MAY 9, 2003

10 CFR 50.55a(a)(3)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-296
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM - REQUESTS FOR RELIEF 3-ISI-13, 3-ISI-14, AND 3-ISI-15

In accordance with 10 CFR 50.55a(a)(3)(i) and (ii), TVA is seeking relief from certain inservice inspection requirements in the 1989 Edition, no addenda, of Section XI of the ASME Boiler and Pressure Vessel Code. The enclosures to this letter contain BFN Unit 3 requests for relief 3-ISI-13, 3-ISI-14, and 3-ISI-15 for NRC review and approval.

TVA has determined that the Standby Liquid Control nozzle, located in the bottom head of the reactor pressure vessel, is inaccessible for examination from inside of the vessel. Additionally, because of the small diameter of the nozzle (approximately 2-inches) and the thickness RPV head (approximately 6-inches), the ratio of the nozzle diameter to the head thickness makes it impractical to perform an examination from outside the RPV of the nozzle-to-head radius blend surface. Geometric and material reflectors inherent in the design prevent a meaningful examination from being performed on the inside radius section of the nozzle. As a result, TVA is submitting request for relief 3-ISI-13 in Enclosure 1.

TVA is also seeking relief from inservice inspection requirements of the 1989 Edition of the ASME Code, Section XI for the volumetric examination of Class 1, Reactor Pressure Vessel (RPV)

nozzle inner radius sections. As an alternative, TVA proposes to use an enhanced remote visual (VT-1) examination, capable of a 1-mil resolution, for the RPV nozzles inner radius section. Requests for relief 3-ISI-14 and 3-ISI-15 are provided in Enclosures 2 and 3 respectively.

These three requests for relief are consistent with ones submitted by TVA for BFN Unit 2 by letters dated May 24, 2002 and February 14, 2003 (2-ISI-13), and April 23, and September 5, 2002 (2-ISI-16 and -17). The NRC approved the requests for relief by letters dated April 3, 2003, and October 7, 2002, respectively.

TVA requests approval of these requests for relief by January 16, 2004, to support resource planning for the Unit 3 Cycle 11 (Spring 2004) refueling outage.

There are no new regulatory commitments contained in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

ORIGINAL SIGNED BY:

T. E. Abney
Manager of Licensing
and Industry Affairs

cc: See Page 3

Enclosures
cc (Enclosures):
(Via NRC Electronic Distribution)
Mr. Stephen J. Cahill, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S.W., Suite 23T85
Atlanta, Georgia 30303-8931

NRC Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

Mr. Kahtan N. Jabbour, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
(MS 08G9)
11555 Rockville Pike
Rockville, Maryland 20852-2739

DTL:JWD:BAB
Enclosures
cc (Enclosures):
A. S. Bhatnagar, PAB 1E-BFN
M. J. Burzynski, BR 4X-C
A. L. Ladd, PEC-2A-BFN
J. E. Maddox, LP 6A-C
D. C. Olcsvary, LP 6A-C
C. M. Root, PAB 1G-BFN
J. R. Rupert, NAB 1A-BFN
K. W. Singer, LP 6A-C
M. D. Skaggs, POB 2C-BFN
E. J. Vigluicci, ET 11A-K
R. E. Wiggall, PEC 2A-BFN
NSRB Support, LP 5M-C
EDMS-K

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-13

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
ASME SECTION XI INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-13

Executive Summary: Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested for the following on the basis that the proposed alternative would provide an acceptable level of quality and safety.

TVA is requesting relief from certain inservice inspection requirements of the 1989 Edition, no addenda, of Section XI of the ASME Boiler and Pressure Vessel Code for the volumetric examination of the reactor pressure vessel (RPV) Standby Liquid Control (1 nozzle) nozzle inside radius section.

The Standby Liquid Control nozzle is designed with an integral socket to which the boron injection piping is welded. The nozzle is located in the bottom head of the reactor pressure vessel in an area that is inaccessible, since it is below the core shroud plate, for examination from the inside of the vessel. Therefore, the examinations must be performed from the outside surface of the vessel head. Because of the small diameter of the nozzle (i.e., ~2-inches) and the thickness of the head (i.e., ~6-inches), the ratio of the nozzle diameter to the head thickness make it impractical to perform an examination from the nozzle-to-head radius blend surface. Also, to perform the ultrasonic examination (UT) from the head surface the sound must travel through the full thickness of the head into a complex cladding/socket configuration. Therefore, geometric and material reflectors inherent in the design prevent a meaningful examination from being performed on the inside radius section of the nozzle.

	As an alternative, TVA proposes to perform a visual (VT-2) examination of the nozzle area each refueling outage in conjunction with the Class 1 System Leakage Test. This request for relief is consistent with one submitted by TVA for BFN Unit 2 (2-ISI-13) by letters dated May 24, 2002, and February 14, 2003. NRC approved TVA's request by letter dated April 3, 2003.
Unit:	Three (3)
ISI Interval:	ASME Section XI, Second Ten-Year ISI Interval (November 19, 1996 to November 18, 2005)
System(s):	Standby Liquid Control (SLC)
Components:	RPV Nozzle (N-10) Inside Radius Section (See Attachment, Sketch SK-B3022)
ASME Code Class:	ASME Code Class 1
ASME Section XI Code Edition:	1989 Edition, No Addenda
Code Table:	IWB-2500-1
Examination Category:	B-D, "Full Penetration Welds of Nozzles in Vessels"
Examination Item Number:	B3.100, "Nozzle Inside Radius Section"
Code Requirement:	The 1989 Edition, no Addenda, ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100, requires a volumetric examination of the inside radius section of nozzles in vessels.
Code Requirements From Which Relief Is Requested:	Relief is requested from the requirement to perform a volumetric examination of the inside radius section of the ~2-inches diameter Standby Liquid Control nozzle.

List Of Items Associated With The Relief Request:

N10-NV (Standby Liquid Control nozzle (1 nozzle) inside radius section)

Basis For Relief Request:

The Standby Liquid Control nozzle is designed with an integral socket to which the boron injection piping is welded. The Standby Liquid Control nozzle is located in the bottom head of the reactor pressure vessel in an area that is inaccessible, since it is below the core shroud plate, for examination from inside of the vessel. Therefore, any examination would have to be performed from the outside surface of the vessel head. Because of the small diameter of the nozzle (i.e., ~2-inches) and the thickness of the head (i.e., ~6-inches), the ratio of the nozzle diameter to the head thickness makes it impractical to perform an examination from the nozzle-to-head radius blend surface. Also, to perform the ultrasonic examination from the head surface the sound must travel through the full thickness of the head into a complex cladding/socket configuration. These geometric and material reflectors, inherent in the design, prevent a meaningful examination from being performed on the inside radius section of the nozzle. Additionally, the inside radius section socket is welded to piping which injects boron at locations far removed from the nozzle, thus eliminating any thermal stratification possibility at the nozzle inside radius section.

This request for relief is consistent with one submitted by TVA for BFN Unit 2 (2-ISI-13) by letters dated May 24, 2002, and February 14, 2003. NRC approved TVA's request by letter dated April 3, 2003.

Alternate Examination:

TVA will perform a visual (VT-2) examination of the nozzle area each refueling outage in conjunction with the Class 1 System Leakage Test.

Justification For The Granting Of Relief:

The inner radius section of the SLC nozzle is required to be examined in accordance with ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100 once during each Ten-Year ISI interval. The nozzle is inaccessible from inside the RPV since it is below the core shroud plate. The design configuration prevents a meaningful UT examination from being performed on the inside radius section of the SLC nozzle from outside the vessel.

A review of the first Ten-Year ISI interval program shows the nozzle was exempt (i.e., 3-inch and smaller) from examination based on section IWB-1220(b)(1) of the Code of record in effect for the first Ten-Year interval (ASME Section XI, 1974 Edition, Summer 1975 Addenda). Therefore, no examination was required, or performed, for the SLC nozzle during the first Ten-Year ISI inspection interval.

