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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Third Ten-Year Interval Inservice Inspection Plan For Arkansas Nuclear One, Unit 2

Gentlemen:

The third Ten-Year Interval Inservice Inspection Plan for Arkansas Nuclear One Unit 2 has been issued and will be effective from March 26, 2000, through and including March 25, 2010. This program complies with the 1992 edition and portions of the 1993 addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. In accordance with ASME Section XI, IWA-1400(c), a copy of the program plan is being provided for your information.

Should you have any questions or need additional information, please contact me.

Very truly yours,

Jimmy D. Vandergrift
Director, Nuclear Safety Assurance

JDV/fpv
Attachment

A047

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THIRD TEN-YEAR INTERVAL INSERVICE INSPECTION PLAN FOR ARKANSAS NUCLEAR ONE UNIT 2

ENTERGY OPERATIONS, INC.

REVISION 0

May 15, 2000

THIRD INTERVAL

INSERVICE INSPECTION PLAN

ARKANSAS NUCLEAR ONE - UNIT 2

Prepared by

6-13-00

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SECTION 1.0
INTRODUCTION AND PLAN DESCRIPTION

1.1 Overview

1.1.1 This Inservice Inspection Plan outlines the requirements for the inspection of Class 1, 2, and 3 pressure retaining components and their supports at Arkansas Nuclear One, Unit 2.

1.1.2 This Inservice Inspection Plan will be effective from March 26, 2000, through and including March 25, 2010, which represents the third ten-year interval for Arkansas Nuclear One, Unit 2.

1.1.3 The key features of this Plan are the Introduction and Plan Description, List of Applicable Drawings, Piping Line List, Summary Tables, Requests for Alternatives and Relief Requests. The details of the Inservice Inspection Program referenced in this Inservice Inspection Plan are contained in documents that are available at Arkansas Nuclear One. These documents include, but are not limited to, piping and instrument diagrams, piping isometric drawings, a database listing of each weld, valve, support, etc. in the Inservice Inspection Program and documents supporting implementation of the Inservice Inspection Program.

1.2 Basis of Inservice Inspection Plan

1.2.1 This Inservice Inspection Plan was developed in accordance with the requirements delineated in the lastest issue of 10 CFR 50.55a.

1.2.2 This Inservice Inspection Plan was developed in accordance with the 1992 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Subsections IWA, IWB, IWC, IWD, and IWF, for Inspection Program B. In addition, the following portions of the ASME Section XI 1993 Addenda will be adopted in lieu of the corresponding portions of the 1992 Edition.

1.2.2.1 General pressure test requirements of IWA-5000 consisting of Table IWA-5210-1, paragraph IWA-5250(a)(2) and paragraph IWA-5265(b).

1.2.2.2 Class 1 pressure test requirements consisting of Table IWB-2500-1, Examination Categories B-E and B-P, and Article IWB-5000 in its entirety.

1.2.2.3 Class 2 pressure test requirements consisting of Table IWC-2500-1, Examination Category C-H, and Article IWC-5000 in its entirety.

1.2.2.4 Class 3 pressure test requirements consisting of Article IWD-5000 in its entirety.

1.2.2.5 1995 Edition through and Including the 1995 Addenda

1.2.2.5.1 The NRC has approved the use of the 1995 Edition through the 1995 Addenda in 10 CFR 50.55a(b). Table 1.1 identifies the portions of the 1995 Addenda that have been adopted by Entergy for use.

TABLE 1.1
1995 ADDENDA

	Code Paragraph	Code Change Description	Related Requirements
1.	IWA-5213	IWA-5213 is revised to reflect a change in the required hold time after pressurization to test conditions prior to performing the visual examinations during the conduct of a system leakage test. This change eliminates the hold time after attaining the test pressure and temperature for periodic pressure testing. Repair/Replacement pressure testing hold times remain unchanged.	None

Accordingly, this Inservice Inspection Plan provides the details necessary for performing the inservice inspection of the Arkansas Nuclear One, Unit 2, Class 1, 2, and 3 pressure retaining components and supports.

1.2.3 ANO-2 has been issued an SER, letter 2CNA129805 dated December 29, 1998, to perform a Risk Informed alternative to the 1992 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Section XI, which is based on ASME Code Case N-578, “Risk-Informed Requirements for Class 1, 2, and 3 Piping – Method B,” and the Electric Power Research Institute (EPRI) Technical Report No. TR-106706, “Risk-informed Inspection Evaluation Procedure, Interim Report,” as augmented by ANO-2 plant-specific methodologies. The alternative is for the remaining license term of the plant.

1.2.4 Use of the 1992 Edition of ASME Section XI with the portions of the 1993 Addenda referenced in 1.2.2 was authorized by the Nuclear Regulatory Commission in the following letter dated December 12, 1996:

"Evaluation of Entergy Operations, Inc., Request for Authorization to Update Inservice Inspection Programs to the 1992 and Portions of the 1993 ASME Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94472, M94471, M94454, M94473, and M94488)"

1.2.5 The following ASME Section XI, 1992 Edition Subsections, Articles, or Paragraphs are not included or addressed in this Inservice Inspection Plan.

1.2.5.1 The containment liner and concrete inspection and testing requirements of Subsections IWE and IWL are not included in this Inservice Inspection Plan. The rules of Subsections IWE and IWL as invoked by 10CFR50 will be implemented in a separate submittal to the NRC staff.

1.2.5.2 The pump and valve testing requirements of Subsections IWP and IWV are not included in this Inservice Inspection Plan. The rules of IWP and IWV are addressed in a separate submittal to the NRC staff.

1.2.5.3 The snubber inservice inspection requirements of Article IWF-5000 are not addressed in this Inservice Inspection Plan. The extent, frequency, and acceptance standards for snubber assembly testing and inspection will be in accordance with Arkansas Nuclear One Unit 2 Technical Specification 3 / 4.7.8.

1.2.5.4 The steam generator tubing examination requirements of Table IWB-2500-1, Examination Category B-Q are not addressed in this Inservice Inspection Plan. As allowed by ASME Section XI, IWB-2413, the extent, frequency, and acceptance standards for steam generator tubing inspection and testing will be in accordance with Arkansas Nuclear One Unit 2 Technical Specification 3 / 4.4.5.

1.2.6 Alternative requirements to ASME Section XI are set forth in Section 5.0 of this Inservice Inspection Plan. Alternative requirements are in accordance with 10 CFR 50.55a and ASME Section XI.

1.2.7 With the exception of examinations that may be deferred until the end of the inspection interval as specified in Table IWB-2500-1, inservice inspections shall be performed in accordance with Inspection Program B as outlined in IWA-2432, IWB-2412, IWC-2412 and IWD-2412 of ASME Section XI. The inspection schedule for the third interval is divided into three periods such that approximately one third of the inspections will be completed every period. Successive inspections shall be in accordance with IWB-2420, IWC-2420,

IWD-2420 and IWF-2420. Deviations to inspection schedules may occur provided compliance with Code requirements is maintained.

1.3 System Classifications

1.3.2 The quality group classification system for water, steam, and radioactive waste containing components important to the safety of water-cooled nuclear power plants is established by NRC Regulatory Guide 1.26, Revision 3, in conjunction with 10 CFR 50.55a. Regulatory Guide 1.26, "Quality Group Classification and Standards", defines the Quality Group Classification System consisting of four Quality Groups, A through D. The definition of Quality Group A is provided by 10 CFR 50.2 under "Reactor Coolant Pressure Boundary". The definitions of Groups B, C, and D (Class 2, Class 3 and ISI non-classed, respectively) are provided by Regulatory Guide 1.26.

1.3.3 Piping and components subject to inservice inspection are shown on the Piping and Instrumentation Diagrams listed in Section 2.2 of this Inservice Inspection Plan. Specific piping lines subject to inservice inspection are documented in the Piping Line List shown in Section 3.0 of this Inservice Inspection Plan. Pursuant to 10 CFR 50.55a, the inservice inspection requirements of ASME Section XI have been assigned to these piping lines and components within the constraints of existing plant design.

1.3.4 Piping, components and supports classified as exempt from examination requirements are defined in ASME Section XI, paragraphs IWB-1220, IWC-1220, IWD-1220 and IWF-1230. In accordance with ASME Section XI, paragraph IWB-1220(a), piping may be exempted from the volumetric and surface examinations of ASME Section XI provided they are connected to the reactor coolant boundary, and are of such size and shape that upon a postulated rupture, the resulting flow of coolant under normal operating conditions is within the make-up capacity of the plant.

1.4 Augmented Inservice Inspection Requirements

Augmented inservice inspection requirements are those examinations that are specified by documents other than the ASME Section XI Code. Frequently, these augmented examinations are at the request of the Nuclear Regulatory Commission through such mechanisms as Bulletins, Notices and Regulatory Guides. However, the Inservice Inspection Program also addresses several plant specific, internal commitments. In some instances, these augmented examinations may include piping and components outside the ASME Section XI inservice inspection boundaries.

SECTION 2.0
INSERVICE INSPECTION PROGRAM DRAWINGS

This section provides a listing of the various drawings applicable to the Arkansas Nuclear One, Unit 2 Inservice Inspection Program.

2.1 Drawing Nomenclature

2.1.1 Zone Designators

Table 2.1 below lists the System Zone Designations used for the piping systems and components subject to inservice inspection at Arkansas Nuclear One, Unit 2.

TABLE 2.1
SYSTEM ZONE DESIGNATORS
(Starts on Next Page)

01	Reactor Pressure Vessel
02	Reactor Vessel Closure Head
03	Steam Generator 2E24A
04	Steam Generator 2E24B
05	Pressure Vessel
06	Hot Leg From reactor Vessel To SG 2E24A
07	Hot Leg From reactor Vessel To SG 2E24B
08	Cold Leg From SG 2E24A to RC Pump 2P32B
09	Cold Leg From RC Pump 2P32B To Reactor Vessel.
10	Cold Leg From SG 2E24A to RC Pump 2P32A
11	Cold Leg From RC Pump 2P32A To Reactor Vessel.
12	Cold Leg From SG 2E24B to RC Pump 2P32C
13	Cold Leg From RC Pump 2P32C To Reactor Vessel.
14	Cold Leg From SG 2E24B to RC Pump 2P32D
15	Cold Leg From RC Pump 2P32D To Reactor Vessel.
16	Pressure Surge Line
17	Feedwater Loop 1 (Inside Containment)
18	Main Steam Loop 1 (Inside Containment)
19	Feedwater Loop 2 (Inside Containment)
20	Main Steam Loop 2 (Inside Containment)
21	Safety Injection Loop 1A (Inside Containment)
22	Safety Injection Loop 1B (Inside Containment)
23	Safety Injection Loop 2A (Inside Containment)
24	Safety Injection Loop 2B (Inside Containment)
25	Shutdown Cooling Piping (Inside Containment)
26	Pressurizer Spray Piping (Loop 1A)
27	Pressurizer Spray Piping (Loop 1B)
28	Pressurizer Enclosure Spray Piping
29	Pressurizer Auxiliary Spray Piping
30	Shutdown Cooling Piping (Inside Containment)
31	Reactor Coolant Pump 2P32B
32	Reactor Coolant Pump 2P32A
33	Reactor Coolant Pump 2P32C
34	Reactor Coolant Pump 2P32D
35	Hot Leg Drain (Loop 1)
36	Cold Leg Drain (Loop 1A)
37	Cold Leg Drain (Loop 1B)
38	Cold Leg Drain (Loop 2A)
39	Cold Leg Drain (Loop 2B)
40	Charging Piping (Loop 1A)
41	Charging Piping (Loop 2A)
42	Pressurizer Safety Nozzles
43	Pressurizer LTOP Piping
44	Regenerative Heat Exchanger
45	Letdown Heat Exchanger

46	Low Pressure Safety Injection Pump 2P60A
47	Low Pressure Safety Injection Pump 2P60B
48	Shutdown Cooling Heat Exchanger 2E35A
49	Shutdown Cooling Heat Exchanger 2E35B
50	Shutdown Cooling and LPSI Pump Suction
51	Shutdown Cooling and LPSI Pump 2P60A Suction
52	Shutdown Cooling and LPSI Pump 2P60B Suction
53	LPSI Pump 2P60A and Combined Output
54	LPSI Pump 2P60B Output
55	LPSI Pumps Output
56	Shutdown Cooling Heat Exchanger Combined Output
57	Shutdown Cooling Heat Exchanger 2E35A Input
58	Shutdown Cooling Heat Exchanger 2E35B Input
59	Shutdown Cooling Heat Exchanger 2E35A Output
60	Shutdown Cooling Heat Exchanger 2E35B Output
61	Safety Injection Header
62	Feedwater Loop 1 (Outside Containment)
63	Main Steam Loop 1 (Outside Containment)
64	Feedwater Loop 2 (Outside Containment)
65	Main Steam Loop 2 (Outside Containment)
66	Safety Injection Subsystem
71	Service Water
72	Service Water
73	Service Water
75	Containment Spray Piping
76	Containment Spray Piping
77	Containment Spray Piping
78	Containment Spray Piping
79	Containment Spray Piping
80	High Pressure Safety Injection Piping
81	High Pressure Safety Injection Piping
82	High Pressure Safety Injection Piping
83	High Pressure Safety Injection Piping
85	Emergency Feedwater
86	Containment Spray Pump 2P35A
87	Containment Spray Pump 2P35B
88	High Pressure Safety Injection Pump 2P89A
89	High Pressure Safety Injection Pump 2P89B
90	High Pressure Safety Injection Pump 2P89C
91	Safety Injection (HPSI Pumps Suction)
92	Service Water
93	Safety Injection (RWST Recirc. Header)
94	Emergency Feedwater (T41B To 2P7A and 2P7B)
100	Augmented Inspections

2.1.2 Piping Classifications

2.1.2.1 Piping classifications are designated by a three-letter code. Listed below are the appropriate letter designations for piping at Arkansas Nuclear One, Unit 2. The first letter indicates the Standard Rating Class; the second letter, the type of material; and the third letter, the Code to which the piping is designed.

2.1.2.2 First Letter - Pressure Rating Class

B - 2500#
C - 1500#
D - 900#
E - 600#
F - 400#
G - 300#
H - 150#
J - 125# ANSI B16.1
K - 175# WOG Underwriter's Laboratories, Inc.
L - 250# ANSI B16.1
M - 200# WOG
N - 150# ANSI B16.24 (not used, historical reference only)
T - Tubing

Second Letter - Material

B - Carbon Steel
C - Stainless Steel
D - Copper, Brass, or Bronze
E - For General Use
F - As designated on Class Sheets
G - As designated on Class Sheets
J - Cast Iron – cement lined
H - Cast Iron
L - Carbon Steel – Impact Tested
S - Carpenter 20 Cb-3 Stainless Steel
N - Galvanized Carbon Steel
R - Fiberglass Reinforced

Third Letter - Design Codes

A - Nuclear Power Piping, ANSI B31.7, Class I
B - Nuclear Power Piping, ANSI B31.7, Class II
C - Nuclear Power Piping, ANSI B31.7, Class III
D - Code for Pressure Piping, ANSI B31.1.0
F - National Fire Protection Association Codes
J - American Water Works Standards

R - Copper Tubing per ANSI B31.5

2.1.3 Line Identification Numbers

The line numbers identified on the drawings listed herein provide useful information about the piping. The lines are identified using the following convention:

EBB - 03 - 10"

Pipe Classification (EBB)

Sequence Number (03)

Pipe Size (10")

Each line, or portion of line, is assigned a pipe classification, line sequence number, and pipe size. The line identification numbers can be cross referenced to the Piping Line List provided in Section 3.0 of this ISI Plan to determine the line description, system, P&ID and normal operating temperature and pressure. The pipe classification can be cross-referenced to Arkansas Nuclear One Specification ANO-M-2555 to determine the pipe schedule and material specification.

2.2 Piping and Instrumentation Diagrams

Table 2.2 provides a listing of the Piping and Instrumentation Diagrams (P&IDs) that depict the piping subject to inservice inspection at Arkansas Nuclear One, Unit 2.

