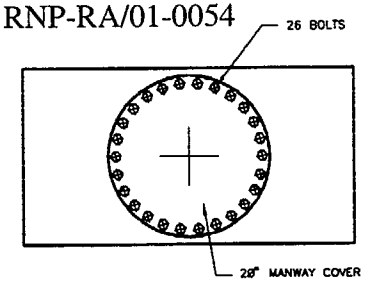
Proposed Alternative Examinations

The proposed alternative to the code-required surface examination is a VT-2 visual examination of the accessible portion of the affected nozzle-to-safe end welds. This examination will be performed during Modes 5 or 6 with the access covers removed and with insulation removed to the extent allowed by the access provided. The intent of this visual examination is to detect boric acid residue and other evidence of leakage. The proposed alternative visual examination, in conjunction with the code-required ultrasonic examination of the inner diameter lower one-third weld volume, will provide assurance of RCS piping integrity while utilizing examination techniques that are commensurate with the personnel hazards and physical limitations associated with the RPV nozzle-to-safe end piping welds.

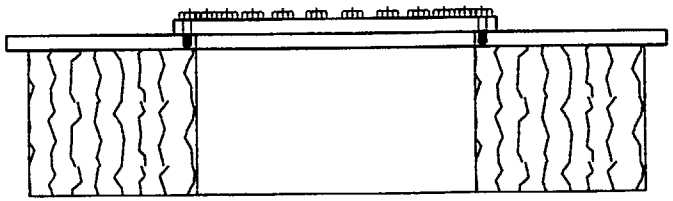
Implementation Schedule

This relief is requested for and will be implemented in the HBRSEP, Unit No. 2, Third Ten-Year ISI Interval, which began on February 19, 1992.

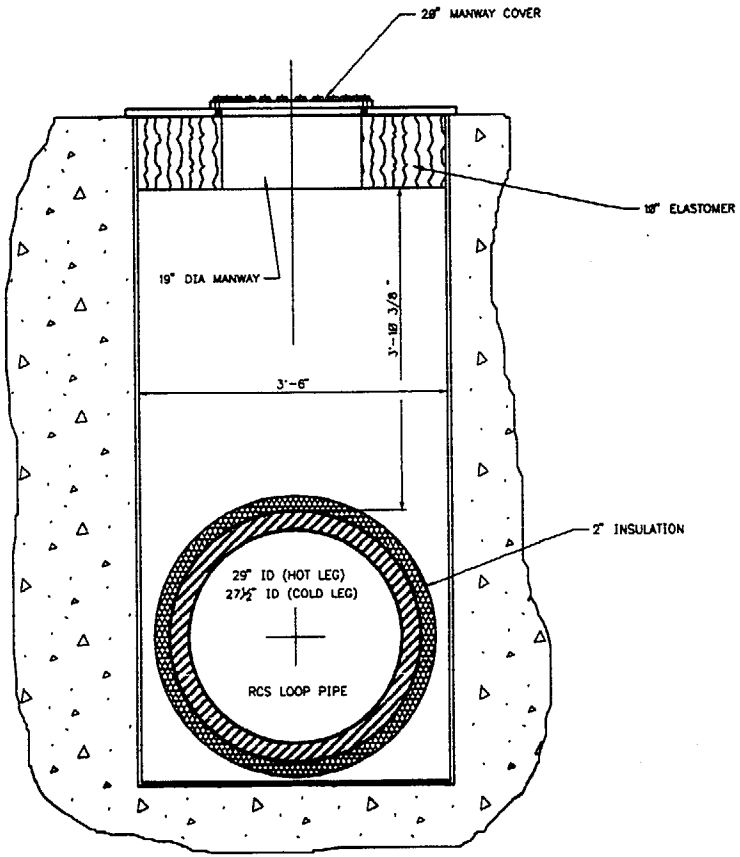
It is requested that this relief be approved on a schedule that will allow implementation during the upcoming RO-20, which is currently scheduled to begin in April 2001. Approval of this relief on or before April 7, 2001, would allow adequate time for the necessary ISI program revisions in support of examinations scheduled to be performed during RO-20.