However, the SLC nozzle has received a VT-2 (visual) examination in conjunction with the Class 1 System Leakage Test conducted during each refueling outage of the Second Ten-Year ISI interval. Consequently, the SLC nozzle has undergone four VT-2 (visual) examinations during the second Ten-Year interval. No leakage has been identified during the VT-2 (visual) examinations of the SLC nozzle.

Implementation Schedule:

This request for relief is applicable to the BFN Unit 3, ASME Section XI, Second Ten-Year Inservice Inspection Interval (November 19, 1996 to November 18, 2005).

Attachment:

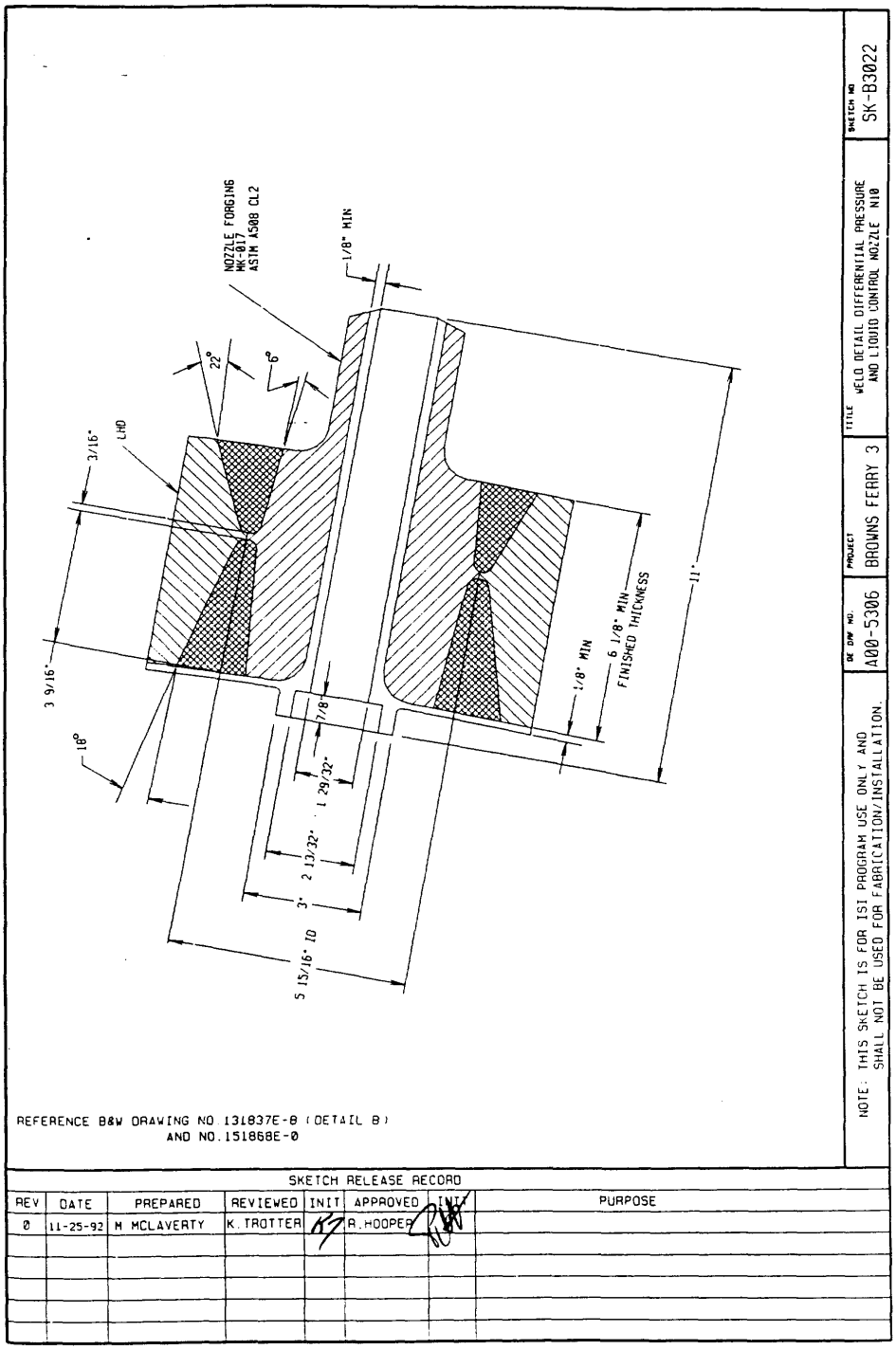
Sketch SK-B3022

Attachment

3-ISI-13

One (1) Sketch

SK-B3022



SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	11-25-92	M MCLAVERTY	K. TROTTER	KT	A. HOOPER	AH	

SK-B3022

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-14

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
ASME SECTION XI INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-14

Executive Summary: In accordance with 10 CFR 50.55a(a)(3)(i), TVA is requesting relief from inservice inspection requirements of the 1989 Edition, no Addenda, Section XI of the ASME Boiler and Pressure Vessel Code for the volumetric examination of Class 1, reactor pressure vessel (RPV) nozzle inner radius sections. The examination requirement is for a volumetric examination of ASME Section XI, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels," Item No. B3.100, "Reactor Vessel Nozzle Inner Radius Section."

This request for relief applies to the BFN Unit 3 Reactor Pressure Vessel Nozzles, with the exception of the six (N4) Feedwater nozzles. The six Feedwater nozzles inner radius section will continue to be examined with ultrasonic testing (UT) techniques developed and qualified using GE Procedure, GE-NE-523-A71-0594-A, Revision 01, "Alternate BWR Feedwater Nozzle Inspection Requirements," (the NRC has approved this report in an SER transmitted by letter dated March 10, 2000), and ASME Section XI Code requirements.

TVA proposes to inspect the nozzle inner radius sections using enhanced visual (VT-1) requirements in accordance with the acceptance criteria of Table IWB-3512-1 of the 1989 Edition, no Addenda of ASME Section XI Code.

For the reactor pressure vessel nozzles inner radius section, TVA will perform an enhanced remote visual (VT-1) examination, capable of a 1-mil wire resolution, in accordance with ASME Section XI, VT-1 requirements.

TVA considers the above proposed alternative examinations will provide an acceptable level of quality and safety. The proposed alternatives will also provide a significant savings in examination resources and radiation exposure.

This request for relief is consistent with one submitted by TVA for the BFN Unit 2 RPV Nozzles (2-ISI-16) submitted by TVA letters dated April 23, 2002, and September 5, 2002. NRC approved TVA's request for relief by letter dated October 7, 2002.

It should be noted that 2-ISI-16 also requested relief for examination of three RPV head nozzles. This request for relief (3-ISI-14) does not include the three RPV head nozzles. Relief for the three BFN Unit 3 RPV head nozzles was previously approved by NRC letter dated March 13, 2002.

Unit: Three (3)

ISI Interval: ASME Section XI, Second Ten-Year ISI Interval, (November 19, 1996 to November 18, 2005)

System(s): Reactor Pressure Vessel (RPV)

Components: RPV Nozzles Inner Radius Section as follows:

Reactor Recirculation Suction Loop Nozzles, N1A and N1B (28-inch diameter) (Total of 2 nozzles) (See Attachment A, Sketch SK-B3017)

Main Steam Nozzles, N3A, N3B, N3C, and N3D (26-inch diameter) (Total of 4 nozzles) (See Attachment A, Sketch B-3018)

	Control Rod Drive Return Line Nozzle, (capped) N9 (4-inch diameter) (Total of 1 nozzle) (See Attachment A, Sketch SK-B3020)
ASME Code Class:	ASME Code Class 1
ASME Section XI Code Edition:	1989 Edition, no Addenda
Code Table:	IWB-2500-1
Examination Category:	B-D, "Full Penetration Welded Nozzles In Vessels"
Examination Item Number:	B3.100, "Nozzle Inside Radius Section," (7 Nozzles - N1A, N1B, N3A, N3B, N3C, N3D, and N9)
Code Requirement:	The 1989 Edition, no Addenda of ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100, requires a volumetric examination of the reactor pressure vessel (RPV) nozzles inner radius section once each Ten-Year ISI interval.
Code Requirements From Which Relief Is Requested:	Relief is requested from the requirement to perform a volumetric examination of the reactor pressure vessel nozzles inner radius section (Nozzles N1A, N1B, N3A, N3B, N3C, N3D, and N9)
List Of Items Associated With The Relief Request:	Reactor Pressure Vessel Nozzles, N1A, N1B, N3A, N3B, N3C, N3D, and N9 (Total of 7 nozzles) Note: The six Feedwater nozzle inner radius sections will continue to be examined with ultrasonic examination (UT) techniques developed and qualified with GE-NE-523-A71-0594-A, Revision 01 (NRC has approved this report by letter dated March 10, 2000), and ASME Section XI Code requirements.