TABLE 2.2
PIPING AND INSTRUMENTATION DIAGRAMS

P&ID	Sheet	Title
204	5	Emergency Feedwater Storage
210	1	Service Water
2202	4	Lube Oil, Oil Cooling, Electro / Hydraulic Control, and Main Steam
2204	4	Emergency Feedwater
2206	1	Steam Generator Secondary System
2206	2	Steam Generator Secondary System
2210	1	Service Water System
2210	2	Service Water System
2210	3	Service Water System
2212	4	Makeup Water Demineralization System
2213	1	Liquid Radioactive Waste System
2213	2	Liquid Radioactive Waste System
2213	8	Liquid Radioactive Waste System Reactor Building All Elevations
2214	1	Boron Management System
2215	1	Gaseous Radioactive Waste
2217	3	Emergency Diesel Generator Auxiliary Systems
2218	1	Service Air System
2218	2	Instrument Air System
2218	3	Instrument Air System
2218	5	Breathing Air System
2219	2	Fire Water
2220	1	Plant Heating System
2222	1	Chilled Water System: Containment, Turbine, and Aux. Bldg.
2230	1	Reactor Coolant System
2230	2	Reactor Coolant System
2231	1	Chemical Volume Control System
2231	2	Chemical Volume Control System
2232	1	Safety Injection System
2234	1	Component Cooling Water System
2235	1	Fuel Pool System
2236	1	Containment Spray System
2236	2	Containment Spray System
2237	1	Sampling System
2238	1	Reactor Coolant Pump Connections
2239	1	Nitrogen Addition System
2261	1	HVAC: Containment Building
2261	2	HVAC: Containment Building
2261	3	Post Accident Hydrogen Analysis System
2264	1	Containment Penetration Room Ventilation System

2.3 <u>Piping Isometric Drawings</u>

Table 2.3 provides a listing of the Piping Isometric Drawings for systems subject to inservice inspection. These drawings identify piping welds, flanges, valves, pumps, and piping supports that are within the non-exempt piping boundaries. In addition, system identifications, pipe classifications, pipe sizes, containment penetrations and piping configurations are identified. Piping and components that are exempt from nondestructive and visual examination in accordance with ASME Section XI, paragraphs IWB-1220, IWC-1220, and IWD-1220 may also be depicted on these drawings. If exempt piping or components are shown, it is for information only. Note that the drawing number is for sheet one unless otherwise specified in the table.

TABLE 2.3
PIPING ISOMETRIC DRAWINGS
(Starts on Next Page)

2GCB-7-1 (Sh. 2)	LOW PRESSURE SAFETY INJECTION DISCHARGE HEADER
2CBA-14-1	LARGE PIPE ISOMETRIC REACTOR COOLANT SYSTEM
2CCA-12-1	SMALL PIPE ISOMETRIC REACTOR COOLANT LETDOWN TO CONTROL VALVE 2CV-4821-1
2CCA-13-1	REACTOR COOLANT SYSTEM
2CCA-14-1	LARGE PIPING ISOMETRIC PRESSURIZER SPRAY SYSTEM
2CCA-15-1	DISCHARGE FROM SPRAY VALVES TO PRESSURIZER SPRAY SYSTEM HEADER
2CCA-15-2	LARGE PIPING ISOMETRIC PRESSURIZER SPRAY SYSTEM
2CCA-15-4	PRESSURIZER SPRAY SYSTEM
2CCA-16-1	CHEMICAL & VOLUME CONTROL SYSTEM
2CCA-16-2	AUXILIARY SPRAY FROM REGENERATIVE HEAT EXCHANGER
2CCA-21-1	SAFETY INJECTION TO RCP 2P-32B
2CCA-21-2	SAFETY INJECTION AND SHUTDOWN COOLING TO RCP 2P-32B
2CCA-22-1	SAFETY INJECTION & SHUTDOWN COOLING TO RCP2P-32A
2CCA-22-2	SAFETY INJECTION SUPPLY FROM VALVES 2SI-13A AND 2SI-14A
2CCA-23-1	SAFETY INJECTION TANK 2T-2D DISCHARGE PIPING
2CCA-23-1 (Sh. 2)	SAFETY INJECTION TANK 2T-2D DISCHARGE PIPING
2CCA-23-2	SAFETY INJECTION AND SHUTDOWN COOLING TO RCP 2P-32D
2CCA-24-1	SAFETY INJECTION FROM SI TANK 2T-2C TO 2CCA-8-30"
2CCA-24-1 (Sh. 3)	LARGE PIPE ISOMETRIC SAFETY INJECTION SYSTEM
2CCA-24-2	SAFETY INJECTION FROM CONTAINMENT PEN. 2P-29 AND 2P-30
2CCA-25-1	SHUTDOWN COOLING DISCHARGE FROM REACTOR COOLANT LOOP TO 2CV-5086-2
2CCA-25-2	SAFETY INJECTION PIPING FROM VALVE 2SI-19
2CCA-25-3	SAFETY INJECTION SYSTEM
2CCA-26-14	SMALL PIPE ISOMETRIC CHEMICAL & VOLUME CONTROL SYSTEM
2CCA-26-15	SMALL PIPE ISOMETRIC CHEMICAL & VOLUME CONTROL SYSTEM
2CCA-26-16	SAMLL PIPE ISOMETRIC CHEMICAL & VOLUME CONTROL SYSTEM
2CCA-27-1	SMALL PIPE ISOMETRIC CHARGING INLET FROM REGEN HEAT EXCHANGER
2CCA-27-2	CHARGING INLET FROM REGEN HEAT EXCHANGER TO 2CCA-6
2CCA-27-3	SMALL PIPE ISOMETRIC CHARGING INLET FROM REGEN HEAT EXCHANGER TO 2CCA-27-3
2CCA-27-4	SMALL PIPE ISOMETRIC CHARGING INLET FROM REGEN HEAT EXCHANGER
2CCA-29-1	REACTOR COOLANT DRAIN SYSTEM
2CCA-30-1	REACTOR COOLANT DRAIN SYSTEM TO REACTOR COOLANT TANK 2T-68
2CCA-31-1	SMALL PIPE ISOMETRIC REACTOR COOLANT SYSTEM DRAIN TO REACTOR COOLANT TANK
2CCA-32-1	REACTOR COOLANT DRAIN SYSTEM
2CCB-11-1	SMALL PIPE ISOMETRIC CHARGING PUMP DISCHARGE TO HIGH PRESSURE SAFETY INJECTION HEADER #1
2CCB-12-1	HIGH PRESSURE SAFETY INJECTION HEADER LOOP 1
2CCB-12-1	LARGE PIPE ISOMETRIC SAFETY INJECTION
2CCB-12-1 (Sh. 2)	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION HEADER LOOP 1
2CCB-13-2	LARGE PIPE ISOMETRIC FROM 2CV-5035-1 AND 2CV-5036-2 TO CONTAINMENT PENETRATION 2P-11
2CCB-13-3	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FROM FLUED HEAD 2P-11 TO

	VALVE 2SI-13B
2CCB-14-2	LARGE PIPE ISOMETRIC SAFETY INJECTION FORM VALVE 2CV-5015-1 AND 2CVB-5016-2 CONTAINMENT PENETRATION 2P-5
2CCB-14-3	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FRO CONTAINMENT PENERTATION 2P-5
2CCB-15-2	HIGH PRESSURE SAFETY INJECTION FROM VALVES 2CV-5075-1 AND 5076-2 TO CONTAINMENT PENETRATION 2P-25
2CCB-15-3	LARGE PIPE ISOMETRIC SAFETY INJECTION HEADER CORSS CONNECTION TO LOOP D
2CCB-3-1	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FORM CONTROL VALVE 2CV-5037-1 TO CONTAINMENT PENETRATION 2P-10
2CCB-4-1	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FORM CONTROL VALVE 2CV-5017-1 TO CONTAINMENT PENETRATION 2P-15
2CCB-5-1	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FORM CONTROL VALVE 2CV-5077-2 TO CONTAINMENT PENETRATION 2P-24
2CCB-5-2	SAFETY INJECTON FROM FLUED HEAD 2P-24 TO REACTOR COOLANT PUMP 2P-32D
2CCB-6-1	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FORM CONTROL VALVE 2CV-5077-2 TO CONTAINMENT PENETRATION 2P-24
2CCB-6-2	LARGE PIPE ISOMETRIC PENETRATION PIPING FROM FLUED HEAD 2P-29 TO VALVE 2SI-14C
2CCB-70-1	LARGE PIPE ISOMETRIC SHUTDOWN COOLING SUPPLY FROM HPSI HEADER #1
2CCB-70-2	LARGE PIPE ISOMETRIC SAFETY INJECTION SYSTEM FROM 2CCB-12 TO REACTOR COOLANT SYSTEM
2CCB-70-3	LARGE PIPE ISOMETRIC SAFETY INJECTION SYSTEM FROM LINE 2CCB-12 TO REACTOR COOLANT SYSTEM
2CCB-70-4	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION HEADER NUMBER 1 TO CONTAINMENT PENETRATION 2P-12
2CCB-7-1	LARGE PIPE ISOMETRIC SAFETY INJECTION SUPPLY FROM VALVES 2CV-5055-1 AND 2CV-5056-2 TO CONTAINMENT PENETRATION 2P-30
2CCB-71-1	LARGE PIPE ISOMETRIC SAFETY INJECTION
2CCB-71-2	LARGE PIPE ISOMETRIC SAFETY INJECTION FROM 2CCB-12 TO REACTOR COOLANT SYSTEM
2CCB-71-3	LARGE PIPE ISOMETRIC SHUTDOWN COOLING FROM HPSI HEADER #2
2CCB-71-4	LARGE PIPE ISOMETRIC SAFETY INJECTION
2CCB-71-5	LARGE PIPE ISOMETRIC FROM HPSI HEADER #2 TO REACTOR COOLANT SYSTEM
2CCB-7-2	LARGE PIPE ISOMETRIC SAFETY INJECTION PIPING FORM FLUED HEAD 2P-3- TO VALVE 2SI-13C
2CCB-76-1	LARGE PIPE ISOMETRIC SAFETY INJECTION
2DBB-1-1	LARGE PIPE ISOMETRIC FROM MAIN FEEDWATER SUPPLY TO STEAM GENERATOR 2E-24A
2DBB-1-2	MAIN FW SUPPLY TO STEAM GEN 2E-24A
2DBB-1-2 (Sh. 2)	MAIN FW SUPPLY TO STEAM GEN 2E-24A
2DBB-2-1	LARGE PIPE ISOMETRIC MAIN FEEDWATER SUPPLY TO STEAM GENERATOR 2E-24B FROM 2CV-1074-1
2DBC-1-1	EMERGENCY FEEDWATER POUMP2P-7B DISCHARGE TO STEAM GENERATOR 2E-24A
2DBC-1-1(Sh. 2)	2P-7A EMERGENCY FEEDWATER PUMP DISCHARGE PIPING TO 2E-24A STEAM GENERATOR
2DBC-1-2	FROM EMERGENCY FEEDWATER PUMP 2P-7B TO STEAM GENERATOR 2E-4B
2DBC-2-1	2P-7A EMERGENCY FEEDWATER PUMP DISCHARGE PIPING TO 2E-24A STEAM

	GENERATOR
2DBC-2-2	2P-7A EMERGENCY FEEDWATER PUMP DISCHARGE PIPING TO 2E-24A STEAM GENERATOR
2DBC-3-1	2P-7B EMERGENCY FEEDWATER PUMP DISCHARGE PIPING TO 2E-24B STEAM GENERATOR
2DBC-4-1	LARGE PIPE ISOMETRIC EMERGNECY FEEDWATER PUMP 2P-7A DISCHARGE TO STEAM GENERATOR 2E-24A
2DBC-4-1(Sh. 2)	LARGE PIPE ISOMETRIC EMERGNECY FEEDWATER PUMP 2P-7A DISCHARGE TO STEAM GENERATOR 2E-24A
2DBC-7-1	EMERGENCY FEEDWATER PUMP 2P-7A MINIMUM BYPASS
2DBC-8-1	SMALL PIPE ISOMETRIC EMERGENCY FEEDWATER PUMP 2P-7B MUNIMUM BYPASS
2DCB-1-1	LARGE PIPE ISOMETRIC HPSI PUMP 2P-89A DISCHARGE TO HIGH PRESSURE SAFETY INJECTION HEADER #1
2DCB-1-1 (Sh. 2)	LARGE PIPE ISOMETRIC HPSI PUMP 2P-89A DISCHARGE TO HIGH PRESSURE SAFETY INJECTION HEADER #1
2DCB-1-2	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMP 2P-89B & C DISCHARGE PIPING
2DCB-1-2 (Sh. 2)	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMP 2P-89B & C DISCHARGE PIPING
2DCB-3-1	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION
2DCB-3-2	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION HEADER LOOP 2
2DCB-3-2 (Sh. 2)	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION HEADER LOOP 2
2DCB-500-1	SMALL PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMP 2P-89C DISCHARGE TO REFUELING WATER TANK 2T-3
2DCB-502-1	SMALL PIPING ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMP 2P-89A DISCHARGE TO REFUELING WATER 2T-3
2DCB-502-1	SMALL PIPING ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMP 2P-89B DISCHARGE TO VALVE 2CV-5128-1
2DCB-511-1 (Sh. 2)	SMALL PIPE ISOMETRIC HPSI PUMP 2P-89A MINIMUM RECIRCULATION PIPING FROM VALVE 2SI-64 TO VALVE 2SI-64 TO VALVE 2BS-53
2DCB-511-2	SMALL PIPE ISOMETRIC HPSI PUMP MINIMUM RECIRCULATION PIPING
2DCB-511-3	SMALL PIPE ISOMETRIC HPSI PUMP MINIMUM RECIRCULATION PIPING
2DCB-511-4	SMALL PIPE ISOMETRIC HPSI PUMP MINIMUM RECIRCULATION FROM HPSI PUMP 2P-89A
2DCB-511-5	SMALL PIPE ISOMETRIC HPSI PUMP MINIMUM RECIRCULATION FROM HPSI PUMP 2P-89A
2EBB-1-1	MAIN STEAM FROM STEAM GENERATOR 2E-24A TO CONTAINMENT PENETRATION
2EBB-1-2	LARGE PIPE ISOMETRIC MAIN STEAM HEADER FROM PENETRATION 2P-1 TO MSIV 2CV-1010-1
2EBB-2-1	MAIN STEAM HEADER FROM STEAM GEN. 2E24B TO CONTAINMENT PEN. 2P-2
2EBB-2-2	SUPPLY FROM CONTAINMENT PENETRATION 2P-4 TO STEAM GENERATOR 2E-24B
2EBB-2-2	LARGE PIPE ISOMETRIC MAIN STEAM HEADER #2 FROM PENETRATION 2P-2 TO MSIV 2CV-1060-2
2EBB-8-1	LARGE PIPE ISOMETRIC MAIN STEAM HEADER FROM PENETRATION 2P-1 TO MSIV 2CV-1010-1
2GCA-5-4	2CCA-25 TO LOW PESSUE SAFETY INJECTION PUMP 2P-60A & B INLET
2GCB-1-1	LOW PRESSURE SAFETY INJECTION PUMP 2P-60A INLET
2GCB-11-1	LARGE PIPING ISOMETRIC CONTAINMENT SPRAY
2GCB-16-1	CONTAINMENT SPRAY DISCHARGE FROM SHUTDOWN COOLING HEAT