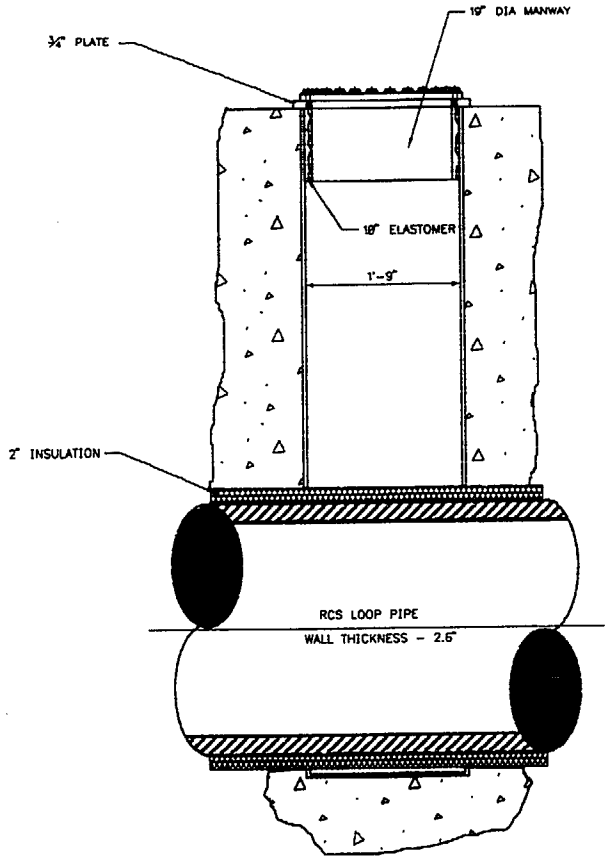
PLAN VIEW



ENLARGED END VIEW
20" MANWAY COVER, PLATE, AND ELASTOMER

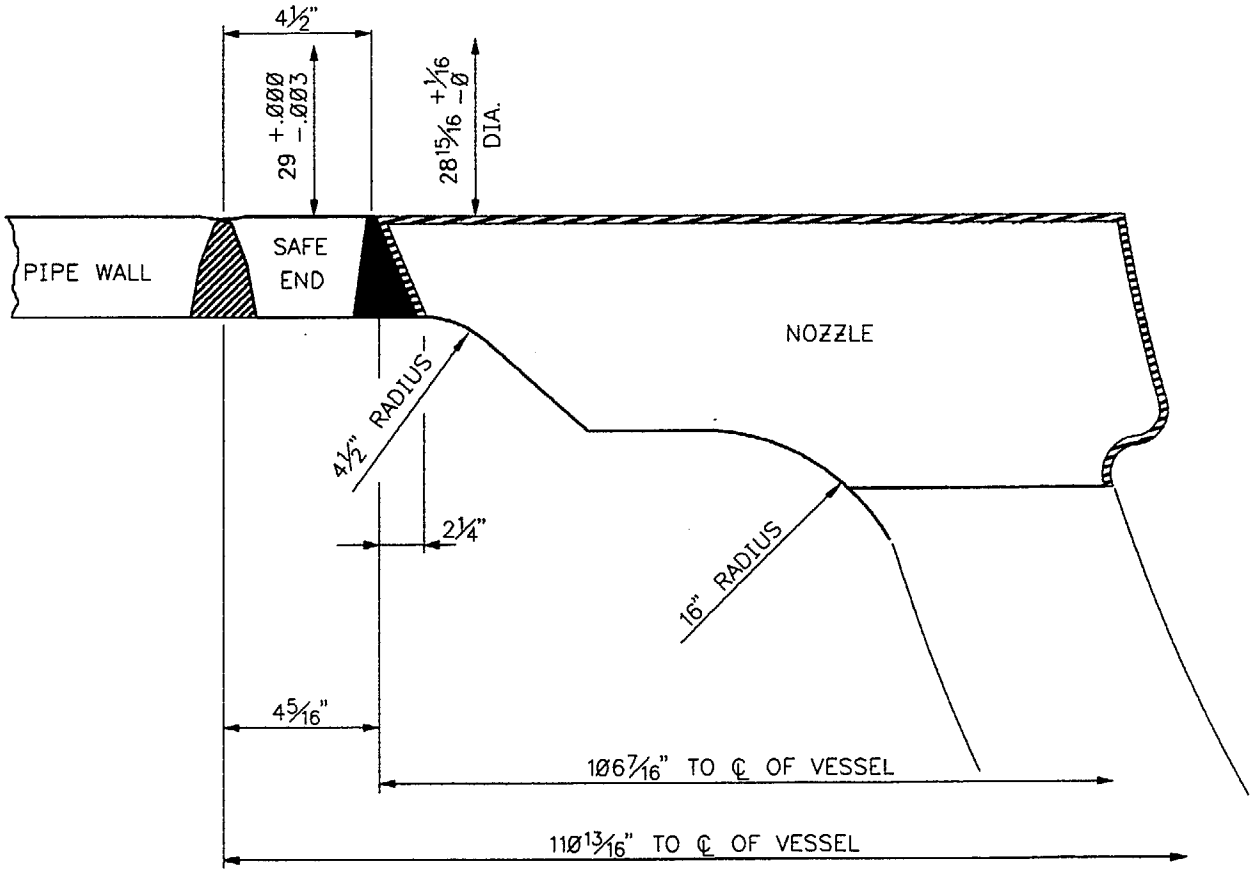


END VIEW



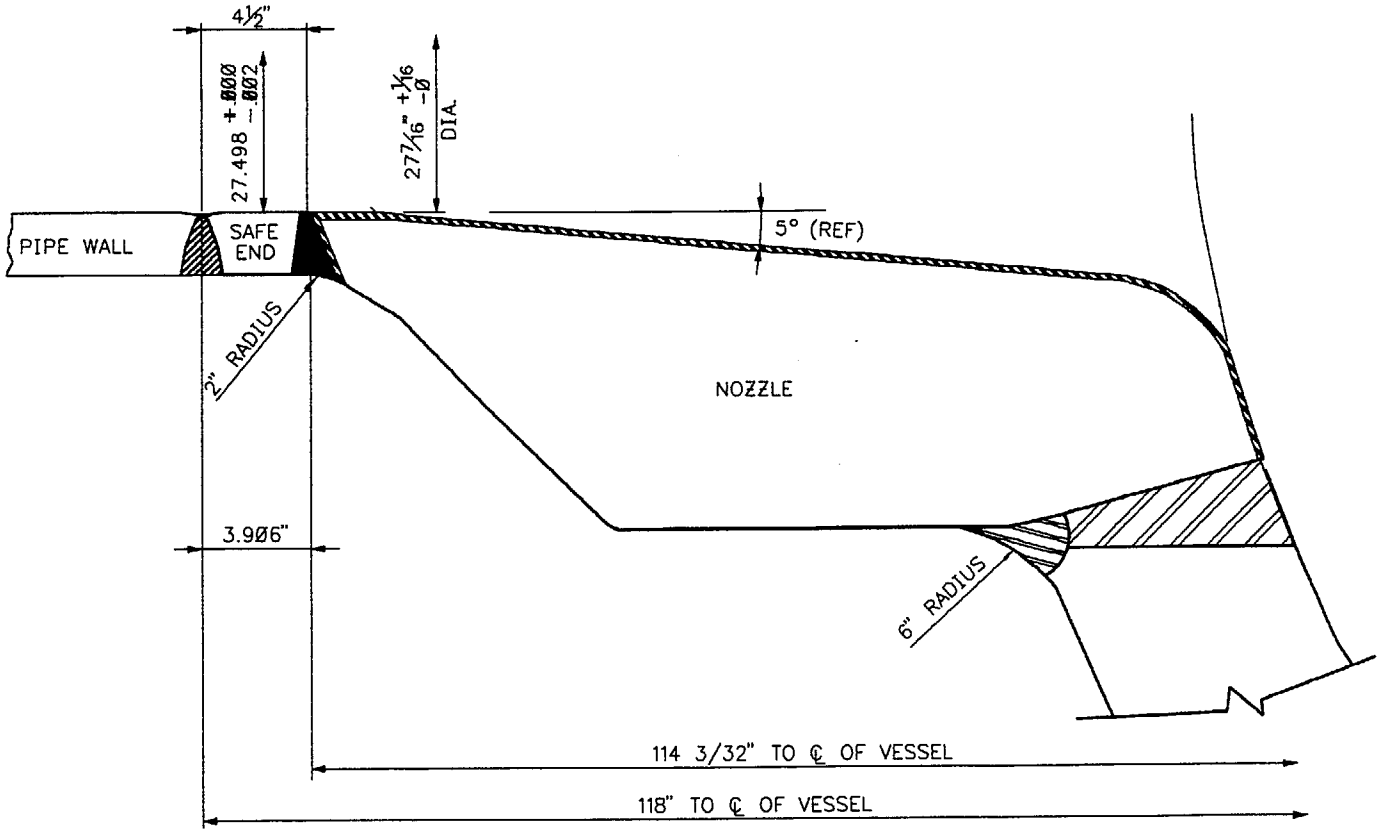
SIDE VIEW

Diagram of Access Area to
Reactor Pressure Vessel Nozzle-to-Safe End Welds



Hot Leg Nozzle Assembly