Basis For Relief Request:

Pursuant to 10 CFR 50.55a(a)(3)(i) TVA is requesting relief from certain ASME Section XI requirements to perform the volumetric examination described above. TVA is proposing to perform an enhanced visual (VT-1) examination in accordance with the acceptance criteria of Table IWB-3512-1 of the 1989 Edition, no Addenda of ASME Section XI Code.

The visual examination will cover the same inspection surface as specified for the volumetric examination.

The volumetric examinations (ultrasonic) conducted from the outside surfaces are difficult and time consuming due to the asymmetrical configuration of both the nozzle outside surface (where the transducers are manipulated) and the inner radius section of the nozzle being interrogated. Examination of the asymmetrical surfaces may require several different transducer/wedge angle combinations and these are applied at certain azimuths around the nozzle weld blend area of the vessel surface. Different size nozzles usually require a separate set of transducer/wedge angle combinations and calibrations. Several hours may be required for the calibrations and examination of a typical nozzle inner radius section.

An enhanced visual (VT-1) examination of the nozzles inner radius section would provide assurance of the required coverage and indicate the presence of surface flaws. The option to perform an enhanced visual (VT-1) examination will provide an acceptable examination without compromising the level of quality and safety.

The proposed alternative will also provide a significant savings in examination resources and radiation exposure to examination and support personnel.

Alternate Examination:

In accordance with 10 CFR 50.55a(a)(3)(i) TVA will perform the following alternate examination:

For the Reactor pressure vessel nozzles inner radius section, (N1A, N1B, N3A, N3B, N3C, N3D, and N9), TVA will perform an enhanced remote visual examination (VT-1), capable of a 1-mil wire resolution, in accordance with ASME Section XI, VT-1 requirements. This examination will be a remote visual exam utilizing cameras. Essentially 100 percent Code coverage will be attained.

TVA is proposing to perform enhanced visual (VT-1) examination using the most conservative surface flaw acceptance criteria of Table IWB-3512-1 of the 1989 Edition, no Addenda of ASME Section XI Code. A maximum allowable a/t value of 2.5 percent will be used for the acceptance criteria with surface indications encountered using this alternative visual examination.

Note: As used above, “enhanced” in enhanced visual (VT-1) examination refers to the 1-mil standard at two feet that is to be demonstrated by the examiners to assure acceptable resolution sensitivity.

Surface indications that exceed 2.5 percent a/t value will be unacceptable for continued service until such time that they are deemed acceptable based on supplemental examinations performed in accordance with paragraph IWB-3412.2, the relevant conditions corrected or repaired in accordance with IWB-3412.3, or demonstrated to be acceptable through analytical evaluation in accordance with paragraph IWB-3412.4.

Note: The remote in-vessel enhanced visual examinations will be performed on the RPV nozzles using approved procedures requiring that the resolution sensitivity be established using a 1-mil wire standard.

This is consistent with that used for Invessel Visual Inspection (IVVI) examinations intended to detect cracking.

IVVI examinations typically utilize a Sensitivity, Resolution and Contrast Standard (SRCS) which is fabricated with a surface texture representative of the surface to be examined or the actual surface to be examined may be used. A target (1-mil wire) is superimposed over the SRCS or surface to be examined. Equipment resolution and sensitivity is demonstrated prior to performing examinations. Resolution and sensitivity of the examination equipment and technique is considered adequate when the system is capable of discerning the required target.

Justification For The Granting Of Relief:

The RPV nozzles were nondestructively examined during fabrication and have previously been examined using inservice ultrasonic techniques specific to the nozzle configuration. No indication of fabrication defects or service related cracking has been detected by these examinations. See Attachment B for nozzle listing and previous UT examination coverage.

The RPV nozzles inner radius sections are the only non-welded areas (excluding the RPV head bolts) requiring examination on the reactor vessel. This requirement was deterministically made early in the development of ASME Section XI. For all nozzles, other than Feedwater, there is no significant thermal cycling during operation. From an industry experience perspective, there is no need to perform a volumetric examination on any nozzle other than the Feedwater and CRD return nozzles. No service related cracking has been discovered in any of the BWR fleet nozzles other than on Feedwater or CRD return lines.

Implementation Schedule: This request for relief is applicable to the BFN Unit 3, Second Ten-Year ASME Section XI, Inservice Inspection Interval (November 19, 1996 to November 18, 2005).

Attachments: **Attachment A -** 4 sketches

Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3017, N1 Recirculation Nozzles