	EXCHANGER 2E-35A
2GCB-16-1 (Sh. 2)	CONTAINMENT SPRAY DISCHARGE FROM SHUTDOWN COOLING HEAT EXCHANGER 2E-35A
2GCB-17-1	DISCHARGE FROM SHUTDOWN COOLING HEAT EXCHANGER 2E-35B
2GCB-17-1 (Sh. 2)	DISCHARGE FROM SHUTDOWN COOLING HEAT EXCHANGER 2E-35B
2GCB-2-1	LOW PRESSURE SAFETY INJECTION PUMP 2P-60B INLET PIPING
2GCB-3-1	LOW PRESSURE SAFETY INJECTION PUMP 2P-60A DISCHARGE
2GCB-3-1	LOW PRESSURE SAFETY INJECTION PUMP 2P-60A DISCHARGE
2GCB-3-1 (Sh. 2)	LARGE PIPE ISOMETRIC LOW PRESSURE SAFETY INJECTION PUMP 2P-60A DISCHARGE
2GCB-3-2	LOW PRESSURE SAFETY INJECTION PUMPS DISCHARGE TO SHUTDOWN COOLING HEAT EXCHANGERS
2GCB-3-3	LARGE PIPE ISOMETRIC LOW PRESSURE SAFETY INJECTION PUMP 2P-60B DISCHARGE TO SHUTDOWN COOLONG HEAT EXCHANGER 2E-25B
2GCB-3-3	LOW PRESSUE SAFETY INJECTION POUMP 2P-60B DISCHARGE TO SHUTDOWN COOLING HEAT EXCHANGER 2E-35B
2GCB-5-1 (Sh. 1)	RC LOOP 2CCA-25 TO LPSI PUMP 2P-60A & 2P-60B
2GCB-5-1 (Sh. 3)	RC LOOP 2CCA-25 TO LPSI PUMP 2P-60A & 2P-60B
2GCB-5-2	REACTOR COOLANT LOOP TO LOW PRESSURE SAFETY INJECTION PUMP 2P-60B
2GCB-5-3	SAFETY INJECTION FROM REACTOR COOLANT LOOP TO LPSI PUMP 2P-60 A & B INLET
2GCB-7-1	LOW PRESSURE SAFETY INJECTION DISCHARGE HEADER
2GCB-7-1 (Sh. 2)	LOW PRESSURE SAFETY INJECTION DISCHARGE HEADER
2GCB-7-2	LOW PRESSURE SAFETY INJECTION HEADER TO CONTAINMENT PENETRATIONS 2P-10, 2P-24 & 2P-29
2GCB-7-2	LARGE PIPE ISOMETRIC LOW PRESSURE SAFETY INJECTION HEADER TO CONTAINMENT PENETRATIONS 2P-10, 2P-24 & 2P-29
2GCB-8-1	SHUTDOWN COOLING HEAT EXCHANGER DISCHARGE HEADER TO LOW PRESSURE SAFETY INJECTION HEADER
2GCB-9-1	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMPS 2P-89A INLET PIPING
2GCB-9-1	HIGH PRESSURE SAFETY INJECTION PUMP 2P-89A INLET PIPING
2GCB-9-2	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMPS 2P-89A, B & C SUPPLY
2GCB-9-3	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMPS 2P-89B & CINLET FROM CONTAINMENT SUMP
2GCB-9-3 (Sh. 2)	LARGE PIPE ISOMETRIC HIGH PRESSURE SAFETY INJECTION PUMPS 2P-89B & C INLET FROM CONTAINMENT SUMP
2HBB-2-1	SERVICE WATER SUPPLY FROM 2CV-1551-1 TO CONTAINMENT COOLING COILS 2VCC-2A & 2VCC-2B
2HBB-3-1	CONTAINMENT COOLING COIL SERVICE WATER SUPPLY TO CONTAINMENT PENETRATION 2P-55
2HBB-4-1	SERVICE WATER RETURN FROM CONTAINMENT COOLING COILS 2VCC-2A & 2VCC-2B TO VALVE 2CV-1591-1
2HBB-5-1	PENETRATION PIPING FROM COOLING COILS 2VCC-2C AND 2D
2HBC-103-1	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO 2CV-2 A & B
2HBC-103-2	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO 2VCC-2A
2HBC-103-3	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO 2VCC-2B
2HBC-104-1	SERVICE WATER SUPPLY TO 2VCC-2D

2HBC-104-2	SERVICE WATER SUPPLY TO 2VCC-2C & 2D
2HBC-104-3	SERVICE WATER SUPPLY TO 2VCC-2D
2HBC-105-1	SERVICE WATER RETURN FROM 2VCC-2A & 2B
2HBC-105-2	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO 2VCC-2B
2HBC-105-3	LARGE PIPING ISOMETRIC SERVICE WATER RETURN FORM 2VCC-2A & B
2HBC-106-1	LARGE PIPING ISOMETRIC SERVICE WATER RETURN
2HBC-106-2	LARGE PIPING ISOMETRIC SERVICE WATER RETURN FROM 2VCC-2C
2HBC-106-3	SERVICE WATER RETURN FROM 2VCC-2D
2HBC-106-4	LARGE PIPING ISOMETRIC SERVICE WATER RETURN FROM EMERGENCY DIESEL GENERATOR JACKET COOLER
2HBC-13-1	LARGE PIPE ISOMETRIC FROM CONTAINMENT SUMP TO CONTAINMENT SPRAY PUMP 2P-35B INLET
2HBC-13-1 (Sh. 2)	LARGE PIPE ISOMETRIC FROM CONTAINMENT SUMP TO CONTAINMENT SPRAY PUMP 2P-35B INLET
2HBC-24-1	LARGE PIPING ISOMETRIC REFUELING WATER TANK 2T-3 TO CONTAINMENT SPRAY PUMPS
2HBC-32-1	LARGE PIPE ISOMETRIC SERVICE WATER PUMP 2P-4A, 2P-4B AND 2P-4C DISCHARGE AND CROSSOVER PIPING
2HBC-33-1	SERVICE WATER SUPPLY HEADER #1
2HBC-33-2	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO HEADER #1
2HBC-34-1	LOOP II SERVICE WATER SUPPLY HEADER
2HBC-34-2	SERVICE WATER SUPPLY HEADER #2
2HBC-35-1 (Sh. 2)	LARGE PIPING ISOMETRIC SERVICE WATER SUPPLY TO SHUTDOWN HEAT EXCHANGER 2E-35A
2HBC-43-1	LOOP 2 SERVICE WATER SUPPLY TO SHUTDOWN COOLING HEAT EXCHANGER 2E-35B
2HBC-50-1	SERVICE WATER RETURN TO HEADER #1
2HBC-50-2	SERVICE WATER RETURN HEADER #2 TO 2CV-1541-1 SUPPLY TO EMERGENCY POND
2HBC-51-1	SERVICE WATER RETURN LOOP 2
2HBC-51-2	SERVICE WATER RETURN HEADER LOOP #2
2HBC-59-1	SERVICE WATER RETURN FORM SHUTDOWN COOLING HEAT EXCHANGER 2E-35A TO HEADER #2
2HBC-59-1	SERVICE WATER RETURN FROM SHUTDOWN COOLING HEAT EXCHANGER 2E-35A TO HEADER #2
2HBC-60-1	SERVICE WATER RETURN FROM SHUTDOWN COOLING HEAT EXCHANGER 2E-35B TO HEADER #2
2HBC-63-1	SERVICE WATER TO EMERGENCY DIESEL GENERATOR 2K-4A JACKET COOLER HEAT EXCHANGER 2E-64A
2HBC-63-1	SERVICE WATER TO EMERGENCY DIESEL GENERATOR 2K-4A JACKET COOLER HEAT EXCHANGER 2E-64A
2HBC-64-1	SERVICE WATER FROM LOOP II SERVICE WATER HEADER TO EMERGENCY DIESEL JACKET COOLER
2HBC-64-2	SERVICE WATER TO EMERGENCY DIESEL JACKET COOLER 2E-64B
2HBC-68-1	SERVICE WATER PIPING FROM LOOP 1 HEADER TO PENETRATION VALVE 2CV-1511-1
2HBC-69-1	SERVICE WATER PIPING TO CONTAINMENT COOLING COIL 2VCC-2D
2HBC75-1	SERVICE WATER FROM EMERGENCY DIESEL GENRATOR 2K-4A ENGINE JACKET TO RESERVOIR DISCHARGE

2HBC-75-1	SERVICE WATER FORM EMERGENCY DIESEL GENERATOR 2K-4A ENGINE JACKET TO RESERVOIR DISCHARGE
2HBC-75-1 (Sh. 2)	SERVICE WATER FORM EMERGENCY DIESEL GENERATOR 2K-4A ENGINE JACKET TO RESERVOIR DISCHARGE
2HBC-76-2	SERVICE WATER RETURN FROM EMERGENCY DIESEL GENERATOR JACKET COOLER 2E-20B
2HBC-77-1	LARGE PIPING ISOMETRIC SERVICE WATER RETURN FROM PENETRATION LINE 2HBB-4 TO RETURN HEADER
2HBC-78-1	SERVICE WATER RETURN FROM CONTAINMENT PENETRATION 2P-63 TO HEADER #2
2HBC-81-1	SERVICE WATER RETURN FROM FUEL POOL HEAT EXCHANGER 2E-27
2HBC-81-1	SERVICE WATER RETURN FROM FUEL POOL HEAT EXCHANGER 2E-27
2HBC-81-1 (Sh. 2)	SERVICE WATER RETURN FROM FUEL POOL HEAT EXCHANGER 2E-27
2HBC-81-2	SERVICE WATER RETURN PIPING FROM HEAT EXCHANGER 2E-27 TO SERVICE WATER HEADER
2HBC-83-1	SERVICE WATER RETURN TO EMERGENCY COOLING POND
2HBC-83-2	SERVICE WATER RETURN TO EMERGENCY COOLING POND
2HBC-85-1	EMERGENCY FEEDWATER PUMP 2P-7B INLET FROM SERVICE WATER HEADER #1
2HBC-85-1 (Sh. 2)	EMERGENCY FEEDWATER PUMP 2P-7B INLET FROM SERVICE WATER HEADER #1
2HBC-86-1	EMERGENCY FEEDWATER PUMP 2P-7A INLET FROM SERVICE WATER HEADER #2
2HBC-87-1	SERVICE WATER HEADER #2 SUPPLY TO SPENT FUEL POOL HEAT EXCHANGER
2HBC-87-2	SERVICE EATER TO PUEL POOL HEAT EXCHANGER
2HCB-10-1	LARGE PIPING ISOMETRIC FROM CONTAINMENT SPRAY PUMP
2HCB-10-1(Sh. 2)	LARGE PIPING ISOMETRIC FROM CONTAINMENT SPRAY PUMP 2P-35A TO SHUTDOWN COOLING HEAT EXCHANGER 2E-35A
2HCB-13-2	CONTAINMENT SUMP TO CONTAINMENT SPRAY PUMP 2P-35B
2HCB-15-1	LARGE PIPING ISOMETRIC FROM CONTAINMENT SPRAY TO CONTAINMENT SPRAY PUMP 2P-35A
2HCB-15-1	FROM CONTAINMENT SUMP TO CONTAINMENT SPRAY PUMP 2P-35A
2HCB-15-1 (Sh. 2)	LARGE PIPING ISOMETRIC FROM CONTAINMENT SPRAY TO CONTAINMENT SPRAY PUMP 2P-35A
2HCB-15-2	FROM CONTAINMENT SUMP TO CONTAINMENT SPRAY PUMP
2HCB-20-1	LARGE PIPING ISOMETRIC SUPPLY FROM VALVE 2CV-5612-1 TO FLUED HEAD 2P-17
2HCB-23-1	LARGE PIPE ISOMETRIC BUILDING SPRAY RECIRCULATION TO REFUELING WATER TANK 2T-3
2HCB-24-2	LARGE PIPING ISOMETRIC REFUELING WATER TANK 2T-3 TO CONTAINMENT SPRAY PUMPS
2HCB-26-1	LARGE PIPING ISOMETRIC FROM CONTAINMENT SPRAY PUMP 2P-35A SUPPLY
2HCB-27-1	LARGE PIPING ISOMETRIC CONTAINMENT SPRAY PUMP 2P-35B SUPPLY FROM CONTROL VALVE 2CV-5631-2
2HCB-27-1 (Sh. 2)	LARGE PIPING ISOMETRIC CONTAINMENT SPRAY PUMP 2P-35B SUPPLY FROM CONTROL VALVE 2CV-5631-2
2HCB-32-3	LARGE PIPE ISOMETRIC SERVICE WATER SUPPLY HEADER #1
2HCC-282-1	EMERGNECY FEEDWATER FROM T-41B TO PUMPS 2P_7A & B
2HCC-282-2	LARGE PIPE ISOMETRIC EMERGENCY FEEDWATER
2HCC-282-2	FROM CONDENSATE STORAGE TANK T-41B TO EMERGNECY FEEDWATER PUMPS 2P_7A & B
2HCC-282-3	FROM CONDENSATE STORAGE TANK T-41B TO EMERGNECY FEEDWATER PUMPS 2P_7A & B

2HCC-282-3 (Sh. 2)	LARGE PIPE ISOMETRIC CONDENSATE STORAGE TANK T-41B SUPPLY TO EMERGENCY FEEDWATER PUMPS 2P-7A & B
2HCC-282-4	LARGE PIPE ISOMETRIC CONDENSATE STORAGE TANK T-41B SUPPLY TO EMERGENCY FEEDWATER PUMPS 2P-7A & B
2HCC-282-5	EMERGENCY FEEDWATER
2HCC-282-5	FROM CONDENSATE STORAGE TANK T-41B TO EMERGNECY FEEDWATER PUMPS 2P_7A & B
2HCC-282-6	LARGE PIPE ISOMETRIC CONDENSATE STORAGE TANK T-41B SUPPLY TO EMERGENCY FEEDWATER PUMPS 2P-7A & B

SECTION 3.0
INSERVICE INSPECTION PIPING LINE LIST

The Inservice Inspection Piping Line List is a tabulation of the ASME Code Class 1, 2, and 3 lines at Arkansas Nuclear One, Unit 2. The table includes pertinent information on the piping lines within the inservice inspection boundaries.

The information that is included in the table is as follows: line number, pipe size, main P&ID, location coordinate of line on the main P&ID, additional P&ID, system, class, operating pressure, operating temperature, pipe schedule, pipe thickness, safety function, method of inspection, and exemption basis. These are listed in the order that they appear in the header of the table from left to right.

Under the heading of "Safety Function", the following safety function abbreviations have been assigned to Class 1, 2, and 3 lines. If a particular line serves more than one safety function, each one will be listed.

"R" – Reactor Residual Heat Removal (RHR)
"E" – Emergency Core Cooling (ECC)
"C" – Containment Heat Removal (CHR)

The following assumptions were used as the basis for the line list:

1) All vent and drain lines are not assigned a safety function.
2) Lines to safety valves, which are passive in design basis accidents and only provide for system overpressure protection are not assigned a safety function.
3) Service Water lines are assigned the same function as the component(s) they serve.
4) Reactor Building sump recirculation lines are not assigned an "R" safety function. They are listed as an "E" since they serve and ECC function.
5) Class 1, 2, and 3 **tubing** is typically not assigned a specific line number.
6) The Emergency Feedwater (EFW) pump recirculation lines are included since they are not isolated on EFW actuation.
7) Low Pressure Safety Injection recirculation lines are included since they are unisolable.
8) High Pressure Safety Injection pump recirculation lines beyond the applicable isolation valves are excluded since they are isolated on ECC actuation.
9) Test loops and system interconnections that are provided for operational convenience are not assigned a safety function.

Additional Notes:

1) Any lines that are exempt under Section XI Code Rules and not exempted under the Risk Informed Application are shown in the Exempt Basis Column (EX BASIS) as "N/A-Risk Inf". Any lines not exempted under Section XI Code Rules which are included in the Risk Informed Application are shown as "RISK".
2) Attempts were not made to obtain operating pressure and temperatures for some exempt piping.