Diagrams of Reactor Pressure Vessel Nozzle-to-Safe End Welds



Cold Leg Nozzle Assembly

Diagrams of Reactor Pressure Vessel Nozzle-to-Safe End Welds

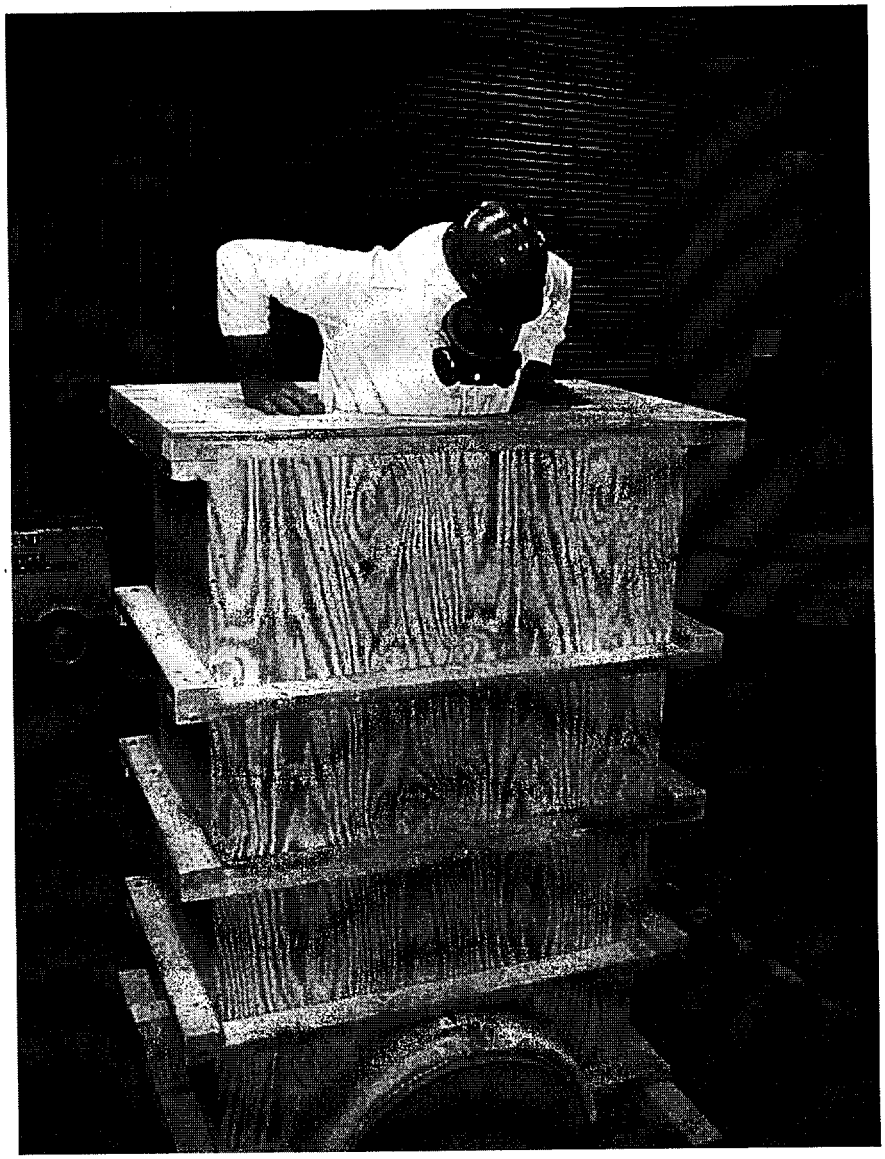
Photographs of Access Area Mock-Up for
Reactor Pressure Vessel Nozzle-to-Safe End Welds

Figure 1

This photograph shows a worker standing adjacent to a mock-up of the access area to the Reactor Pressure Vessel (RPV) nozzle-to-safe end welds. This mock-up has been constructed to the actual dimensions of the area that is entered to complete preparations for and performance of the code-required surface examination of RPV nozzle-to-safe end welds.