Sketch SK-B3018, N3,Main Steam Nozzles

Sketch SK-B3020, N9, Control Rod Drive Return Line Nozzle

Attachment B - Table

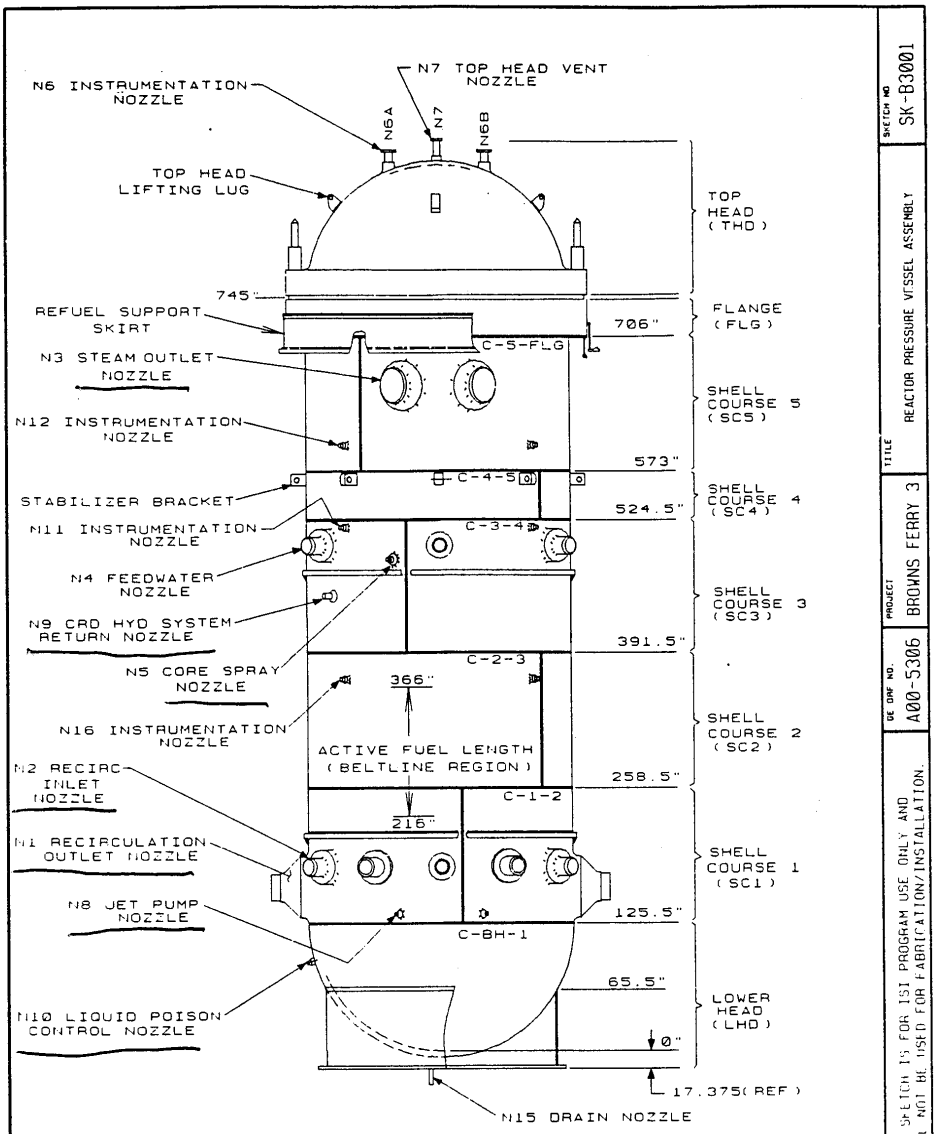
Unit 3 RPV Nozzle Examinations

Attachment A

3-ISI-14

FOUR (4) Sketches

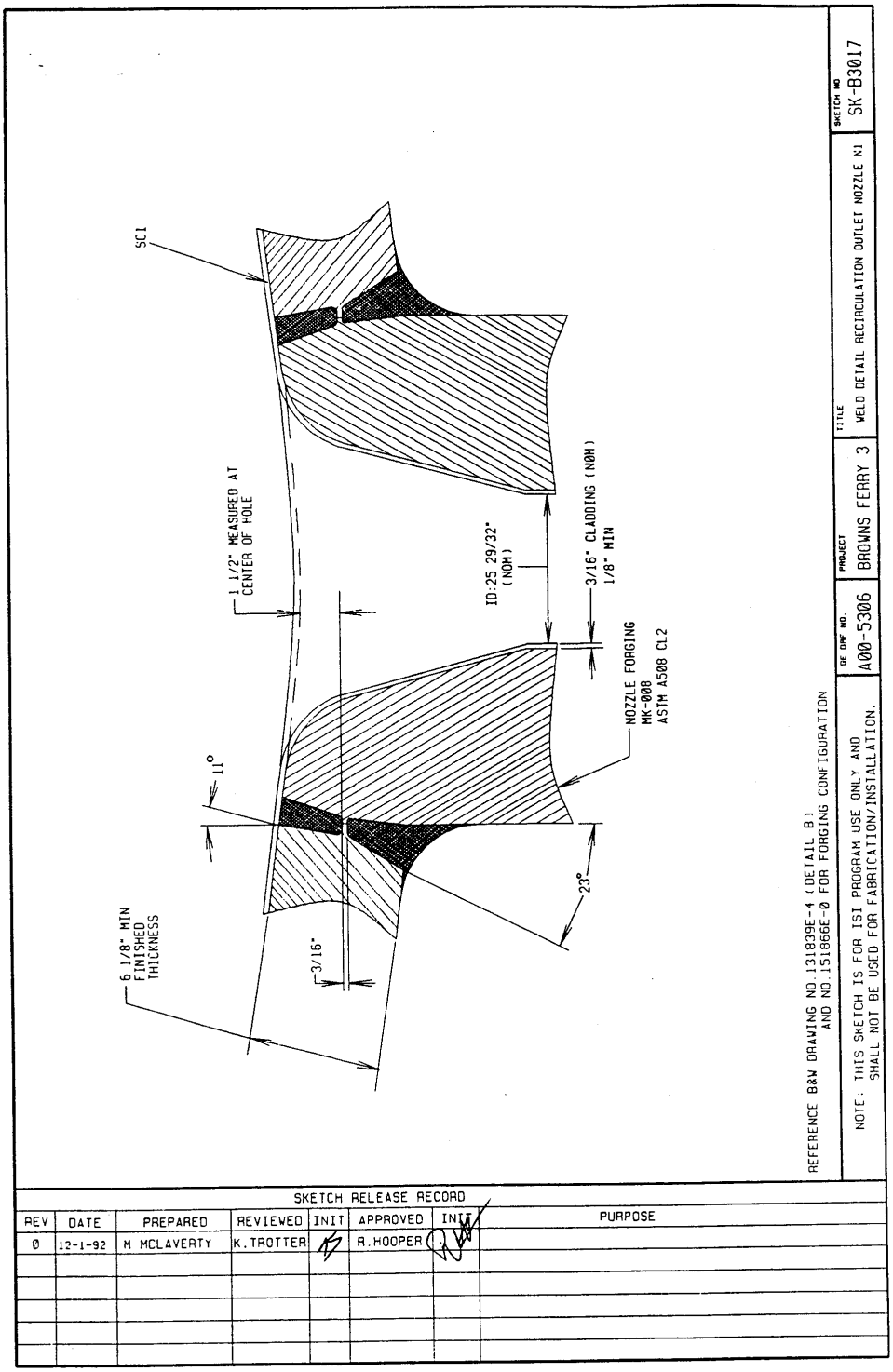
SK-B3001, RPV Assembly
SK-B3017, Recirc. Nozzles
SK-B3018, Main Steam Nozzles
SK-B3020, CRD Return Line Nozzle



SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	11-30-92	M MCLAVERTY	K.TROTTER	KT	R.HOOPER	RH	

SK-B3001



SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	12-1-92	M MCLAVERTY	K.TROTTER		R.HOOPER		