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2BCA-001	12	2230-1	D7	2230-2	RCS	1	2250	611	140	1.125		Vol.	RISK
2BCA-014	3	2230-2	G3	N/A	RCS	1	2250	652	160	0.438		Vol.	RISK
2BCA-014	4	2230-2	G3	N/A	RCS	1	2250	652	120	.438		Vol.	RISK
2BCA-014	6	2230-2	F4	N/A	RCS	1	2250	652	120	0.562		Vol.	RISK
2BCA-016	.75	2230-2	G3	N/A	RCS	1	2250	652	160	0.219			IWB-1220.b.1
2CCA-001	42	2230-1	D5	N/A	RCS	1	2257	611	N/A	3.75		Vol.	RISK
2CCA-002	42	2230-1	D4	N/A	RCS	1	2250	611	N/A	3.75		Vol.	RISK
2CCA-003	30	2230-1	C8	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-004	30	2230-1	C7	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-005	30	2230-1	A8	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-006	30	2230-1	A7	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-007	30	2230-1	C2	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-008	30	2230-1	C3	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-009	30	2230-1	A2	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-010	30	2230-1	A3	2238-1	RCS	1	2250	553	N/A	3		Vol.	RISK
2CCA-012	.75	2230-1	D5	N/A	RCS	1	2250	553	160	0.219			IWB-1220.b.1
2CCA-012	2	2230-1	C8	2231-1	RCS	1	2250	553	160	0.344		Vol.	RISK
2CCA-013	3	2230-1	C7	2230-2	RCS	1	2250	553	160	0.438		Vol.	RISK
2CCA-014	3	2230-2	C2	2230-1	RCS	1	2250	553	160	0.438		Vol.	RISK
2CCA-015	3	2230-2	E2	N/A	RCS	1	2250	553	160	0.438		Vol.	RISK
2CCA-015	4	2230-2	E2	N/A	RCS	1	2250	553	120	0.438		Vol.	RISK
2CCA-016	2	2231-1	D8	2230-2	CVC	1	2250	140	160	0.344		Vol.	RISK
2CCA-017	1	2230-2	D5	2230-1	RCS	1	2250	582	160	.25			IWB-1220.b.1
2CCA-018	.75	2230-1	D7	2230-2	RCS	1	2250	611	160	0.219			IWB-1220.b.1
2CCA-021	12	2232-1	G8	2230-1	SIS	1	1000	150	140	1.125	E	Vol.	RISK
2CCA-021	3	2232-1	G5	N/A	SIS	1	1000	150	160	0.438	E	Surf, VT-3	N/A
2CCA-021	6	2232-1	G5	N/A	SIS	1	1000	150	120	0.562	E	Vol., Surf, VT-3	N/A
2CCA-021	8	2232-1	G5	N/A	SIS	1	1000	150	120	0.719	E	Vol., Surf, VT-3	N/A
2CCA-022	12	2232-1	E8	2230-1	SIS	1	1000	150	140	1.125	E	Vol.	RISK
2CCA-022	3	2232-1	E5	N/A	SIS	1	1000	150	160	0.438	E	Surf, VT-3	N/A
2CCA-022	6	2232-1	E5	N/A	SIS	1	1000	150	120	0.562	E	Vol., Surf, VT-3	N/A
2CCA-022	8	2232-1	E6	N/A	SIS	1	1000	150	120	0.719	E	Vol., Surf, VT-3	N/A
2CCA-023	12	2232-1	C8	2230-1	SIS	1	1000	150	140	1.125	E	Vol.	RISK
2CCA-023	3	2232-1	C5	N/A	SIS	1	1000	150	160	0.438	E	Vol., Surf, VT-3	N/A
2CCA-023	6	2232-1	C5	N/A	SIS	1	1000	150	120	0.562	E	Vol., Surf, VT-3	N/A
2CCA-023	8	2232-1	C6	N/A	SIS	1	1000	150	120	0.719	E	Vol., Surf, VT-3	N/A
2CCA-024	12	2232-1	A7	2230-1	SIS	1	1000	150	140	1.125	E	Vol.	RISK
2CCA-024	3	2232-1	A5	N/A	SIS	1	1000	150	160	0.438	E	Surf, VT-3	N/A
2CCA-024	6	2232-1	A5	N/A	SIS	1	1000	150	120	0.562	E	Vol., Surf, VT-3	N/A
2CCA-024	8	2232-1	A6	N/A	SIS	1	1000	150	120	0.719	E	Vol., Surf, VT-3	N/A
2CCA-025	14	2232-1	F8	2230-1	SIS	1	2250	300	140	1.25	E	Vol.	RISK
2CCA-025	3	2230-1	D3	N/A	SIS	1	2250	300	160	0.438	E	Vol.	RISK
2CCA-025	8	2232-1	F6	N/A	SIS	1	2250	300	120	0.719	E	Vol., Surf, VT-3	N/A
2CCA-026	2	2230-1	D8	2231-1	CVC	1	2250	200	160	0.344		Vol.	RISK
2CCA-027	2	2231-1	C8	2230-1	CVC	1	2250	200	160	0.344		Vol.	RISK
2CCA-029	2	2230-1	A8	N/A	BMS	1	2250	553	160	0.344		Surf, VT-3	N/A
2CCA-030	2	2230-1	C2	N/A	BMS	1	2250	553	160	0.344		Surf, VT-3	N/A
2CCA-031	2	2230-1	A2	N/A	BMS	1	2250	553	160	0.344		Surf, VT-3	N/A
2CCA-032	2	2230-1	D7	N/A	BMS	1	2250	611	160	0.344		Surf, VT-3	N/A
2CCA-038	1	2230-2	D1	N/A	RCP	1	2250	553	160	0.25			IWB-1220.b.1
2CCA-047	1	2230-2	D2	N/A	RCS	1	2250	553	160	0.25			IWB-1220.b.1
2CCA-051	1	2232-1	G7	N/A	SIS	1	610	120	160	0.25	E		IWB-1220.b.1
2CCA-052	1	2232-1	E7	N/A	SIS	1	610	120	160	0.25	E		IWB-1220.b.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2CCA-053	1	2232-1	C7	N/A	SIS	1	610	120	160	0.25	E		IWB-1220.b.1
2CCA-054	1	2232-1	A7	N/A	SIS	1	610	120	160	0.25	E		IWB-1220.b.1
2CCA-057	0.75	2232-1	F6	N/A	SIS	1	600	300	160	0.219	E		IWB-1220.b.1
2BCB-001	0.5	2237-1	G2	N/A	RCS	2	2250	611	160	0.188			IWC-1222.a
2BCB-001	0.75	2237-1	G2	N/A	RCS	2	2250	611	160	0.219			IWC-1222.a
2BCB-002	0.5	2237-1	G1	2230-2	RCS	2	2250	652	160	0.188			IWC-1222.a
2BCB-002	0.75	2230-2	G6	N/A	RCS	2	2250	652	160	0.219			IWC-1222.a
2BCB-003	0.75	2230-2	B4	N/A	RCS	2	2250	611	160	0.219			IWC-1222.a
2BCB-003	0.5	2230-2	B4	2237-1	RCS	2	2250	611	160	0.188			IWC-1222.a
2BCB-004	0.5	2237-1	H1	2230-1	RCS	2	2250	611	160	0.188			IWC-1222.a
2BCB-006	1	2230-2	E5	N/A	RCS	2	2250	611	160	0.25			IWC-1222.a
2BCB-007	1	2230-2	E4	N/A	RCS	2	2250	611	160	0.25			IWC-1222.a
2BCB-008	0.75	2230-2	E6	N/A	RCS	2	2250	611	160	0.219			IWC-1222.a
2BCB-009	0.75	2230-2	E4	N/A	RCS	2	2250	611	160	0.219			IWC-1222.a
2BCB-010	1	2230-2	D5	N/A	RCS	2	2250	611	160	0.25			IWC-1222.a
2BCB-011	1	2230-2	D4	N/A	RCS	2	2250	611	160	0.25			IWC-1222.a
2CCB-001	2.5	2231-1	E7	N/A	CVC	2	?	?	160	0.375		Vol.	N/A - Risk Inf.
2CCB-001	8	2231-1	E7	N/A	CVC	2			120	0.719			N/A
2CCB-001	2	2231-1	E7	N/A	CVC	2	2250	553	160	0.344		Vol.	N/A - Risk Inf.
2CCB-002	1	2231-1	D7	N/A	BMS	2	2250	450	160	0.344			IWC-1222.a
2CCB-002	2	2231-1	E6	N/A	CVC	2	2250	450	160	0.344		Vol.	N/A - Risk Inf.
2CCB-003	6	2232-1	G5	N/A	LPSI	2	150	150	120	0.562	R,E	Vol.	RISK
2CCB-004	6	2232-1	E5	N/A	LPSI	2	150	150	120	0.562	R,E	Vol.	RISK
2CCB-005	6	2232-1	C5	N/A	LPSI	2	150	150	120	0.562	R,E	Vol.	RISK
2CCB-006	6	2232-1	A5	N/A	LPSI	2	150	150	120	0.562	R,E	Vol.	RISK
2CCB-007	2	2232-1	B5	N/A	HPSI	2	1000	100	160	.344	E	Vol., Surf, VT-3	N/A
2CCB-007	3	2232-1	B5	N/A	HPSI	2	1000	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-008	1	2231-1	D6	N/A	CVC	2	2250	120	160	0.25			IWC-1222.a
2CCB-008	3	2231-1	B6	N/A	CVC	2	2250	120	160	0.438	E		IWC-1221.a.1
2CCB-009	2	2231-1	D7	N/A	CVC	2	2250	290	160	0.344	E		IWC-1221.a.1
2CCB-010	0.75	2231-1	C4	N/A	RCP	2	100	130	160	0.219			IWC-1222.a
2CCB-011	2	2231-1	A6	2232-1	HPSI	2	2250	120	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-012	2	2232-1	H5	N/A	HPSI	2	1250	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-012	3	2232-1	E4	N/A	HPSI	2	1250	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-012	4	2232-1	E4	N/A	HPSI	2	1250	100	120	0.438	E	Vol., Surf, VT-3	N/A
2CCB-013	2	2232-1	H5	N/A	HPSI	2	1000	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-013	3	2232-1	G5	N/A	HPSI	2	1000	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-014	2	2232-1	E5	N/A	HPSI	2	1000	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-014	3	2232-1	F5	N/A	HPSI	2	1000	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-015	2	2232-1	D5	N/A	HPSI	2	1000	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-015	3	2232-1	C5	N/A	HPSI	2	1000	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-016	1	2231-1	C6	N/A	CVC	2	2250	120	160	0.25			IWC-1222.a
2CCB-016	1.5	2231-1	C6	N/A	CVC	2	2250	120	160	0.281			IWC-1222.a
2CCB-017	1	2231-1	B6	N/A	CVC	2	2250	120	160	0.25			IWC-1222.a
2CCB-017	1.5	2231-1	B6	N/A	CVC	2	2250	120	160	0.281			IWC-1222.a
2CCB-018	1.5	2231-1	D5	N/A	CVC	2	2250	120	160	0.281			IWC-1222.a
2CCB-023	1.5	2232-1	D4	N/A	HPSI	2	1250	100	160	0.281	E		IWC-1221.b.1
2CCB-025	1	2231-1	D7	N/A	CVC	2	2250	120	160	0.281			IWC-1222.a
2CCB-025	2	2231-1	D6	N/A	CVC	2	2250	120	160	0.344	E		IWC-1221.a.1
2CCB-026	1	2231-1	B5	N/A	CVC	2	2250	120	160	0.344			IWC-1222.a
2CCB-027	1	2231-1	A6	N/A	CVC	2	2250	120	160	0.25			IWC-1222.a
2CCB-028	1	2231-1	C5	N/A	CVC	2	2250	120	160	0.25			IWC-1222.a
2CCB-048	0.75	2231-1	D4	2238	RCP	2	100	130	160	0.219			IWC-1222.a

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2CCB-048	1	2238-1	C6	N/A	RCP	2	100	130	160	0.25			IWC-1222.a
2CCB-049	0.75	2231-1	D4	2238	RCP	2	100	130	160	0.219			IWC-1222.a
2CCB-049	1	2238-1	B8	N/A	RCP	2	100	130	160	0.25			IWC-1222.a
2CCB-050	0.75	2231-1	D4	2238	RCP	2	100	130	160	0.219			IWC-1222.a
2CCB-050	1	2238-1	B8	N/A	RCP	2	100	130	160	0.25			IWC-1222.a
2CCB-051	0.75	2231-1	D4	2238	RCP	2	100	130	160	0.219			IWC-1222.a
2CCB-051	1	2238-1	B8	N/A	RCP	2	100	130	160	0.25			IWC-1222.a
2CCB-053	0.75	2231-1	D6	N/A	CVC	2	2250	200	160	0.219			IWC-1222.a
2CCB-054	0.75	2230-1	D6	N/A	RCS	2	2250	611	160	0.219			IWC-1222.a
2CCB-056	0.75	2238-1	A2	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-057	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-058	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-059	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-060	0.75	2238-1	A3	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-061	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-062	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-063	0.75	2238-1	B8	N/A	RCP	2	2250	553	160	0.219			IWC-1222.a
2CCB-064	0.75	2238-1	B3	N/A	CCS	2	ATM	100	160	0.219			IWC-1222.a
2CCB-065	0.75	2238-1	B8	N/A	CCS	2	ATM	100	160	0.219			IWC-1222.a
2CCB-066	0.75	2238-1	B8	N/A	CCS	2	ATM	100	160	0.219			IWC-1222.a
2CCB-067	0.75	2238-1	B8	N/A	CCS	2	ATM	100	160	0.219			IWC-1222.a
2CCB-068	1	2231-1	D7	N/A	CVC	2	2250	200	160	0.25			IWC-1222.a
2CCB-069	0.75	2230-1	E5	N/A	RCS	2	2250	582	160	0.219			IWC-1222.a
2CCB-069	1	2230-1	F5	N/A	RCS	2	2250	582	160	0.25			IWC-1222.a
2CCB-070	2	2232-1	E4	N/A	HPSI	2	1250	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-070	3	2232-1	E4	2230-1	HPSI	2	1250	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-071	2	2232-1	B4	N/A	HPSI	2	1250	100	160	0.344	E	Vol., Surf, VT-3	N/A
2CCB-071	3	2232-1	B4	2230-1	HPSI	2	1250	100	160	0.438	E	Vol., Surf, VT-3	N/A
2CCB-076	1	2230-2	H2	N/A	RCS	2	2250	611	160	0.25			IWC-1222.a
2DBB-001	18	2206-1	E7	N/A	EFW	2	985	455	80	0.938	R	Vol.	RISK
2DBB-001	24	2206-1	E7	N/A	EFW	2	985	455	80	1.218	R	Vol., Surf, VT-3	N/A
2DBB-002	18	2206-1	E2	N/A	EFW	2	985	455	80	0.938	R	Vol.	RISK
2DBB-002	24	2206-1	E2	N/A	EFW	2	985	455	80	1.218	R	Vol., Surf, VT-3	N/A
2DBB-003	4	2206-1	D8	2204-4	EFW	2	985	455	80	0.337	R	Vol.	N/A - Risk Inf.
2DBB-004	4	2206-1	D1	N/A	EFW	2	985	455	80	0.337	R	Vol.	N/A – Risk Inf.
2DBB-005	0.5	2237-1	F1	2206-1	SMP	2	900	530	80	0.147			IWC-1222.a
2DBB-005	0.75	2206-1	D7	N/A	SMP	2	900	530	80	0.154			IWC-1222.a
2DBB-006	0.5	2237-1	F1	2206-1	SMP	2	900	530	80	0.147			IWC-1222.a
2DBB-007	4	2206-1	D7	2206-2	SGS	2	900	530	80	0.337			IWC-1222.a
2DBB-008	4	2206-1	D2	2206-2	SGS	2	900	530	80	0.337			IWC-1222.a
2DBB-009	2	2206-1	D7	N/A	SGS	2	885	529	80	0.218			IWC-1222.a
2DBB-010	2	2206-1	D2	N/A	SGS	2	885	529	80	0.218			IWC-1222.a
2DBB-011	1	2206-1	D2	N/A	SGS	2	885	529	80	0.179			IWC-1222.a
2DBB-012	1	2206-1	C8	N/A	EFW	2	965	455	80	0.179	R		IWC-1221.a.1
2DBB-013	0.5	2206-1	E2	N/A	SGS	2	900	530	80	0.147			IWC-1222.a
2DBB-014	0.5	2206-1	E7	N/A	SGS	2	900	530	80	0.147			IWC-1222.a
2DBB-100	0.75	2206-1	D2	N/A	SGS	2	900	530	80	0.154			IWC-1222.a
2DBB-1000	0.75	2206-1	D6	N/A	SGS	2	900	530	80	0.154			IWC-1222.a
2DBB-1001	0.75	2206-1	D6	N/A	SGS	2	900	530	80	0.154			IWC-1222.a
2DBB-101	0.75	2206-1	D2	N/A	SGS	2	900	530	80	0.154			IWC-1222.a
2DCB-001	4	2232-1	D3	N/A	HPSI	2	1250	100	80S	0.337	E	Vol., Surf, VT-3	N/A
2DCB-002	4	2236-1	F3	N/A	CSS	2	700	100	80S	0.337	C,R,E		IWC-1221.a.1
2DCB-003	2	2232-1	G5	N/A	HPSI	2	1250	100	80S	0.218	E	Vol., Surf, VT-3	N/A