Photographs of Access Area Mock-Up for
Reactor Pressure Vessel Nozzle-to-Safe End Welds

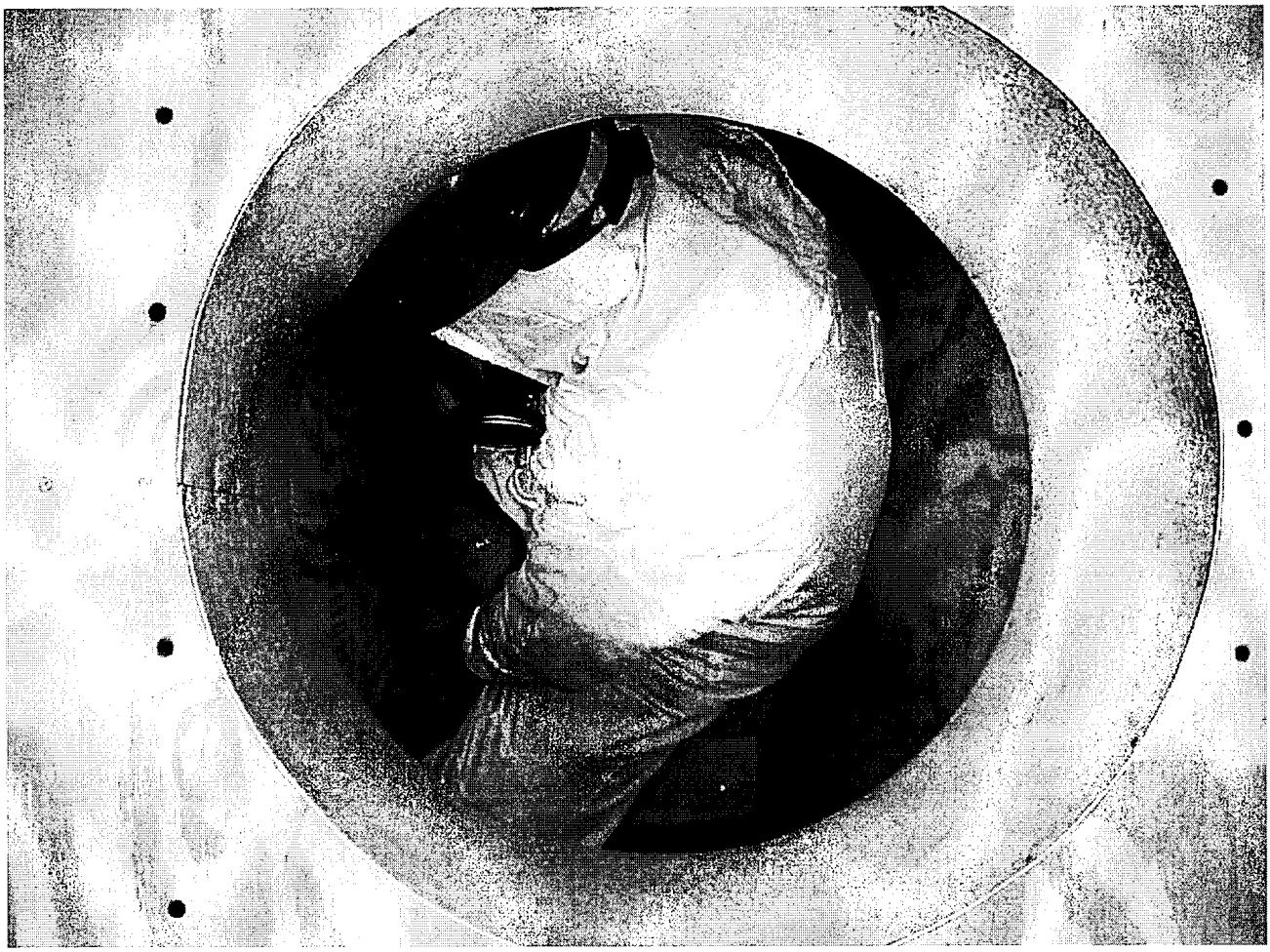
Figure 2



This photograph shows a worker entering the access area mock-up for the RPV nozzle-to-safe end welds. This simulates access to the area that would be gained from the floor of the refueling cavity.

Photographs of Access Area Mock-Up for
Reactor Pressure Vessel Nozzle-to-Safe End Welds

Figure 3



This photograph shows a worker inside the access area simulating tasks that would be required for examination of RPV nozzle-to-safe end welds. In this photograph, the worker is shown straddling a mock-up of the Reactor Coolant System piping. Such positioning would be required during preparations for and performance of the code-required surface examination.