SK-B3017

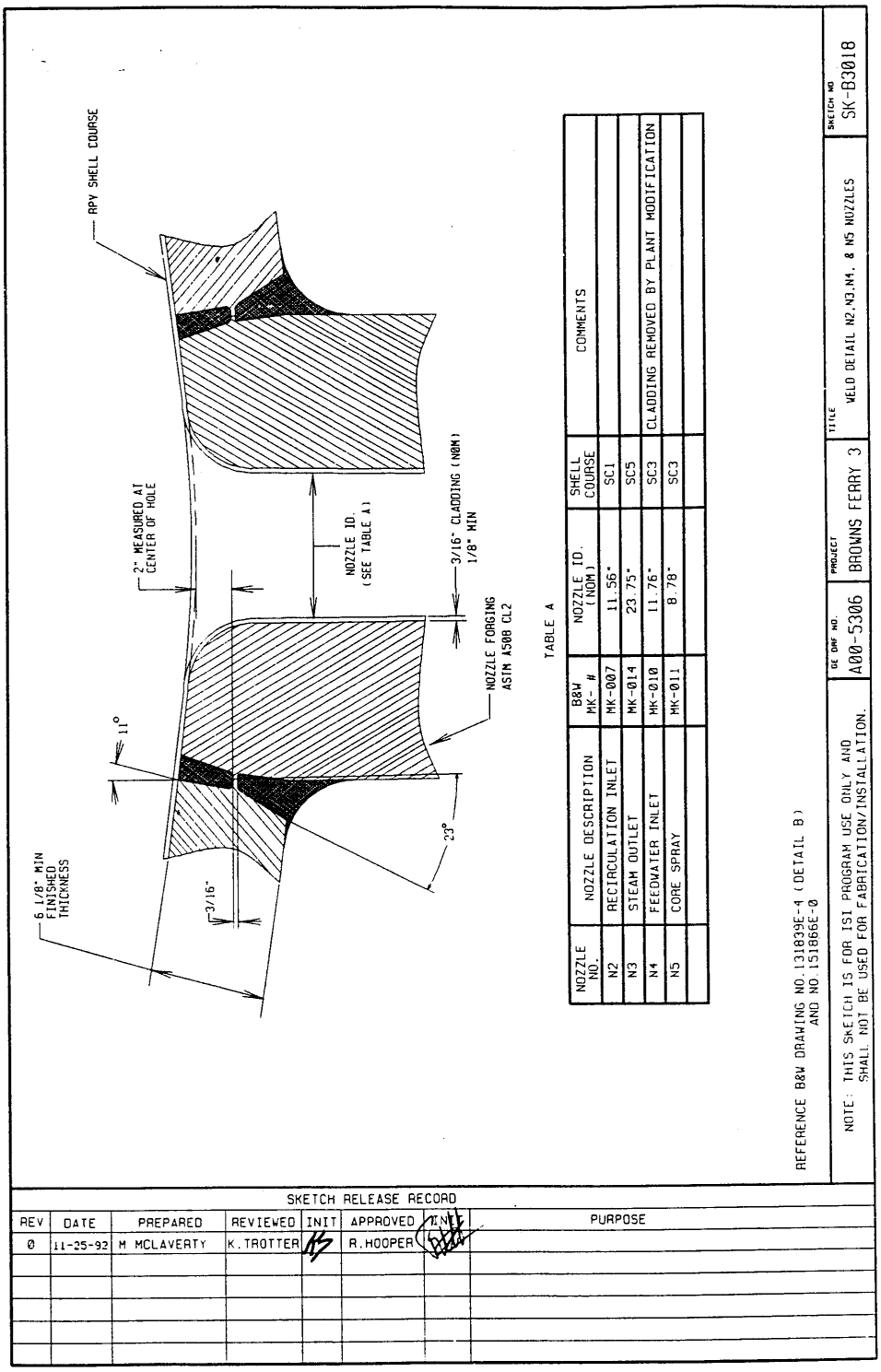


TABLE A

NOZZLE NO.	NOZZLE DESCRIPTION	B&W MK- #	NOZZLE ID. (NOM.)	SHELL COURSE	COMMENTS
N2	RECIRCULATION INLET	MK-007	11.56"	SC1	
N3	STEAM OUTLET	MK-014	23.75"	SC5	
N4	FEEDWATER INLET	MK-010	11.76"	SC3	CLADDING REMOVED BY PLANT MODIFICATION
N5	CORE SPRAY	MK-011	8.78"	SC3	

REFERENCE B&W DRAWING NO. 131839E-4 (DETAIL B)
AND NO. 151866E-0

NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

GE DWF NO. A00-5306

PROJECT BROWNS FERRY 3

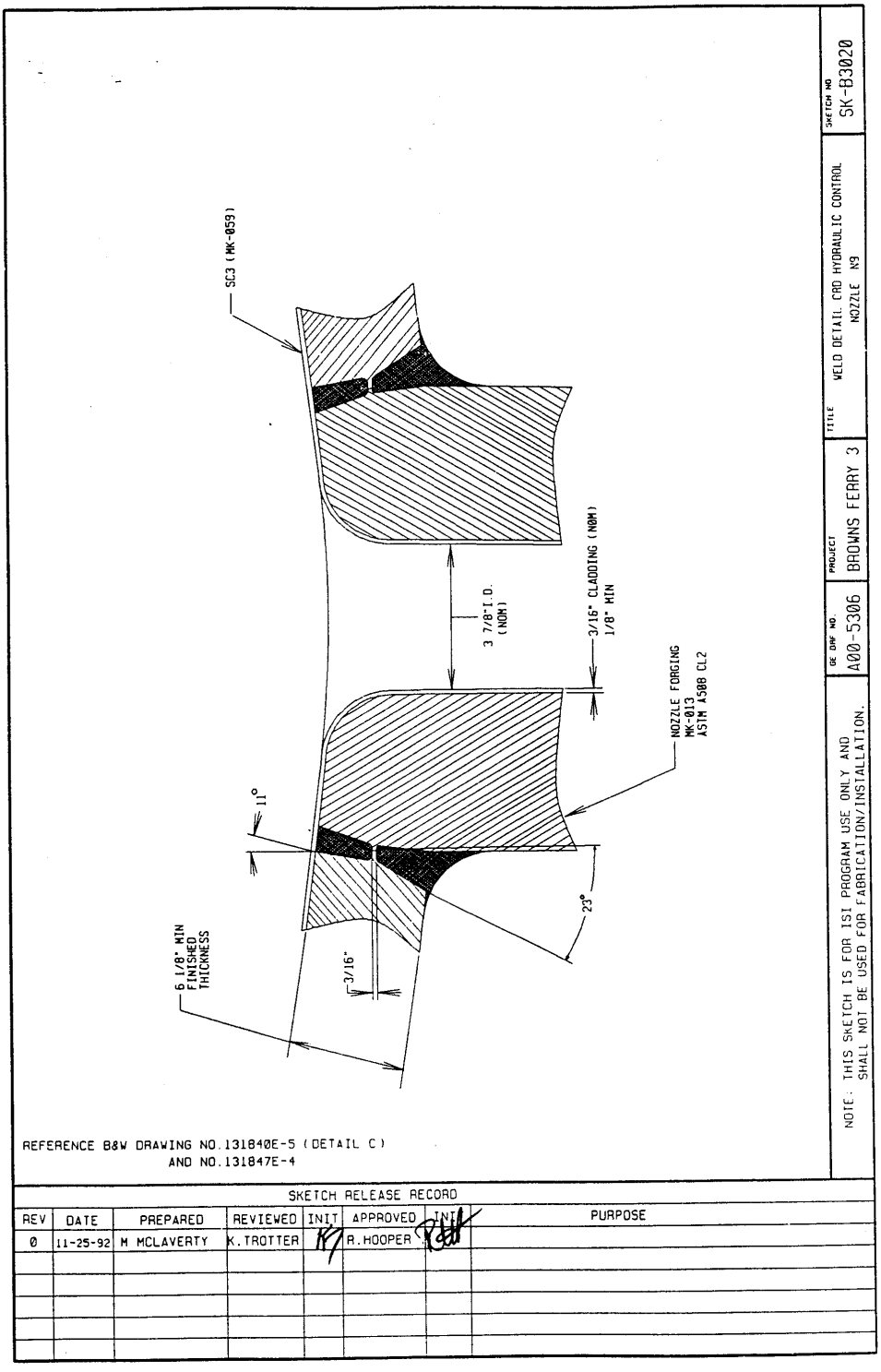
TITLE WELD DETAIL N2,N3,N4, & N5 NOZZLES

SKETCH NO SK-B3018

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	11-25-92	M MCLAVERTY	K.TROTTER	KT	R.HOOPER	RH	

SK-B3018



SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	11-25-92	M MCLAVERTY	K.TROTTER	KT	R.HOOPER	RH	

SK-B3020

Attachment B

3-ISI-14

UNIT 3 RPV NOZZLE EXAMINATIONS

REQUEST FOR RELIEF 3-ISI-14

UNIT 3 RPV NOZZLE EXAMINATIONS

Ultrasonic Examination					Enhanced Visual Examination
Nozzle	**Size**	**Date Examined**	**Report No.**	**Actual % Coverage**	**Estimated % Coverage**
N1A-IR	28″	10/8/98	R-205A	100	100
N1B-IR	28″	3/29/02	R-157	100	100
N3A-IR	26″	3/10/02	R-165	100	100
N3B-IR	26″	10/8/98	R-209A	100	100
N3C-IR	26″	11/17/93	R-1207	100	100
N3D-IR	26″	11/11/93	R-1178	100	100
*N9-IR	4″	4/1/02	R-173	100	100

***Non-operational/capped**

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-15

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
ASME SECTION XI INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-15

Executive Summary: In accordance with 10 CFR 50.55a(a)(3)(ii), TVA is requesting relief from inservice inspection requirements of the 1989 Edition no Addenda, Section XI of the ASME Boiler and Pressure Vessel Code for the volumetric examination of Class 1, reactor pressure vessel (RPV) nozzles inner radius section for the Recirculation Inlet loop, Jet Pump Instrumentation, and Core Spray nozzles. The examination requirement is for a volumetric examination of ASME Section XI, Examination Category B-D, Full Penetration Welded Nozzles in Vessels, Item No. B3.100, "Reactor Vessel Nozzle Inside Radius Section."

TVA is proposing to perform a remote enhanced visual VT-1 examination of the accessible surface (reactor internal piping configuration prevents placement of camera to obtain essentially 100 percent coverage) of the nozzle inner radius region for the specified nozzles.

TVA proposes to implement enhanced visual (VT-1) requirements in accordance with the acceptance criteria of Table IWB-3512-1 of the 1989 Edition, no Addenda of ASME Section XI Code.

For the Reactor pressure vessel nozzle inner radius sections, TVA will perform an enhanced remote visual (VT-1) examination, capable of a 1-mil wire resolution, in accordance with ASME Section XI, VT-1 requirements.