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2DCB-003	3	2232-1	D5	N/A	HPSI	2	1250	100	80S	0.3	E	Vol., Surf, VT-3	N/A
2DCB-003	4	2232-1	D5	N/A	HPSI	2	1250	100	80S	0.337	E	Vol., Surf, VT-3	N/A
2DCB-004	0.75	2232-1	A8	N/A	SIS	2	700	120	80S	0.154	E		IWC-1221.a.1
2DCB-004	2	2232-1	B8	N/A	SIS	2	700	120	80S	0.218	E		IWC-1221.a.1
2DCB-011	2	2236-1	F3	N/A	CSS	2	200	100	80S	0.218	C		IWC-1221.a.1
2DCB-013	2	2236-1	D4	N/A	CSS	2	200	100	80S	0.218	C		IWC-1221.a.1
2DCB-024	1	2232-1	D2	N/A	HPSI	2	1250	100	80S	0.191	E		IWC-1221.b.1
2DCB-025	1	2232-1	C2	N/A	HPSI	2	1250	100	80S	0.191	E		IWC-1221.b.1
2DCB-026	1	2232-1	C2	N/A	HPSI	2	1250	100	80S	0.191	E		IWC-1221.b.1
2DCB-500	2	2236-1	F3	2232-1	HPSI	2	1250	100	80S	0.218	E	Vol., Surf, VT-3	N/A
2DCB-501	2	2236-1	G3	2232-1	HPSI	2	1250	100	80S	0.218	E	Vol., Surf, VT-3	N/A
2DCB-502	2	2236-1	F3	2232-1	HPSI	2	1250	100	80S	0.218	E	Vol., Surf, VT-3	N/A
2DCB-504	2	2236-1	G3	2232-1	LPSI	2	150	150	80S	0.218	R,E		IWC-1221.a.1
2DCB-505	2	2232-1	F3	2236-1	LPSI	2	150	150	80S	0.218	R,E		IWC-1221.a.1
2DCB-506	0.75	2232-1	D3	N/A	HPSI	2	1250	100	80S	0.154	E		IWC-1221.b.1
2DCB-508	0.75	2232-1	C3	N/A	HPSI	2	1000	100	80S	0.154	E		IWC-1221.b.1
2DCB-511	2	2236-1	D2	2232-1	HPSI	2	1250	100	80	0.218	E	Vol., Surf, VT-3	N/A
2EBB-001	36	2206-1	F7	N/A	MS	2	885	529	N/A	1.8125	R	Vol., Surf, VT-3	N/A
2EBB-001	38	2206-1	G7	N/A	MS	2	885	529	N/A	1.167	R	Vol., Surf, VT-3	N/A
2EBB-001	38	2206-1	G7	N/A	MS	2	885	529	N/A	1.875	R	Vol., Surf, VT-3	N/A
2EBB-002	36	2206-1	F2	N/A	MS	2	885	529	N/A	1.8125	R	Vol., Surf, VT-3	N/A
2EBB-002	38	2206-1	G4	N/A	MS	2	885	529	N/A	1.167	R	Vol., Surf, VT-3	N/A
2EBB-002	38	2206-1	G4	N/A	MS	2	885	529	N/A	1.875	R	Vol., Surf, VT-3	N/A
2EBB-003	1	2206-1	F7	N/A	N2	2	885	529	80	0.179			IWC-1222.a
2EBB-004	1	2206-1	F2	N/A	N2	2	885	529	80	0.179			IWC-1222.a
2EBB-005	1	2239-1	G5	N/A	N2	2	625	100	80	0.179			IWC-1222.a
2EBB-006	4	2206-1	G5	N/A	MS	2	885	529	40	0.237	R	FAC	N/A - Risk Inf.
2EBB-007	4	2206-1	G4	N/A	MS	2	885	529	40	0.237	R	FAC	N/A - Risk Inf.
2EBB-008	10	2206-1	G5	N/A	MS	2	885	529	60	0.5	R	Vol., Surf, VT-3	N/A
2EBB-009	10	2206-1	G4	N/A	MS	2	885	529	60	0.5	R	Vol., Surf, VT-3	N/A
2EBB-012	0.75	2206-1	G2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-013	0.75	2206-1	G2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-014	0.75	2206-1	G7	N/A	MS	2	885	529	80	0.154			IWC-1222.a
2EBB-015	0.75	2206-1	G7	N/A	MS	2	885	529	80	0.154			IWC-1222.a
2EBB-016	2	2206-1	G5	N/A	SGS	2	885	529	80	0.218	R	FAC	N/A - Risk Inf.
2EBB-017	2	2206-1	G4	N/A	SGS	2	885	529	80	0.218	R	FAC	N/A - Risk Inf.
2EBB-018	1	2206-1	G5	N/A	SGS	2	885	529	80	0.179			IWC-1222.a
2EBB-019	1	2206-1	G6	N/A	SGS	2	885	529	80	0.179			IWC-1222.a
2EBB-020	0.75	2206-1	F7	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-021	0.75	2206-1	F7	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-022	0.75	2206-1	F7	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-023	0.75	2206-1	F7	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-024	0.75	2206-1	F2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-025	0.75	2206-1	F2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-026	0.75	2206-1	F2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-027	0.75	2206-1	F2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2EBB-030	0.5	2206-1	F3	N/A	SGS	2	900	530	80	0.147			IWC-1222.a
2EBB-031	0.5	2206-1	F7	N/A	SGS	2	900	530	80	0.147			IWC-1222.a
2EBB-032	1	2206-1	F5	N/A	SGS	2	885	529	80	0.179			IWC-1222.a
2EBB-033	0.75	2206-1	G4	N/A	SGS	2	880	520	80	0.154			IWC-1222.a
2EBB-033	1	2206-1	G4	N/A	SGS	2	880	520	80	0.179			IWC-1222.a
2EBB-034	0.75	2206-1	H6	N/A	MS	2			80	0.154			IWC-1222.a
2EBB-056	0.75	2206-1	H3	N/A	MS	2			80	0.154			IWC-1222.a

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2ECB-005	0.75	2206-1	G7	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2ECB-006	0.75	2206-1	G2	N/A	SGS	2	885	529	80	0.154			IWC-1222.a
2FCB-001	1	2232-1	H7	N/A	SIT	2	600	100	40s	0.133			IWC-1222.a
2FCB-002	1	2232-1	H7	N/A	N2	2	600	100	40s	0.133			IWC-1222.a
2FCB-003	12	2232-1	G7	N/A	SIT	2	600	100	40s	0.375	E		IWC-1221.c
2FCB-004	1	2232-1	G7	N/A	SIT	2	600	100	40s	0.133	E		IWC-1221.a.1
2FCB-004	2	2232-1	G7	N/A	SIT	2	600	100	40s	0.154	E		IWC-1221.a.1
2FCB-005	0.5	2237-1	A2	2232-1	LPSI	2	600	100	40s	0.109			IWC-1222.a
2FCB-005	0.75	2232-1	G6	N/A	SIT	2	600	100	40s	0.219			IWC-1222.a
2FCB-006	1	2232-1	F7	N/A	SIT	2	600	100	40s	0.133			IWC-1222.a
2FCB-007	1	2232-1	F7	N/A	N2	2	600	100	40s	0.133			IWC-1222.a
2FCB-008	12	2232-1	E7	N/A	SIT	2	600	100	40s	0.375	E		IWC-1221.c
2FCB-009	1	2232-1	E7	N/A	SIT	2	600	100	40s	0.133	E		IWC-1221.a.1
2FCB-009	2	2232-1	E7	N/A	SIT	2	600	100	40s	0.154	E		IWC-1221.a.1
2FCB-010	0.5	2237-1	E6	2232-1	LPSI	2	600	100	40s	0.109			IWC-1222.a
2FCB-010	0.75	2232-1	E6	N/A	SIT	2	600	100	40s	0.219			IWC-1222.a
2FCB-011	1	2232-1	D6	N/A	SIT	2	600	100	40s	0.133			IWC-1222.a
2FCB-012	1	2232-1	D7	N/A	N2	2	600	100	40s	0.133			IWC-1222.a
2FCB-013	12	2232-1	C7	N/A	SIT	2	600	100	40s	0.375	E		IWC-1221.c
2FCB-014	1	2232-1	D7	N/A	SIT	2	600	100	40s	0.133	E		IWC-1221.a.1
2FCB-014	2	2232-1	C7	N/A	SIT	2	600	100	40s	0.154	E		IWC-1221.a.1
2FCB-015	0.5	2237-1	B2	2232-1	LPSI	2	600	100	40s	0.109			IWC-1222.a
2FCB-015	0.75	2232-1	C6	N/A	SIT	2	600	100	40s	0.219			IWC-1222.a
2FCB-016	1	2232-1	B6	N/A	SIT	2	600	100	40s	0.133			IWC-1222.a
2FCB-017	1	2232-1	B7	N/A	N2	2	600	100	40s	0.133			IWC-1222.a
2FCB-018	12	2232-1	A7	N/A	SIT	2	600	100	40s	0.375	E		IWC-1221.c
2FCB-019	1	2232-1	B7	N/A	SIT	2	600	100	40s	0.133	E		IWC-1221.a.1
2FCB-019	2	2232-1	B7	N/A	SIT	2	600	100	40s	0.154	E		IWC-1221.a.1
2FCB-020	0.5	2237-1	B2	2232-1	LPSI	2	600	100	40s	0.109			IWC-1222.a
2FCB-020	0.75	2232-1	A6	2237-1	SIT	2	600	100	40s	0.219			IWC-1222.a
2FCB-021	1	2231-1	F7	N/A	CVC	2	460	120	40s	0.133			IWC-1222.a
2FCB-021	2	2231-1	F7	N/A	CVC	2	460	120	40s	0.154			IWC-1222.a
2FCB-022	2	2231-1	H3	N/A	CVC	2	460	442	40s	0.154			IWC-1222.a
2FCB-022	3	2231-1	E7	2232-1	LPSI	2	460	442	40	0.216			IWC-1222.a
2FCB-023	0.75	2237-1	B3	N/A	SMP	2	600	100	40s	0.219			IWC-1222.a
2FCB-1000	0.75	2232-1	E6	N/A	SIT	2	600	100	40s	0.219			IWC-1222.a
2FCB-1001	0.75	2232-1	G6	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1002	0.75	2232-1	B6	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1003	0.75	2232-1	D6	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1004	0.75	2232-1	E6	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1005	0.75	2232-1	C6	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1006	0.75	2232-1	B7	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2FCB-1007	0.75	2232-1	C7	N/A	SIT	2	600	100	40s	0.113			IWC-1222.a
2GCB-001	0.75	2232-1	G2	N/A	LPSI	2	ATM	150	40	0.113			IWC-1222.a
2GCB-001	12	2232-1	G2	N/A	LPSI	2	ATM	150	20	0.25	R,E	Vol., Surf, VT-3	N/A
2GCB-001	14	2232-1	G2	N/A	LPSI	2	ATM	150	20	0.312	R,E	Vol., Surf, VT-3	N/A
2GCB-002	12	2232-1	F2	N/A	LPSI	2	ATM	150	20	0.25	R,E	Vol., Surf, VT-3	N/A
2GCB-002	14	2232-1	F2	N/A	LPSI	2	ATM	150	20	0.312	R,E	Vol., Surf, VT-3	N/A
2GCB-003	12	2236-1	E5	2232-1	LPSI	2	150	150	20	0.25	R,E	Vol.	RISK
2GCB-003	14	2232-1	G3	N/A	LPSI	2	150	150	20	0.312	R,E	Vol., Surf, VT-3	N/A
2GCB-003	8	2232-1	G2	N/A	LPSI	2	150	150	20	0.25	R,E	Vol., Surf, VT-3	N/A
2GCB-005	14	2232-1	F4	N/A	LPSI	2	ATM	150	20	0.312	R	Vol., Surf, VT-3	N/A
2GCB-006	0.5	2232-1	G4	N/A	LPSI	2	ATM	150	40s	0.109			IWC-1222.a

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2GCB-007	10	2232-1	C4	N/A	LPSI	2	150	150	20	0.25	R,E	Vol., Surf, VT-3	N/A
2GCB-007	14	2232-1	G4	N/A	LPSI	2	150	150	20	0.312	R,E	Vol.	RISK
2GCB-007	4	2232-1	G4	N/A	LPSI	2	150	150	40	0.237			IWC-1222.a
2GCB-007	6	2232-1	G5	N/A	LPSI	2	150	150	40s	0.28	R,E	Vol.	RISK
2GCB-007	8	2232-1	G4	N/A	LPSI	2	150	150	20	0.25	R,E	Vol.	RISK
2GCB-008	0.75	2232-1	H4	N/A	SIS	2	150	150	160	0.219			IWC-1222.a
2GCB-008	1	2232-1	H4	N/A	SIS	2	150	150	160	0.25			IWC-1222.a
2GCB-008	12	2236-1	C7	N/A	LPSI	2	150	150	20	0.25	R	Vol., Surf, VT-3	N/A
2GCB-008	14	2236-1	C7	2232-1	LPSI	2	150	150	20	0.312	R	Vol., Surf, VT-3	N/A
2GCB-008	3	2232-1	H4	N/A	SIS	2	150	150	40	0.216			IWC-1222.a
2GCB-008	6	2236-1	E6	N/A	LPSI	2	150	150	40s	0.28	R	Vol., Surf, VT-3	N/A
2GCB-008	8	2232-1	G4	N/A	SIS	2	150	150	20	0.25	R	Vol., Surf, VT-3	N/A
2GCB-009	6	2232-1	D1	N/A	HPSI	2	ATM	120	40	0.28	E	Vol., Surf	N/A
2GCB-009	8	2232-1	D1	N/A	HPSI	2	ATM	120	40s	0.322	E	Vol., Surf, VT-3	N/A
2GCB-010	12	2236-1	E5	N/A	CSS	2	460	300	20	0.25	C,R	Vol., Surf, VT-3	N/A
2GCB-011	12	2236-1	D5	N/A	CSS	2	460	300	20	0.25	C,R	Vol., Surf, VT-3	N/A
2GCB-016	0.5	2236-1	D7	N/A	CSS	2			40	0.109			IWC-1222.a
2GCB-016	10	2236-1	D7	N/A	CSS	2	460	300	20	0.25	C	Vol., Surf, VT-3	N/A
2GCB-016	12	2236-1	E6	N/A	CSS	2	460	300	20	0.25	C,R	Vol., Surf, VT-3	N/A
2GCB-016	3	2236-1	D7	N/A	CSS	2	460	300	40	0.216			IWC-1222.a
2GCB-017	0.5	2236-1	C7	N/A	CSS	2			40	0.109			IWC-1222.a
2GCB-017	3	2236-1	C7	N/A	CSS	2	460	300	40	0.216			IWC-1222.a
2GCB-017	10	2236-1	C7	N/A	CSS	2	460	300	20	0.25	C	Vol., Surf, VT-3	N/A
2GCB-017	12	2236-1	C6	N/A	CSS	2	460	300	20	0.25	C,R	Vol., Surf, VT-3	N/A
2GCB-034	2	2236-1	D4	N/A	CSS	2	250	110	40s	0.154	C		IWC-1221.a.1
2GCB-035	2	2236-1	F4	N/A	CSS	2	250	110	40s	0.154	C		IWC-1221.a.1
2GCB-041	0.75	2232-1	F2	N/A	LPSI	2	150	150	40s	0.113			IWC-1222.a
2GCB-042	0.75	2232-1	G2	N/A	LPSI	2	150	150	40s	0.113			IWC-1222.a
2GCB-057	1	2236-1	E4	N/A	CSS	2	250	110	40s	0.133			IWC-1222.a
2GCB-061	1	2236-1	C4	N/A	CSS	2	250	110	40s	0.133			IWC-1222.a
2GCB-064	0.5	2236-1	D4	N/A	CSS	2	250	110	40	0.109			IWC-1222.a
2GCB-064	0.75	2236-1	D4	N/A	CSS	2	250	110	40s	0.113			IWC-1222.a
2GCB-065	0.5	2236-1	E4	N/A	CSS	2	250	110	40	0.109			IWC-1222.a
2GCB-065	0.75	2236-1	E4	N/A	CSS	2	250	110	40s	0.113			IWC-1222.a
2GCB-069	2	2236-1	D5	N/A	CSS	2	460	300	40s	0.154			IWC-1222.a
2GCB-070	2	2236-1	E5	N/A	CSS	2	460	300	40s	0.154			IWC-1222.a
2GCB-071	0.75	2236-1	D6	N/A	CSS	2	460	300	40s	0.113			IWC-1222.a
2GCB-072	0.75	2236-1	C6	N/A	CSS	2	460	300	40s	0.113			IWC-1222.a
2GCB-073	0.75	2236-1	E6	N/A	CSS	2	460	300	40s	0.113			IWC-1222.a
2GCB-074	0.75	2236-1	C6	N/A	CSS	2	460	300	40s	0.113			IWC-1222.a
2GCB-078	1.5	2232-1	F5	N/A	LPSI	2	ATM	150	40s	0.145			IWC-1222.a
2GCB-1000	0.75	2232-1	G1	N/A	LPSI	2			40	0.113			IWC-1222.a
2GCB-1001	0.75	2232-1	F1	N/A	LPSI	2			40	0.113			IWC-1222.a
2GCB-504	1	2232-1	F2	N/A	LPSI	2	150	150	40s	0.133			IWC-1222.a
2GCB-505	1	2232-1	F2	N/A	LPSI	2	150	150	40s	0.133			IWC-1222.a
2GCB-508	2	2232-1	G2	N/A	LPSI	2			40	0.154	R,E		IWC-1221.a.1
2GCB-509	2	2232-1	F3	N/A	LPSI	2	150	150	40s	0.154	R,E		IWC-1221.a.1
2GCB-512	0.75	2232-1	F4	N/A	LPSI	2	150	150	40s	0.113			IWC-1222.a
2GCB-513	4	2230-2	H4	N/A	RCS	2	300	417	40s	0.237			IWC-1222.a
2GCB-514	4	2230-2	H3	N/A	RCS	2	300	417	40s	0.237			IWC-1222.a
2HBB-001	2	2215-1	D7	N/A	GRW	2	3	120	80	0.218			IWC-1222.a
2HBB-002	12	2210-3	D6	N/A	SWS	2	70	72	STD	0.375	C	Vol.	RISK
2HBB-003	12	2210-3	G6	N/A	SWS	2	70	72	STD	0.375	C	Vol., Surf, VT-3	N/A

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HBB-004	12	2210-3	C4	N/A	SWS	2	55	172	STD	0.375	C	Vol., Surf, VT-3	N/A
2HBB-005	12	2210-3	E4	N/A	SWS	2	55	172	STD	0.375	C	Vol., Surf, VT-3	N/A
2HBB-006	2	2218-5	F3	N/A	HPAS	2	100	100	80	0.218			IWC-1222.a
2HBB-007	3	2218-1	G5	N/A	HPAS	2	100	100	40	0.216			IWC-1222.a
2HBB-008	3	2219-2	E4	N/A	FIRE	2	125	60	40	0.216			IWC-1222.a
2HBB-009	10	2234-1	B4	N/A	CCS	2	100	85	40	0.365			IWC-1222.c
2HBB-010	0.75	2234-1	G4	N/A	CCS	2	65	100	80	0.154			IWC-1222.a
2HBB-010	10	2234-1	G4	N/A	CCS	2	65	100	40	0.365			IWC-1222.c
2HBB-011	6	2222-1	H3	N/A	HVAC	2	90	50	40	0.28			IWC-1222.c
2HBB-012	6	2222-1	G3	N/A	HVAC	2			40	0.28			IWC-1222.c
2HBB-013	3	2220-1	D5	N/A	HVAC	2	90	200	40	0.216			IWC-1222.a
2HBB-014	3	2220-1	E5	N/A	HVAC	2	90	170	40	0.216			IWC-1222.a
2HBB-017	1	2239-1	C5	N/A	N2	2	3	120	80	0.179			IWC-1222.a
2HBB-018	0.75	2234-1	B4	N/A	CCS	2			80	0.154			IWC-1222.a
2HBB-025	54	2261-1	E7	N/A	CPS	2	0	100	N/A	0.375			IWC-1222.d
2HBB-026	54	2261-1	D7	N/A	CPS	2	0	111	N/A	0.375			IWC-1222.d
2HBB-027	1	2261-1	D7	N/A	CPS	2	25	170	80	0.179			IWC-1222.a
2HBB-028	1	2261-1	C7	N/A	CPS	2	25	170	80	0.179			IWC-1222.a
2HBB-031	6	2218-3	B2	N/A	HPAS	2	100	100	40	0.28			IWC-1222.d
2HCB-001	4	2214-1	F7	N/A	BMS	2	10	120	10s	0.12			IWC-1222.a
2HCB-002	2	2231-1	D5	N/A	CVC	2	50	120	40s	0.154			IWC-1222.a
2HCB-002	4	2231-1	C4	N/A	CVC	2	50	120	10s	0.12	E		IWC-1221.a.1
2HCB-003	10	2236-1	G7	N/A	CSS	2	160	300	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-003	2.5	2236-1	G6	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-003	3	2236-1	G6	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-003	4	2236-1	G6	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-003	6	2236-1	G6	N/A	CSS	2	160	300	10s	0.134	C		IWC-1221.d
2HCB-004	10	2236-1	G8	N/A	CSS	2	160	300	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-004	2.5	2236-1	G7	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-004	3	2236-1	G7	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-004	4	2236-1	G7	N/A	CSS	2	160	300	10s	0.12	C		IWC-1221.a.1
2HCB-004	6	2236-1	G7	N/A	CSS	2	160	300	10s	0.134	C		IWC-1221.d
2HCB-005	4	2213-1	H4	2213-8	LRW	2	ATM	300	10s	0.12			IWC-1222.a
2HCB-006	1	2236-1	F2	N/A	CSS	2	20	70	40s	0.133			IWC-1222.a
2HCB-007	3	2236-1	F1	2231-1, 2235-1	CSS	2	20	170	10s	0.12	E		IWC-1221.a.1
2HCB-009	1	2231-2	E7	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-009	3	2231-2	C7	N/A	CVC	2	5	150	10s	0.12			IWC-1222.a
2HCB-009	4	2231-2	E7	N/A	CVC	2	5	150	10s	0.12			IWC-1222.a
2HCB-013	0.75	2236-1	A4	N/A	CSS	2	75	244	40s	0.133			IWC-1222.a
2HCB-013	1	2236-1	A4	N/A	CSS	2	75	244	40s	0.133			IWC-1222.a
2HCB-013	14	2232-1	F1	2236-1	SIS	2	75	244	10s	0.188	C,E	Vol., Surf, VT-3	N/A
2HCB-013	20	2236-1	D2	N/A	CSS	2	75	244	10s	0.218	C,E	Vol., Surf, VT-3	N/A
2HCB-013	24	2236-1	B2	N/A	CSS	2	75	244	10s	0.25	C,E	Vol., Surf, VT-3	Partial (See Note 1) / N/A and RI
2HCB-013	8	2232-1	C1	2236-1	SIS	2	75	244	10s	0.148	E	Vol., Surf, VT-3	N/A
2HCB-014	1.5	2231-2	C4	N/A	CVC	2	100	150	50s	0.145			IWC-1222.a
2HCB-014	3	2231-2	E3	N/A	CVC	2	100	150	10s	0.12			IWC-1222.a
2HCB-015	0.75	2236-1	B4	N/A	CSS	2	75	244	40s	0.133			IWC-1222.a
2HCB-015	1	2236-1	B4	N/A	CSS	2	75	244	40s	0.133			IWC-1222.a
2HCB-015	14	2232-1	G1	2236-1	SIS	2	75	244	10s	0.188	C,E	Vol., Surf, VT-3	N/A
2HCB-015	20	2236-1	E2	N/A	CSS	2	75	244	10s	0.218	C,E	Vol., Surf, VT-3	N/A
2HCB-015	24	2236-1	B2	N/A	CSS	2	75	244	10s	0.25	C,E	Vol., Surf, VT-3	Partial (See Note 2)

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCB-015	8	2232-1	D1	2236-1	SIS	2	75	244	10s	0.148	E	Vol., Surf, VT-3	N/A
2HCB-017	3	2231-1	B4	N/A	CVC	2	20	120	10s	0.12			IWC-1222.a
2HCB-018	1.5	2231-2	H4	2231-1	CVC	2	50	70	40s	0.145			IWC-1222.a
2HCB-019	0.5	2231-2	D1	2231-1	CVC	2	50	120	40s	0.109			IWC-1222.a
2HCB-020	10	2236-1	E8	N/A	CSS	2	190	210	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-020	3	2236-1	D7	N/A	CSS	2	190	210	10s	0.12			IWC-1222.a
2HCB-021	10	2236-1	C8	N/A	CSS	2	190	210	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-021	3	2236-1	C7	N/A	CSS	2	190	210	10s	0.12			IWC-1222.a
2HCB-023	4	2236-1	G3	N/A	CSS	2	20	110	10s	0.134	C,R,E		IWC-1222.a
2HCB-023	6	2236-1	G4	N/A	CSS	2	20	110	10s	0.134	C,R,E	Vol., Surf, VT-3	N/A
2HCB-024	20	2236-1	F2	N/A	CSS	2	20	70	10s	0.218	C,E	Vol.	RISK
2HCB-024	24	2236-1	G2	N/A	CSS	2	20	70	10s	0.25	C,E	Vol., Surf, VT-3	N/A
2HCB-025	1	2231-2	A4	N/A	CVC	2	10	150	40	0.133			IWC-1222.a
2HCB-025	2	2231-2	F8	N/A	CVC	2	10	150	10s	0.109			IWC-1222.a
2HCB-026	10	2236-1	E4	N/A	CSS	2	30	220	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-026	14	2236-1	E3	N/A	CSS	2	30	220	10s	0.188	C	Vol., Surf, VT-3	N/A
2HCB-026	20	2236-1	F2	N/A	CSS	2	30	220	10s	0.218	C,E	Vol., Surf, VT-3	N/A
2HCB-027	10	2236-1	D4	N/A	CSS	2	30	220	10s	0.165	C	Vol., Surf, VT-3	N/A
2HCB-027	14	2236-1	D3	N/A	CSS	2	30	220	10s	0.188	C	Vol., Surf, VT-3	N/A
2HCB-027	20	2236-1	F2	N/A	CSS	2	30	220	10s	0.218	C,E	Vol.	RISK
2HCB-028	2	2235-1	A7	N/A	FPS	2	ATM	120	40s	0.154			IWC-1222.a
2HCB-029	3	2235-1	B7	N/A	FPS	2	20	120	10s	0.12			IWC-1222.a
2HCB-030	3	2236-1	H1	2231-1, 2235-1	FPS	2	70	120	10s	0.12			IWC-1222.a
2HCB-032	1	2231-2	A4	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-033	3	2231-2	G4	2231-1	CVC	2	100	150	10s	0.12			IWC-1222.a
2HCB-034	0.75	2237-1	C4	N/A	SMP	2	100	120	40s	0.113			IWC-1222.a
2HCB-037	8	2236-2	G5	N/A	CSS	2	30	70	10s	0.148			IWC-1222.c
2HCB-038	4	2236-2	E5	N/A	CSS	2	30	70	10s	0.12			IWC-1222.a
2HCB-039	4	2236-2	C5	N/A	CSS	2	30	70	10s	0.12			IWC-1222.a
2HCB-041	1	2236-2	G4	N/A	CSS	2	30	70	40s	0.133			IWC-1222.a
2HCB-042	3	2236-2	G5	N/A	CSS	2	30	70	10s	0.12			IWC-1222.a
2HCB-043	3	2231-1	G6	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-044	3	2231-1	H5	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-045	3	2231-1	D3	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-046	4	2231-1	B2	N/A	CVC	2	150	120	10s	0.12			IWC-1222.a
2HCB-047	0.5	2231-1	G7	N/A	CVC	2	70	120	40s	0.109			IWC-1222.a
2HCB-047	0.75	2231-1	H7	N/A	CVC	2	70	120	40s	0.113			IWC-1222.a
2HCB-047	3	2231-1	H6	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-048	0.5	2231-1	H5	2237-1	SMP	2	70	120	40s	0.109			IWC-1222.a
2HCB-049	3	2231-1	G3	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-050	2	2231-1	F3	N/A	CVC	2	70	120	40s	0.154			IWC-1222.a
2HCB-051	0.5	2231-1	D1	2237-1	SMP	2	70	120	40s	1.109			IWC-1222.a
2HCB-052	3	2231-1	D1	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-053	1.5	2213-2	G1	2231-1	LRW	2	70	120	40s	0.415			IWC-1222.a
2HCB-054	1	2231-1	C2	N/A	GRW	2	70	120	40s	0.133			IWC-1222.a
2HCB-055	0.5	2231-1	C2	N/A	SMP	2	15	120	40s	0.109			IWC-1222.a
2HCB-056	1	2231-1	C1	N/A	N2	2	15	120	40s	0.133			IWC-1222.a
2HCB-057	3	2231-1	C3	2231-2	CVC	2	15	120	10s	0.12			IWC-1222.a
2HCB-058	0.75	2231-1	B3	N/A	CVC	2	15	130	40s	0.113			IWC-1222.a
2HCB-059	1	2231-1	B3	N/A	LRW	2	15	1230	40s	0.133			IWC-1222.a
2HCB-060	3	2231-2	D6	N/A	CVC	2	5	150	10s	0.12			IWC-1222.a
2HCB-061	1	2231-2	G2	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCB-061	3	2231-2	H2	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-062	0.5	2231-1	G8	2237-1	SMP	2	70	120	40s	0.109			IWC-1222.a
2HCB-063	0.75	2235-1	B7	N/A	HPAS	2	ATM	120	40s	0.113			IWC-1222.a
2HCB-065	2	2230-2	A4	N/A	RCS	2	135	70	40s	0.154			IWC-1222.a
2HCB-066	2	2231-1	H6	N/A	CVC	2	70	120	40s	0.154			IWC-1222.a
2HCB-067	2	2231-1	C5	N/A	CVC	2	50	120	40s	0.154			IWC-1222.a
2HCB-068	2	2231-1	B5	N/A	CVC	2	50	120	40s	0.154			IWC-1222.a
2HCB-081	1	2231-2	E4	N/A	CVC	2	10	150	40	0.133			IWC-1222.a
2HCB-081	2	2231-2	E3	N/A	CVC	2	10	150	40s	0.154			IWC-1222.a
2HCB-084	0.75	2231-2	D5	N/A	CVC	2	5	150	40s	0.113			IWC-1222.a
2HCB-092	0.75	2231-2	D7	N/A	CVC	2	5	150	40s	0.113			IWC-1222.a
2HCB-093	2	2236-1	D8	N/A	CSS	2	210	300	40s	0.154	C		IWC-1221.a.1
2HCB-094	2	2236-1	C8	N/A	CSS	2	210	300	40s	0.154	C		IWC-1221.a.1
2HCB-096	1.5	2231-1	F4	N/A	CVC	2	70	120	40s	0.145			IWC-1222.a
2HCB-097	1.5	2231-1	F3	N/A	CVC	2	70	120	40s	0.145			IWC-1222.a
2HCB-099	1	2231-2	E5	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-100	1	2231-2	E5	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-101	1	2231-2	G3	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-102	1	2231-2	E5	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-103	1	2231-2	E7	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-104	1	2231-2	D7	N/A	SMP	2	5	150	40s	0.133			IWC-1222.a
2HCB-105	1	2231-2	F7	N/A	CVC	2	5	150	40s	0.133			IWC-1222.a
2HCB-106	1	2231-2	C4	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-107	1	2231-2	B4	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-107	0.375	2231-2	B4	N/A	CVC	2	100	150	40	0.91			IWC-1222.a
2HCB-124	0.75	2231-1	G5	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a
2HCB-129	0.75	2231-1	G3	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a
2HCB-130	0.75	2231-1	H6	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a
2HCB-134	1	2231-2	G6	N/A	SMP	2	5	150	40s	0.133			IWC-1222.a
2HCB-137	0.75	2231-2	E3	N/A	CVC	2	100	150	40s	0.113			IWC-1222.a
2HCB-139	0.75	2236-1	G3	N/A	CSS	2	20	150	40s	0.113			IWC-1222.a
2HCB-147	1.5	2231-1	F5	N/A	CVC	2	70	120	40s	0.145			IWC-1222.a
2HCB-148	1	2231-1	G6	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a
2HCB-149	0.75	2231-1	G6	N/A	CVC	2	70	120	40s	0.113			IWC-1222.a
2HCB-152	0.75	2231-1	B4	N/A	CVC	2	50	120	40s	0.113			IWC-1222.a
2HCB-154	2	2236-1	F8	N/A	CSS	2	160	289	40s	0.154	C		IWC-1221.a.1
2HCB-155	2	2236-1	F8	N/A	CSS	2	160	289	40s	0.154	C		IWC-1221.a.1
2HCB-156	3	2231-1	D3	N/A	CVC	2	70	120	10s	0.12			IWC-1222.a
2HCB-157	1	2231-1	E2	N/A	CVC	2	70	120	40s	0.133			IWC-1222.a
2HCB-159	2	2236-1	G8	N/A	CSS	2	103	300	40s	0.154	C		IWC-1221.a.1
2HCB-160	2	2236-1	G6	N/A	CSS	2	105	300	40s	0.154	C		IWC-1221.a.1
2HCB-163	1.5	2231-1	H7	N/A	CVC	2	70	120	40s	0.145			IWC-1222.a
2HCB-164	2	2261-1	F6	N/A	HPAS	2	25	170	40s	0.154			IWC-1222.a
2HCB-165	2	2261-1	E7	N/A	HPAS	2	25	170	40s	0.154			IWC-1222.a
2HCB-166	2	2261-1	G6	N/A	HPAS	2	25	170	40s	0.154			IWC-1222.a
2HCB-167	2	2261-1	F7	N/A	HPAS	2	25	170	40s	0.154			IWC-1222.a
2HCB-168	1	2231-2	D3	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-169	0.75	2231-2	C2	N/A	CVC	2	100	150	40	0.113			IWC-1222.a
2HCB-169	1	2231-2	B3	N/A	CVC	2	100	150	40s	0.133			IWC-1222.a
2HCB-170	1.5	2213-2	G1	2231-1	LRW	2	70	120	40s	0.145			IWC-1222.a
2HCB-171	1.5	2213-2	F1	2231-1	LRW	2	70	120	40s	0.145			IWC-1222.a
2HCB-172	3	2231-1	F5	N/A	CVC	2			10	0.12			IWC-1222.a
2HCB-173	0.75	2218-2	E1	N/A	HPAS	2	0	105	40s	0.113			IWC-1222.a