TVA considers that the proposed enhanced visual (VT-1) examination, capable of a 1-mil resolution, of the accessible portions of the nozzle inner radius region for the specified nozzles will provide an acceptable level of quality and safety. Further, compliance with the existing ASME Section XI requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Performance of the volumetric examination requires the examiner to enter and remain inside the biological shield penetration area around the nozzle for the duration of the ultrasonic examination, which takes approximately one hour. Dose rates for the specified RPV nozzles are in the range of 500 to 1200 millirem per hour, with shielding in place. Performance of these examinations results in an estimated personnel exposure of about 4.5 Rem per inspection interval. Performance of a visual examination using remote cameras essentially eliminates any personnel exposure.

This request for relief is consistent with one submitted by TVA for BFN Unit 2 (2-ISI-17) by letters dated April 23 and September 5, 2002. NRC approved this request for relief by letter dated October 7, 2002.

Unit: Three (3)

ISI Interval: ASME Section XI, Second Ten-Year ISI Interval, (November 19, 1996 to November 18, 2005)

System(s): Reactor Pressure Vessel (RPV)

Components: RPV Nozzles Inner Radius Section:

Reactor Recirculation Inlet Loop Nozzles, N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, and N2K (12-inch diameter) (Total of 10 nozzles) (See Attachment A, Sketch SK-B3018)

	Core Spray Nozzles, N5A and N5B (10-inch diameter) (Total of 2 nozzles) (See Attachment A, Sketch SK-B3018) Jet Pump Instrumentation Nozzles, N8A and N8B (4-inch diameter) (Total of 2 nozzles) (See Attachment A, Sketch SK-B3019)
ASME Code Class:	ASME Code Class 1
ASME Section XI Code Edition:	1989 Edition, no Addenda
Code Table:	IWB-2500-1
Examination Category:	B-D, "Full Penetration Welded Nozzles in Vessels"
Examination Item Number:	B3.100, "Nozzle Inside Radius Section," (Nozzles N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, N2K, N5A, N5B, N8A, and N8B)
Code Requirement:	The 1989 Edition, no Addenda of ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100, requires a volumetric examination of all reactor pressure vessel nozzles inner radius section welded with full penetration welds as shown in Figures IWB-2500-7(a) through (d).
Code Requirements From Which Relief Is Requested:	Relief is requested from the requirement to perform the volumetric examination of the reactor pressure vessel nozzles inner radius section (Nozzles N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, N2K, N5A, N5B, N8A, and N8B)
List Of Items Associated With The Relief Request:	Reactor Pressure Vessel Nozzles, N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, N2K, N5A, N5B, N8A, and N8B (Total of 14 nozzles)

Basis For Relief Request:

Pursuant to 10 CFR 50.55a(a)(3)(ii) TVA is requesting relief from ASME Section XI requirements to perform the volumetric examination described above. Performance of the volumetric examination results in significant personnel radiation exposure without a compensating increase in the level of plant quality or safety. TVA is proposing to perform a remote enhanced visual (VT-1) examination, capable of a 1-mil resolution, of the accessible portions of the nozzle inner radius region from inside the vessel for the specified RPV nozzles.

The volumetric examinations (ultrasonic) conducted from the outside surfaces are difficult and time consuming due to the asymmetrical configuration of both the nozzle outside surface (where the transducers are manipulated) and the inner radius section of the nozzle being interrogated. Examination of the asymmetrical surfaces may require several different transducer/wedge angle combinations and these are applied at certain azimuths around the nozzle weld blend area of the vessel surface. Different size nozzles usually require a separate set of transducer/wedge angle combinations and calibrations. Several hours may be required for the calibrations and examination of one typical nozzle inner radius section. An enhanced remote visual (VT-1) examination of the accessible regions of the nozzle inner radius sections from inside the RPV would provide assurance of the required coverage and indicate the presence of surface flaws. The performance of an enhanced remote visual (VT-1) examination would provide an acceptable examination without compromising the level of quality or safety.

The proposed examination would also provide a significant savings in examination resources and radiation exposure to examination and support personnel.

Alternate Examination:

TVA will perform the following examination on the specified nozzles:

For the reactor pressure vessel nozzles inner radius section, (N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, N2K, N5A, N5B, N8A, and N8B), TVA will perform an enhanced remote visual examination (VT-1), capable of a 1-mil wire resolution, in accordance with ASME Section XI, VT-1 requirements. This examination will be a remote visual examination from inside the vessel utilizing cameras. Visual examination of the inner radius section for the above nozzles is limited because the reactor internal piping configuration prevents placement of the camera in all positions necessary to examine the surface M-N [See Figures IWB-2500-7(a) through (d)] over the full circumference. This prevents the examination from obtaining essentially 100 percent coverage.

Note: As used above, "enhanced" in enhanced visual (VT-1) examination refers to the 1-mil standard at two feet that is to be demonstrated by the examiners to assure acceptable resolution sensitivity.

A detailed description of the examination limitations is provided below:

- N-2 nozzles (10), Recirculation Inlet - Thermal sleeve and jet pump riser piping. The inaccessible area is the inside bend radius of elbow at approximate clock positions 11:00 to 1:00, and at the bottom outside diameter bend of the elbow at approximate clock positions 5:00 to 7:00. The limitations are due to the proximity of the jet pump risers.

- N-5A and N-5B, Core Spray nozzles - Core spray thermal sleeve and tee box and feed water sparger. Feedwater spargers are located above the core spray nozzle and the configuration of the core spray thermal sleeve and tee box prohibits placement of the camera 360 degrees around the nozzle. The

limitations are at the top position at approximate clock positions 10:00 to 2:00, and the bottom position at approximate clock positions 4:00 to 8:00.

- N-8A and N-8B nozzles, Jet-Pump Instrumentation - 12 Instrumentation lines pass through the vessel wall into the vessel. The core shroud support plate is located directly beneath the nozzle preventing placement of the camera from approximate clock positions 4:00 to 8:00.

TVA is proposing to perform an enhanced visual (VT-1) examination using the most conservative surface flaw acceptance criteria of Table IWB-3512-1 of the 1989 Edition, no Addenda, of ASME Section XI Code. A maximum allowable a/t value of 2.5 percent will be used for the acceptance criteria with surface indications encountered using this alternative visual examination.

Surface indications that exceed 2.5 percent a/t value will be unacceptable for continued service until such time that they are deemed acceptable based on supplemental examinations performed in accordance with paragraph IWB-3412.2, the relevant conditions corrected or repaired in accordance with IWB-3412.3, or demonstrated to be acceptable through analytical evaluation in accordance with paragraph IWB-3412.4.

The estimated enhanced remote visual (VT-1) examination coverage for each nozzle is provided below.

Nozzle Type/No.	Estimated Coverage
Recirc Inlet, N2 (10 nozzles)	50%
Core Spray, N5 (2 nozzles)	40%
Jet Pump Instrumentation, N8 (2 nozzles)	60%

Justification For The Granting Of Relief:

The RPV nozzles were nondestructively examined during fabrication and have previously been examined using inservice ultrasonic techniques specific to the nozzle configuration. No indication of fabrication defects or service related cracking has been detected by these examinations. See Attachment B for nozzle listing, date of previous UT examination, and percent of UT examination coverage.

The limited remote visual (VT-1) examination of the RPV nozzles inner radius section does not significantly reduce the level of plant quality and safety for the following reasons:

- There are no mechanisms of damage other than fatigue for the nozzle inner radius, and for other than Feedwater nozzles, there is no cause for significant thermal cycling. Therefore, the primary flaw of concern would be a flaw that was not detected during the manufacturing process. The BFN Unit 3 RPV nozzles were examined during and after manufacturing by surface and volumetric techniques. Additionally, preservice and inservice ultrasonic examinations have detected no flaws. It is unlikely that flaws would be initiated by the fatigue mechanism.

- After approximately 18 years of operation (Unit 3 was shut down from March 1985 to November 1995), no cracking in the

subject BFN Unit 3 RPV nozzles inner radius region has been found.

- Fracture toughness tests performed at Oak Ridge National Laboratories[1] indicate there is a large flaw tolerance for BWR Nozzle inner radius regions. Even if flaw propagation was assumed, test results indicate a leak before break scenario would occur, which would not result in a significant increase in core damage frequency[2]. In addition, system pressure testing continues to be performed each refueling outage, and during plant operation the containment is monitored for changes in unidentified leakage.

- More than 50 percent of the total RPV nozzle population receives a complete (i.e., essentially 100 percent) nozzle inner radius examination.

- Visual examination of the accessible nozzle inner radius surface (zone M-N) provides reasonable assurance that deep flaws are not present. Additionally, when flaws are initiated by the fatigue mechanism, they typically are encountered over a significant portion of the circumference as was the case for cracking of Feedwater nozzles addressed in NUREG-0619.

In summary, fatigue cracking is the only relevant degradation mechanism for the RPV nozzle inner radius region, and for all nozzles other than Feedwater there is no significant thermal cycling during operation.

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1 & 2: Conclusions made in ASME NDE subcommittee report ISI-99-26, “Technical Basis for Elimination of Reactor Vessel Nozzle Inner Radius Inspections”

Therefore, from an industry experience perspective, there is no need to perform volumetric examination on any nozzles other than Feedwater and CRD return lines. This is supported by the fact that no service related cracking has ever been discovered in any of the BWR fleet RPV nozzles other than on Feedwater and CRD return lines.

The BFN Unit 3 Feedwater nozzles inner radius section will continue to be examined with ultrasonic techniques developed and qualified in accordance with GE-NE-523-A71-0594-A, Revision 1. The NRC accepted this methodology by letter to the Boiling Water Reactor Owners Group (BWROG) dated March 10, 2000. TVA notified the NRC by letter dated October 23, 2000 (TAC Nos. M08436 and M08437) that it was adopting the BWROG methodology.

The Feedwater nozzles alone represent 20 percent of all RPV nozzles currently requiring volumetric inner radius examination, which is more than industry accepted risk sampling requirements for similar items. Additionally, BFN request for relief 3-ISI-14 provides for a full (i.e., essentially 100 percent) enhanced visual (VT-1) examination of 7 other RPV nozzles, resulting in a complete examination of more than 50 percent of the total BFN Unit 3 RPV nozzle population.

Dose rates for the specified RPV nozzles are in the range of 500 to 1200 millirem per hour, with shielding in place. Performance of these examinations results in an estimated personnel exposure of about 4.5 Rem per inspection interval. Performance of a visual examination using remote cameras essentially eliminates any personnel exposure.

TVA believes complying with the specified Code requirements would result in hardship without a compensating increase in the level of quality and safety, and the proposed alternative examination provides reasonable

assurance of structural integrity of the subject nozzles while providing a significant reduction in personnel dose.

Implementation Schedule:

This request for relief is applicable to the BFN Unit 3, Second Ten-Year ASME Section XI Inservice Inspection Interval, (November 19, 1996 to November 18, 2005).

Attachments:

Attachment A - 3 sketches

Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3018, Recirculation N2 and Core Spray Nozzles N5