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCB-174	0.75	2218-2	E1	N/A	HPAS	2	0	105	40s	0.113			IWC-1222.a
2HCB-178	0.5	2231-1	D4	N/A	CVC	2	70	120	40s	0.109			IWC-1222.a
2HCB-179	3	2231-1	D3	2232-1	CVC	2	70	120	40s	0.12			IWC-1222.a
2HCB-180	0.75	2232-1	F4	N/A	CVC	2	70	120	40s	0.113			IWC-1222.a
2HCB-190	1	2210-3	E6	N/A	SWS	2			40	0.133			IWC-1222.a
2HCB-191	1	2210-3	G6	N/A	SWS	2			40	0.133			IWC-1222.a
2HCB-192	1	2236-1	B4	N/A	CSS	2			40	0.133			IWC-1222.a
2HCB-192	0.75	2236-1	B4	N/A	CSS	2			80	0.154			IWC-1222.a
2HCB-193	1	2236-1	B4	N/A	CSS	2			40	0.133			IWC-1222.a
2HCB-193	0.75	2236-1	B4	N/A	CSS	2			80	0.154			IWC-1222.a
2HCB-194	2	2231-2	F7	N/A	CVC	2			40	0.154			IWC-1222.a
2CCC-006	0.75	2238-1	C3	N/A	RCP	3	50	130	160	0.219			IWD-1220.a.1
2CCC-007	0.75	2238-1	C3	N/A	RCP	3	745	130	160	0.219			IWD-1220.a.1
2CCC-008	0.75	2238-1	B3	N/A	RCP	3	1490	130	160	0.219			IWD-1220.a.1
2CCC-010	1.5	2238-1	D4	N/A	RCP	3	100	130	160	0.281			IWD-1220.a.1
2CCC-010	2	2238-1	D5	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-011	0.75	2238-1	D3	N/A	RCP	3	100	130	160	0.219			IWD-1220.a.1
2CCC-011	1.5	2238-1	D3	N/A	RCP	3	100	130	160	0.281			IWD-1220.a.1
2CCC-011	2	2238-1	D3	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-012	0.75	2238-1	B8	N/A	RCP	3	50	130	160	0.219			IWD-1220.a.1
2CCC-013	0.75	2238-1	B8	N/A	RCP	3	50	130	160	0.219			IWD-1220.a.1
2CCC-014	0.75	2238-1	B8	N/A	RCP	3	50	130	160	0.219			IWD-1220.a.1
2CCC-015	0.75	2238-1	B8	N/A	RCP	3	745	130	160	0.219			IWD-1220.a.1
2CCC-016	0.75	2238-1	B8	N/A	RCP	3	745	130	160	0.219			IWD-1220.a.1
2CCC-017	0.75	2238-1	B8	N/A	RCP	3	745	130	160	0.219			IWD-1220.a.1
2CCC-018	0.75	2238-1	B8	N/A	RCP	3	1490	130	160	0.219			IWD-1220.a.1
2CCC-019	0.75	2238-1	B8	N/A	RCP	3	1490	130	160	0.219			IWD-1220.a.1
2CCC-020	0.75	2238-1	B8	N/A	RCP	3	1490	130	160	0.219			IWD-1220.a.1
2CCC-021	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-021	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-022	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-022	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-023	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-023	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-024	0.75	2238-1	B8	N/A	RCP	3	100	130	160	0.219			IWD-1220.a.1
2CCC-024	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.281			IWD-1220.a.1
2CCC-024	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-025	0.75	2238-1	B8	N/A	RCP	3	100	130	160	0.219			IWD-1220.a.1
2CCC-025	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.281			IWD-1220.a.1
2CCC-025	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-026	0.75	2238-1	B8	N/A	RCP	3	100	130	160	0.219			IWD-1220.a.1
2CCC-026	1.5	2238-1	B8	N/A	RCP	3	100	130	160	0.281			IWD-1220.a.1
2CCC-026	2	2238-1	B8	N/A	RCP	3	100	130	160	0.344			IWD-1220.a.1
2CCC-027	0.75	2231-1	C7	2238	RCP	3	500	20	160	0.219			IWD-1220.a.1
2CCC-027	1	2231-1	C7	N/A	RCP	3	500	20	160	0.25			IWD-1220.a.1
2CCC-027	1.5	2231-1	C7	N/A	RCP	3	500	20	160	0.281			IWD-1220.a.1
2CCC-028	0.75	2204-4	E2	N/A	CVC	3	10	70	160	0.219			IWD-1220.a.1
2DBC-001	4	2204-4	F6	N/A	EFW	3	1200	85	80	0.337	R	Vol.	RISK
2DBC-002	4	2204-4	D6	N/A	EFW	3	1200	85	80	0.337	R	Vol.	RISK
2DBC-003	4	2204-4	G7	N/A	EFW	3	1200	85	80	0.337	R	Vol.	RISK
2DBC-004	4	2204-4	E6	N/A	EFW	3	1200	85	80	0.337	R	Vol.	RISK
2DBC-007	2	2204-4	E7	N/A	EFW	3	1300	100	80	0.218	R	Vol.	RISK
2DBC-008	2	2204-4	G5	N/A	EFW	3	1300	100	80	0.218	R	Vol.	RISK

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2DBC-012	4	2204-4	E5	N/A	EFW	3	1421	161	80	0.337	R	Vol.	RISK
2DBC-013	4	2204-4	D5	N/A	EFW	3	1676	166	80	0.337	R	Vol.	RISK
2EBC-001	1	2202-4	B4	N/A	MS	3	885	529	80	0.179	R		IWD-1220.a.1
2EBC-001	4	2202-4	G4	2206-1	MS	3	885	529	40	0.237	R	Vol.	N/A - Risk Inf.
2EBC-002	4	2202-4	A4	2206-1	MS	3	885	3529	40	0.237	R	Vol.	N/A - Risk Inf.
2FCC-001	10	2230-2	G1	N/A	RCS	3	3	120	20	0.25			IWD-1220.c
2FCC-001	6	2230-2	F5	N/A	RCS	3	3	120	40s	0.28			IWD-1220.c
2FCC-002	6	2230-2	H3	N/A	RCS	3	3	120	40s	0.133			IWD-1220.c
2FCC-006	1	2230-2	G1	N/A	RCS	3	ATM		40s	0.133			IWD-1220.a.1
2HBC-002	0.75	2230-2	C2	2215-1	GRW	3	3	120	80	0.154			IWD-1220.a.1
2HBC-003	0.75	2231-1	D6	2215-1	GRW	3	3	120	80	0.154			IWD-1220.a.1
2HBC-013	0.75	2214-1	H7	2215-1	GRW	3	3	120	80	0.154			IWD-1220.a.1
2HBC-014	2	2215-1	D7	N/A	GRW	3	3	120	80	0.218			IWD-1220.a.1
2HBC-021	1	2215	D7	N/A	GRW	3	3	120	80	0.179			IWD-1220.a.1
2HBC-022	0.5	2215-1	D7	N/A	GRW	3	3	120	80	0.147			IWD-1220.a.1
2HBC-032	20	2210-1	E3	N/A	SWS	3	110	72	STD	0.375	C,R,E	Vol.	RISK
2HBC-033	18	2210-3	H5	N/A	SWS	3	110	72	STD	0.375	C,R,E	Vol.	RISK
2HBC-033	20	2210-3	H7	2210-1	SWS	3	110	72	STD	0.375	C,R,E	Vol.	RISK
2HBC-034	18	2210-3	H3	N/A	SWS	3	110	72	STD	0.375	C,R,E	VT-3	N/A
2HBC-034	20	2210-3	H7	2210-1, 2	SWS	3	110	72	STD	0.375	C,R,E	Vol.	RISK
2HBC-035	14	2210-2	H2	N/A	SWS	3	76	72	STD	0.375	C,R,E	VT-3	N/A
2HBC-035	16	2210-2	H6	2210-1	SWS	3	76	72	STD	0.375	C,R,E	VT-3	N/A
2HBC-041	4	2210-1	H7	N/A	SWS	3	75	72	40	0.237			IWD-1220.a.1
2HBC-043	14	2210-2	H2	N/A	SWS	3	70	72	STD	0.375	C,R,E	VT-3	N/A
2HBC-043	16	2210-2	H7	N/A	SWS	3	70	72	STD	0.375	C,R,E	Vol.	RISK
2HBC-050	16	2210-3	A6	N/A	SWS	3	67	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-050	18	2210-3	A6	2210-2	SWS	3	67	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-051	16	2210-3	B5	N/A	SWS	3	67	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-051	18	2210-3	A6	2210-2	SWS	3	67	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-059	14	2210-2	D1	N/A	SWS	3	67	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-059	16	2210-2	A4	N/A	SWS	3	67	82	STD	0.375	C,R,E	VT-3	N/A
2HBC-060	14	2210-2	B3	N/A	SWS	3	67	82	STD	0.375	C,R,E	VT-3	N/A
2HBC-060	16	2210-2	A4	N/A	SWS	3	65	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-061	4	2210-1	F6	N/A	SWS	3	65	82	40	0.237			IWD-1220.a.1
2HBC-063	6	2210-1	E8	2217-3	SWS	3	72	72	40	0.28	C,R,E	VT-3	N/A
2HBC-063	8	2210-1	H8	N/A	SWS	3	72	72	40	0.322	C,R,E	Vol.	RISK
2HBC-064	6	2210-1	E4	2217-3	SWS	3	72	72	40	0.322	C,R,E	VT-3	N/A
2HBC-064	8	2210-1	H1	N/A	SWS	3	72	72	40	0.322	C,R,E	Vol.	RISK
2HBC-068	12	2210-3	F6	N/A	SWS	3	60	72	STD	0.375	C	Vol.	RISK
2HBC-069	12	2210-3	G6	N/A	SWS	3	60	72	STD	0.375	C	Vol.	RISK
2HBC-075	8	2210-1	G5	2210-2	SWS	3	57	82	40	0.322	C,R,E	Vol.	RISK
2HBC-076	8	2210-1	G4	2210-2	SWS	3	57	82	40	0.322	C,R,E	Vol.	RISK
2HBC-077	12	2210-3	B4	N/A	SWS	3	45	82	STD	0.375	C	VT-3	N/A
2HBC-078	12	2210-3	D4	N/A	SWS	3	45	82	STD	0.375	C	VT-3	N/A
2HBC-081	12	2210-3	B3	N/A	SWS	3	50	82	STD	0.375			IWD-1220.c
2HBC-083	18	2210-3	B2	N/A	SWS	3	30	82	STD	0.375	C,R,E	VT-3	N/A
2HBC-083	30	2210-3	C1	N/A	SWS	3	30	82	STD	0.375	C,R,E	Vol.	RISK
2HBC-083	4	2210-3	B1	N/A	SWS	3	30	82	40	0.237			IWD-1220.a.1
2HBC-085	6	2204-4	G2	2210-3	SWS	3	89	60	40	0.28	R	VT-3	N/A
2HBC-085	8	2204-4	E3	N/A	SWS	3	89	60	40	0.322	R	VT-3	N/A
2HBC-086	6	2204-4	D3	2210-3	SWS	3	89	60	40	0.28	R	Vol.	RISK
2HBC-086	8	2204-4	D3	N/A	SWS	3	89	60	40	0.28	R	Vol.	RISK
2HBC-087	12	2210-3	H5	N/A	SWS	3	87	72	STD	0.375			IWD-1220.c