Sketch SK-B3019, Jet-Pump Nozzles N8

Attachment B - Table

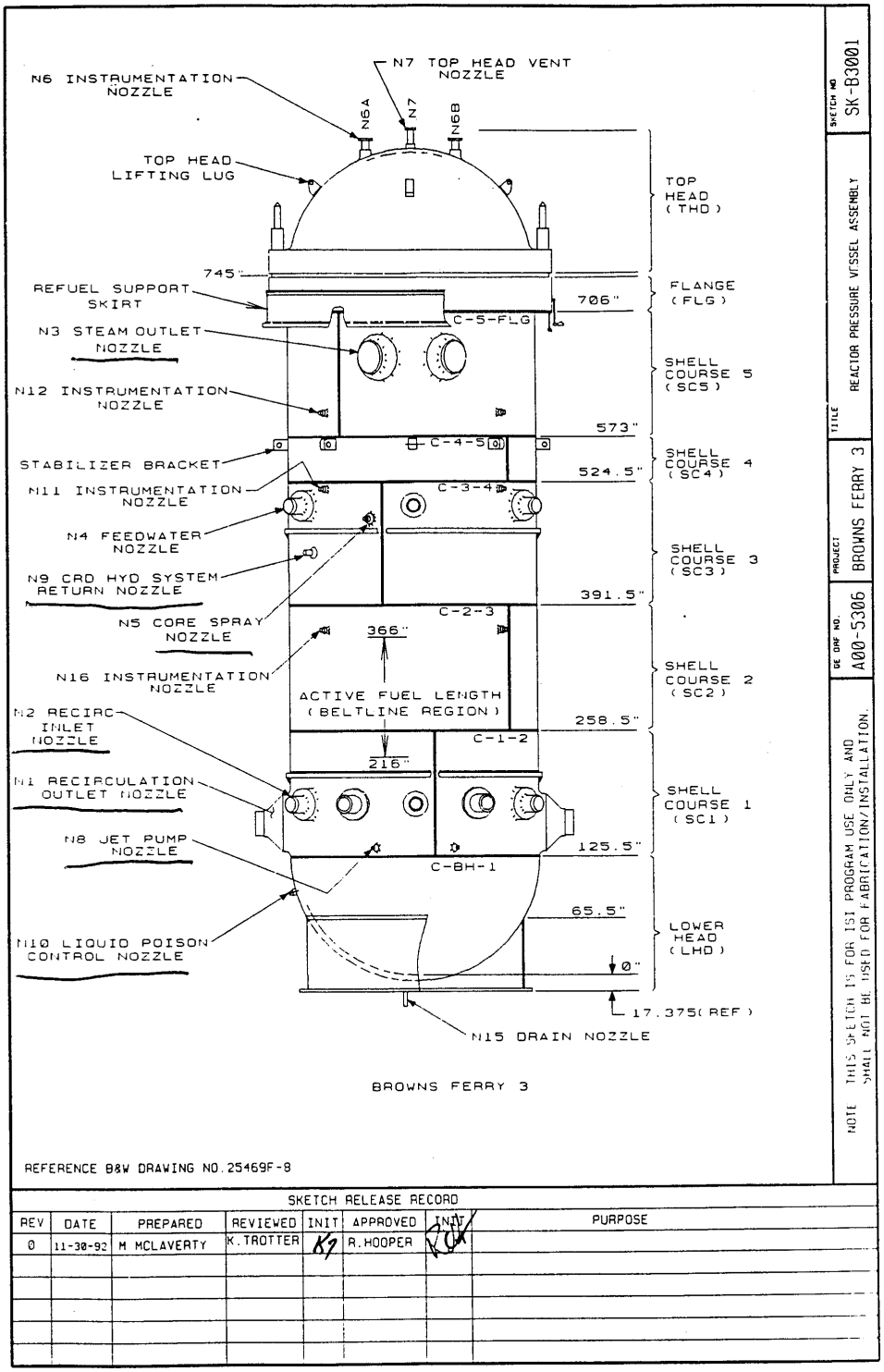
Unit 3 RPV Nozzle Examinations

Attachment A

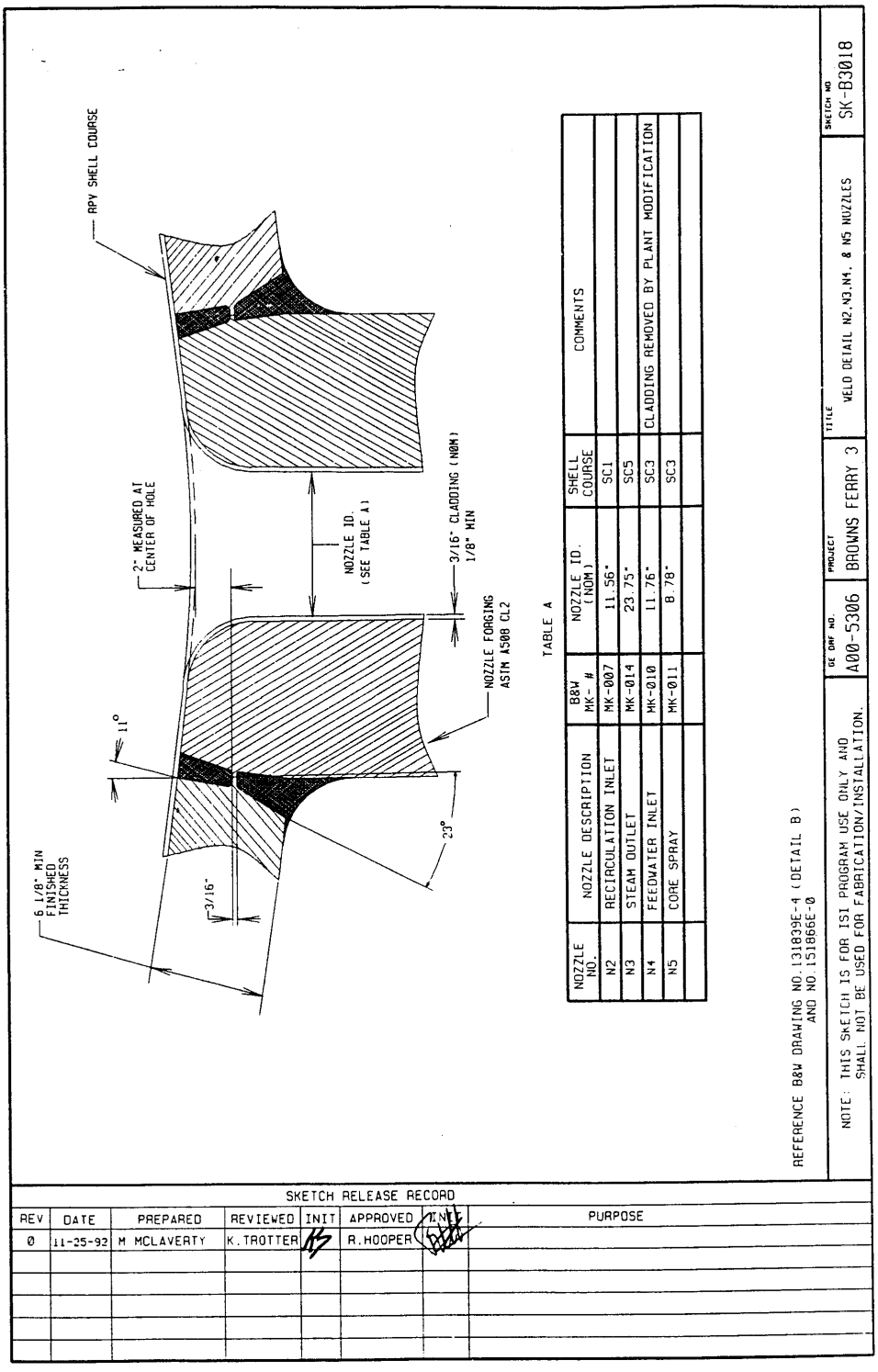
3-ISI-15

Three (3) Sketches

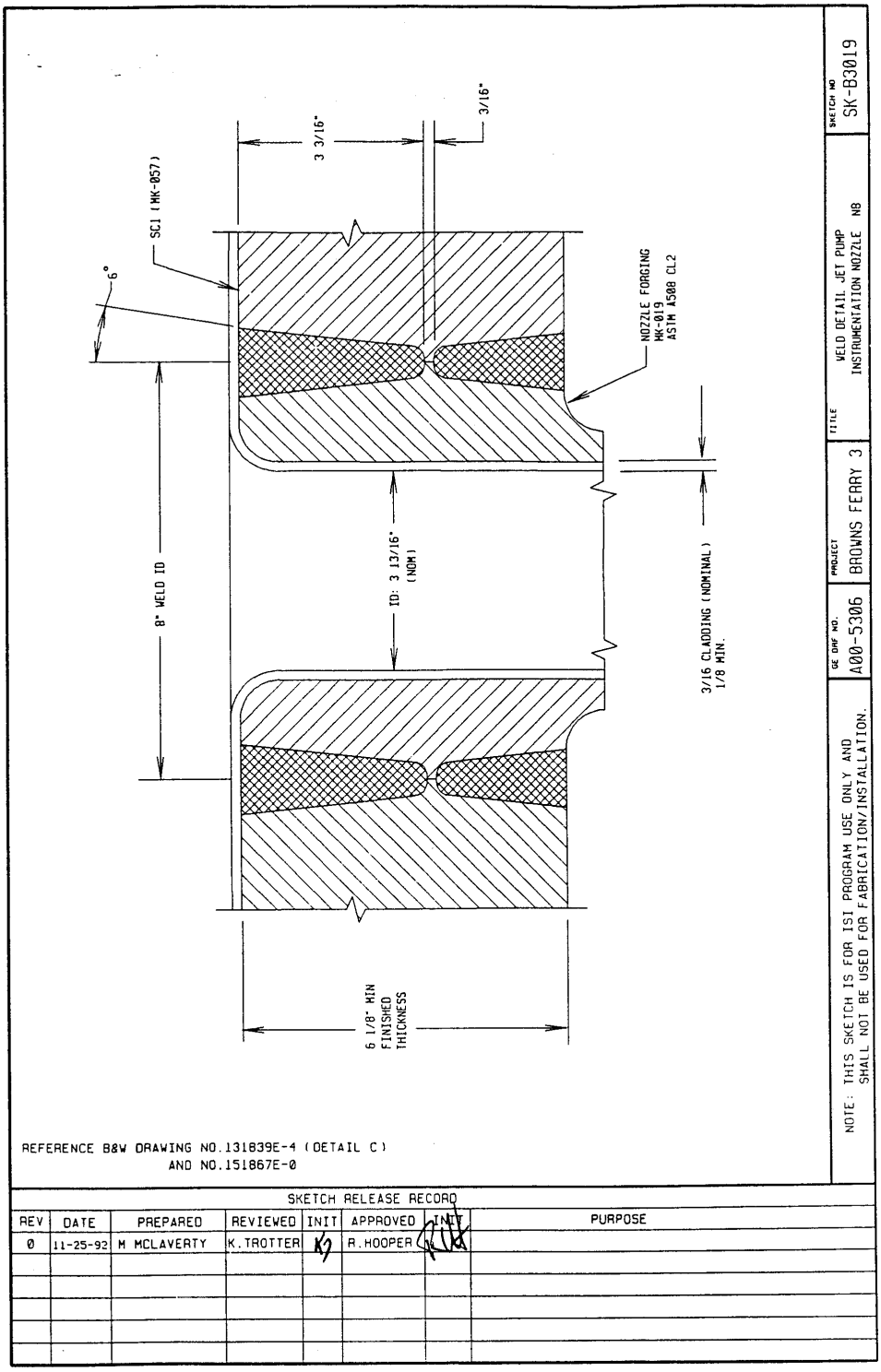
SK-B3001, RPV Assembly
SK-B3018, Recirculation N2 and Core Spray N5 Nozzles
SK-B3019, Jet-Pump Nozzles N8



Sketch SK-B3001



Sketch SK-B3018



Sketch SK-B3019

Attachment B

3-ISI-15

UNIT 3 RPV NOZZLE EXAMINATIONS

REQUEST FOR RELIEF 3-ISI-15

UNIT 3 RPV NOZZLE EXAMINATIONS

Ultrasonic Examination					Enhanced Visual Examination
Nozzle	**Size**	**Date Examined**	**Report No.**	**Actual UT % Coverage**	**Estimated % Coverage**
N2A-IR	12″	4/1/02	R-159	100	50
N2B-IR	12″	10/8/98	R-206A	100	50
N2C-IR	12″	4/1/02	R-161	100	50
N2D-IR	12″	10/8/98	R-207A	100	50
N2E-IR	12″	4/1/02	R-163	100	50
N2F-IR	12″	10/8/98	R-208A	100	50
N2G-IR	12″	12/8/81	R-165	100	50
N2H-IR	12″	11/12/93	R-1204	100	50
N2J-IR	12″	11/14/93	R-1205	100	50
N2K-IR	12″	11/15/93	R-1206	100	50
N5A-IR	10″	10/8/98	R-216A	100	40
N5B-IR	10″	3/31/02	R-171	100	40
N8A-IR	4″	10/9/98	R-217A	73	60
N8B-IR	4″	11/7/93	R-1185	100	60