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HBC-088	42	2210-1	A7	N/A	SWS	3	10	60	STD	0.375	C,R.E	N/A	IWD-1220.d
2HBC-097	4	2210-1	G3	N/A	SWS	3	63	82	40	0.237			IWD-1220.a.1
2HBC-098	4	2210-1	H2	N/A	SWS	3	70	72	40	0.237			IWD-1220.a.1
2HBC-099	1	2210-1	H2	N/A	SWS	3	75	75	80	0.179			IWD-1220.a.1
2HBC-100	1	2210-1	H2	N/A	SWS	3	75	75	80	0.179			IWD-1220.a.1
2HBC-1000	0.75	2210-1	D6	N/A	SWS	3	75	75	80	0.154			IWD-1220.a.1
2HBC-1001	0.75	2210-1	D5	N/A	SWS	3	75	75	80	0.154			IWD-1220.a.1
2HBC-1002	0.75	2210-1	D3	N/A	SWS	3	75	75	80	0.154			IWD-1220.a.1
2HBC-1003	0.75	2210-1	C6	N/A	SWS	3			80	0.154			IWD-1220.a.1
2HBC-1004	0.75	2210-1	C5	N/A	SWS	3			80	0.154			IWD-1220.a.1
2HBC-1005	0.75	2210-1	C3	N/A	SWS	3			80	0.154			IWD-1220.a.1
2HBC-1006	0.75	2210-3	D3	N/A	SWS	3			80	0.154			IWD-1220.a.1
2HBC-1007	0.75	2210-3	C3	N/A	SWS	3			80	0.154			IWD-1220.a.1
2HBC-101	1	2210-1	F4	N/A	SWS	3	65	85	80	0.179			IWD-1220.a.1
2HBC-1011	0.75	2210-1	E7	N/A	SWS	3	75	75	80	0.154			IWD-1220.a.1
2HBC-1012	0.75	2210-1	E2	N/A	SWS	3	75	75	80	0.154			IWD-1220.a.1
2HBC-1013	0.75	2261-2	C5, D6	N/A	HPAS	3			80	0.154			IWD-1220.a.1
2HBC-1014	1	2261-2	B4	N/A	HPAS	3			80	0.179			IWD-1220.a.1
2HBC-102	1	2210-1	F4	N/A	SWS	3	65	85	80	0.179			IWD-1220.a.1
2HBC-103	10	2210-3	D6	N/A	SWS	3	40	105	40	0.365	C	VT-3	N/A
2HBC-103	12	2210-3	D6	N/A	SWS	3	40	105	STD	0.375	C	Vol.	RISK
2HBC-103	6	2210-3	G5	N/A	SWS	3	40	105	40	0.28	C	VT-3	N/A
2HBC-103	8	2210-3	C5	N/A	SWS	3	40	105	40	0.322	C	VT-3	N/A
2HBC-104	10	2210-3	G6	N/A	SWS	3	40	105	40	0.365	C	VT-3	N/A
2HBC-104	12	2210-3	G6	N/A	SWS	3	40	105	STD	0.375	C	VT-3	N/A
2HBC-104	6	2210-3	F5	N/A	SWS	3	40	105	40	0.28	C	VT-3	N/A
2HBC-104	8	2210-3	F5	N/A	SWS	3	40	105	40	0.322	C	VT-3	N/A
2HBC-105	10	2210-3	D4	N/A	SWS	3	40	105	40	0.365	C	VT-3	N/A
2HBC-105	12	2210-3	D4	N/A	SWS	3	40	105	STD	0.375	C	VT-3	N/A
2HBC-105	6	2210-3	D5	N/A	SWS	3	40	105	40	0.28	C	VT-3	N/A
2HBC-105	8	2210-3	D5	N/A	SWS	3	40	105	40	0.322	C	VT-3	N/A
2HBC-106	10	2210-3	F4	N/A	SWS	3	40	105	40	0.365	C	VT-3	N/A
2HBC-106	12	2210-3	F4	N/A	SWS	3	40	105	STD	0.375	C	VT-3	N/A
2HBC-106	6	2210-3	F5	N/A	SWS	3	40	105	40	0.28	C	VT-3	N/A
2HBC-106	8	2210-3	F5	N/A	SWS	3	40	105	40	0.322	C	VT-3	N/A
2HBC-107	1	2261-2	B4	N/A	HPAS	3	15	170	80	0.179			IWD-1220.a.1
2HBC-107	1.25	2261-2	B5	N/A	HPAS	3	15	170	80	0.191			IWD-1220.a.1
2HBC-107	2	2261-2	G7	2261-1	HPAS	3	15	170	80	0.218			IWD-1220.a.1
2HBC-108	1	2261-2	C6	N/A	HPAS	3	15	170	80	0.179			IWD-1220.a.1
2HBC-108	1.25	2261-2	D6	N/A	HPAS	3	15	170	80	0.191			IWD-1220.a.1
2HBC-108	2	2261-2	D4	2261-1, 2264-1	HPAS	3	15	170	80	0.218			IWD-1220.a.1
2HBC-109	0.5	2261-2	D5	N/A	SWS	3	60	75	80	0.147			IWD-1220.a.1
2HBC-109	1	2261-2	D3	2210-3	SWS	3	60	75	80	0.179			IWD-1220.a.1
2HBC-147	1	2210-2	C2	N/A	CSS	3	67	82	80	0.179			IWD-1220.a.1
2HBC-148	1	2210-2	E2	N/A	CSS	3	67	82	80	0.179			IWD-1220.a.1
2HBC-155	0.75	2210-2	E1	N/A	SWS	3	70	80	80	0.154			IWD-1220.a.1
2HBC-156	0.75	2210-2	E1	N/A	SWS	3	70	80	80	0.154			IWD-1220.a.1
2HBC-157	0.75	2210-2	D2	N/A	SWS	3	70	80	80	0.154			IWD-1220.a.1
2HBC-158	0.75	2210-2	C1	N/A	SWS	3	65	82	80	0.154			IWD-1220.a.1
2HBC-166	0.75	2204-4	C2	N/A	EFW	3	0	60	80	0.154			IWD-1220.b.1
2HBC-167	0.75	2204-4	F2	N/A	EFW	3	ATM	60	80	0.154			IWD-1220.b.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HBC-169	1	2261-2	D7	N/A	HPAS	3	15	170	80	0.179			IWD-1220.a.1
2HBC-170	1	2261-2	C3	N/A	HPAS	3	15	170	80	0.179			IWD-1220.a.1
2HBC-170	1.5	2261-2	B2	2210-3	HPAS	3	15	170	80	0.2			IWD-1220.a.1
2HBC-175	1	2210-3	F5	N/A	SWS	3	40	105	80	0.179			IWD-1220.a.1
2HBC-176	1	2210-3	D5	N/A	SWS	3	40	105	80	0.179			IWD-1220.a.1
2HBC-179	1	2210-3	F5	N/A	SWS	3	40	105	80	0.179			IWD-1220.a.1
2HBC-180	1	2210-3	C5	N/A	SWS	3	40	105	80	0.179			IWD-1220.a.1
2HBC-181	1	2204-4	D3	N/A	EFW	3	80	75	80	0.179	R		IWD-1220.b.1
2HBC-182	1	2235-1	E7	N/A	FPS	3	87	72	80	0.179			IWD-1220.a.1
2HBC-183	0.75	2235-1	F7	N/A	FPS	3	87	72	80	0.154			IWD-1220.a.1
2HBC-184	8	2210-1	C8	N/A	SWS	3	15	80	40	0.322			IWD-1220.c / IWD-1220.d
2HBC-185	0.75	2210-2	C1	N/A	SWS	3	70	82	80	0.154			IWD-1220.a.1
2HBC-186	0.75	2210-2	E1	N/A	SWS	3	70	82	80	0.154			IWD-1220.a.1
2HBC-189	2	2210-3	H5	2236-1	SWS	3	110	72	80	0.218			IWD-1220.a.1
2HBC-191	3	2210-1	G1	210-1	SWS	3	70	85	40	0.216			IWD-1220.a.1
2HBC-192	3	2210-1	F5	210-1	SWS	3	70	85	40	0.216			IWD-1220.a.1
2HBC-33-80	20	2210-1	E7	N/A	SWS	3	110	72	20	0.375	C,R,E	Vol.	N/A - Risk Inf.
2HBC-34-80	20	2210-1	E2	N/A	SWS	3	110	72	20	0.375	C,R,E	Vol.	N/A - Risk Inf.
2HBC-83-80	30	2210-1	D7	2210-3	SWS	3	30	82	STD	0.375	C,R,E	Vol.	N/A - Risk Inf.
2HBC-83-81	30	2210-1	D7	2210-3	SWS	3	30	82	STD	0.375	C,R,E	Vol.	N/A - Risk Inf.
2HCC-001	2	2230-1	B8	N/A	RCS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-002	2	2230-1	B8	N/A	RCS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-003	2	2230-1	B2	2214-1	RCS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-004	2	2230-1	B2	N/A	RCS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-005	2	2230-1	D7	2214-1	RCS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-006	0.75	2230-1	F5	2214-1	RCS	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-007	2	2230-2	A3	2214-1	RCS	3	3	120	40s	0.154			IWD-1220.a.1
2HCC-008	1.5	2230-2	A3	2237-1	SMP	3	3	120	40s	0.145			IWD-1220.a.1
2HCC-009	3	2230-2	C3	N/A	RCS	3	3	120	10s	0.12			IWD-1220.a.1
2HCC-011	2	2230-2	B3	N/A	N2	3	3	120	40s	0.154			IWD-1220.a.1
2HCC-017	0.75	2238-1	A6	2214-1	RCP	3	ATM	120	40s	0.113			IWD-1220.a.1
2HCC-018	1	2214-1	H8	2231-1	BMS	3	3	120	40s	0.133			IWD-1220.a.1
2HCC-019	0.75	2214-1	H7	N/A	BMS	3	10	120	40s	0.113			IWD-1220.a.1
2HCC-020	1	2214-1	H7	N/A	BMS	3	3	120	40s	0.133			IWD-1220.a.1
2HCC-021	3	2214-1	H8	N/A	BMS	3	5	120	10s	0.12			IWD-1220.a.1
2HCC-031	3	2214-1	F6	2231-1	BMS	3	50	120	10s	0.12			IWD-1220.a.1
2HCC-032	3	2214-1	F7	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-033	3	2214-1	G8	N/A	BMS	3	5	120	10	0.12			IWD-1220.a.1
2HCC-033	4	2214-1	G7	N/A	BMS	3	5	120	10s	0.12			IWD-1220.a.1
2HCC-034	2	2235-1	F4	N/A	FPS	3	35	120	40s	0.154			IWD-1220.a.1
2HCC-035	1.5	2213-2	G1	2235-1	LRW	3	115	120	40s	0.145			IWD-1220.a.1
2HCC-036	0.75	2235-1	G5	N/A	FPS	3	35	120	40s	0.113			IWD-1220.a.1
2HCC-040	3	2235-1	D4	N/A	FPS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-041	3	2235-1	B7	N/A	FPS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-042	0.75	2231-1	D2	N/A	CVC	3	50	120	40s	0.113			IWD-1220.a.1
2HCC-049	1	2232-1	G8	2214-1	BMS	3	5	120	40s	0.133			IWD-1220.a.1
2HCC-050	1	2232-1	B8	2214-1	SIS	3	5	120	40s	0.133			IWD-1220.a.1
2HCC-051	2	2232-1	F6	N/A	SIS	3	5	120	40s	0.154			IWD-1220.a.1
2HCC-052	3	2232-1	F6	2214-1	SIS	3	5	120	10s	0.12			IWD-1220.a.1
2HCC-053	12	2235-1	C6	N/A	FPS	3	25	120	10s	0.18			IWD-1220.c
2HCC-053	8	2235-1	C6	N/A	FPS	3	25	120	10s	0.148			IWD-1220.c
2HCC-054	3	2235-1	D4	N/A	FPS	3	70	120	10s	0.12			IWD-1220.a.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCC-055	3	2235-1	D4	N/A	FPS	3	ATM	120	10s	0.12			IWD-1220.a.1
2HCC-056	3	2235-1	B3	N/A	FPS	3	15	120	10s	0.12			IWD-1220.a.1
2HCC-057	1	2235-1	E7	N/A	FPS	3	30	120	40s	0.133			IWD-1220.a.1
2HCC-058	12	2235-1	F8	2210-3	FPS	3	60	120	10s	0.18			IWD-1220.c
2HCC-058	8	2235-1	D8	N/A	FPS	3	60	120	10s	0.148			IWD-1220.c
2HCC-059	12	2235-1	C5	2210-3	FPS	3	25	120	10s	0.18			IWD-1220.c
2HCC-059	3	2235-1	C6	N/A	FPS	3	25	120	10s	0.12			IWD-1220.a.1
2HCC-060	3	2235-1	D4	N/A	FPS	3	30	120	10s	0.12			IWD-1220.a.1
2HCC-061	3	2235-1	H2	N/A	FPS	3	100	120	10s	0.12			IWD-1220.a.1
2HCC-062	3	2235-1	H4	N/A	FPS	3	80	120	10s	0.12			IWD-1220.a.1
2HCC-063	3	2235-1	E4	N/A	FPS	3	35	120	10s	0.12			IWD-1220.a.1
2HCC-065	0.5	2214-1	E7	N/A	BMS	3	2	120	40s	0.109			IWD-1220.a.1
2HCC-065	2	2214-1	C8	N/A	BMS	3	2	120	40s	0.154			IWD-1220.a.1
2HCC-066	3	2214-1	C7	N/A	BMS	3	2	120	10s	0.12			IWD-1220.a.1
2HCC-067	0.75	2238-1	B2	2214-1	RCP	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-068	4	2214-1	B6	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-069	3	2214-1	C6	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-070	2	2214-1	B8	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-071	2	2214-1	B7	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-072	1.5	2230-2	A3	2214-1	RCS	3	100	70	40s	0.145			IWD-1220.a.1
2HCC-073	2	2214-1	H5	N/A	BMS	3	70	120	40s	0.154			IWD-1220.a.1
2HCC-074	1	2231-1	E6	2230-1	CVC	3	0.5	120	40s	0.133			IWD-1220.a.1
2HCC-075	1	2231-2	G2	N/A	CVC	3	100	165	40s	0.133			IWD-1220.a.1
2HCC-075	3	2231-2	G2	2235-1	CVC	3	100	165	10s	0.12			IWD-1220.a.1
2HCC-076	2	2231-2	G4	N/A	CVC	3	100	165	40s	0.154			IWD-1220.a.1
2HCC-076	3	2231-2	G4	N/A	CVC	3	100	165	10s	0.12			IWD-1220.a.1
2HCC-077	1	2230-2	C2	2214-1	RCS	3	5	120	40s	0.133			IWD-1220.a.1
2HCC-078	0.75	2238-1	A8	2214-1	RCP	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-079	0.75	2238-1	A8	2214-1	RCP	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-080	0.75	2238-1	A8	2214-1	RCP	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-081	0.75	2238-1	B5	N/A	RCP	3	ATM	120	40s	0.113			IWD-1220.a.1
2HCC-082	0.75	2238-1	A6	N/A	RCP	3	ATM	120	40s	0.113			IWD-1220.a.1
2HCC-083	0.75	2238-1	A6	N/A	RCP	3	ATM	120	40s	0.113			IWD-1220.a.1
2HCC-084	1	2230-1	D7	2230-2	RCS	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-086	8	2235-1	A8	N/A	FPS	3	5	120	10s	0.148	R	Vol., Surf, VT-3	N/A
2HCC-087	8	2232-1	F6	2235-1	FPS	3	24	120	10s	0.148	R	Vol., Surf, VT-3	N/A
2HCC-088	0.75	2235-1	F7	N/A	FPS	3	30	120	40s	0.113			IWD-1220.a.1
2HCC-095	4	2214-1	C4	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-096	1	2235-1	E5	N/A	FPS	3	35	120	40s	0.133			IWD-1220.a.1
2HCC-097	1.5	2235-1	F5	N/A	FPS	3	35	120	40s	0.145			IWD-1220.a.1
2HCC-099	1	2214-1	C5	N/A	BMS	3	1	120	40s	0.133			IWD-1220.a.1
2HCC-1000	0.75	2230-2	B2	N/A	RCS	3			40	0.113			IWD-1220.a.1
2HCC-105	1	2214-1	B4	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-106	1	2214-1	B7	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-107	1	2214-1	B7	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-108	4	2214-1	C5	N/A	BMS	3	2	120	10s	0.12			IWD-1220.a.1
2HCC-109	2	2214-1	B7	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-110	2	2214-1	B6	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-111	2	2214-1	B5	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-112	1	2214-1	C6	N/A	BMS	3	2	120	40s	0.133			IWD-1220.a.1
2HCC-113	4	2214-1	C6	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1
2HCC-114	1	2214-1	C7	N/A	BMS	3	2	120	40s	0.133			IWD-1220.a.1
2HCC-115	1	2214-1	B5	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCC-116	1	2214-1	B6	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-117	1	2214-1	C4	N/A	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-118	1	2214-1	C5	N/A	BMS	3	10	120	40	0.133			IWD-1220.a.1
2HCC-119	2	2214-1	C6	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-121	2	2214-1	B6	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-122	2	2214-1	B6	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-123	2	2214-1	B4	N/A	BMS	3	10	120	40s	0.154			IWD-1220.a.1
2HCC-129	1	2214-1	G8	2213-8	BMS	3	10	120	40s	0.133			IWD-1220.a.1
2HCC-144	1	2231-2	D2	N/A	CVC	3	100	150	40s	0.133			IWD-1220.a.1
2HCC-146	1	2214-1	C8	N/A	BMS	3	2	120	40s	0.133			IWD-1220.a.1
2HCC-152	3	2235-1	B4	N/A	FPS	3	5	120	10s	0.12			IWD-1220.a.1
2HCC-153	3	2235-1	B4	N/A	FPS	3	5	120	10s	0.12			IWD-1220.a.1
2HCC-154	1	2235-1	G2	N/A	FPS	3	100	120	40s	0.133			IWD-1220.a.1
2HCC-164	0.75	2235-1	E5	N/A	FPS	3	35	120	40s	0.113			IWD-1220.a.1
2HCC-165	1	2235-1	F5	N/A	FPS	3	35	120	40s	0.133			IWD-1220.a.1
2HCC-169	0.75	2235-1	H2	N/A	FPS	3	100	120	40s	0.113			IWD-1220.a.1
2HCC-170	1	2235-1	G3	N/A	FPS	3	100	120	40s	0.133			IWD-1220.a.1
2HCC-171	1	2235-1	G3	N/A	FPS	3	100	120	40s	0.133			IWD-1220.a.1
2HCC-172	0.75	2235-1	G2	N/A	FPS	3	ATM	120	40s	0.113			IWD-1220.a.1
2HCC-173	1	2235-1	F2	N/A	FPS	3	ATM	120	40s	0.133			IWD-1220.a.1
2HCC-174	1	2235-1	C2	N/A	FPS	3	100	120	40s	0.133			IWD-1220.a.1
2HCC-183	0.75	2261-1	G7	2261-3	HPAS	3	25	170	40s	0.113			IWD-1220.a.1
2HCC-184	1	2261-1	F7	N/A	HPAS	3	25	170	40s	0.133			IWD-1220.a.1
2HCC-185	0.75	2261-1	F7	2261-3	HPAS	3	25	170	40s	0.113			IWD-1220.a.1
2HCC-186	0.75	2261-1	F7	2261-3	HPAS	3	25	170	40s	0.113			IWD-1220.a.1
2HCC-186	2	2261-1	F7	N/A	HPAS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-187	0.75	2261-1	E7	2261-3	HPAS	3	25	170	40s	0.113			IWD-1220.a.1
2HCC-187	2	2261-1	E7	N/A	HPAS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-188	0.75	2230-2	C3	N/A	RCS	3	3	120	40s	0.113			IWD-1220.a.1
2HCC-190	2	2236-1	G8	2214-1	CSS	3	5	120	40s	0.154	C		IWD-1220.a.1
2HCC-191	3	2235-1	C4	N/A	FPS	3	35	120	10s	0.12			IWD-1220.a.1
2HCC-192	2	2261-1	E6	N/A	HPAS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-193	0.75	2231-2	G3	N/A	CVC	3	100	165	40s	0.113			IWD-1220.a.1
2HCC-199	0.5	2214-1	C4	N/A	BMS	3	2	120	40	0.109			IWD-1220.a.1
2HCC-199	2	2214-1	C4	N/A	BMS	3	2	120	40s	0.154			IWD-1220.a.1
2HCC-200	0.5	2214-1	C5	N/A	BMS	3	2	120	40s	0.109			IWD-1220.a.1
2HCC-200	2	2214-1	C6	N/A	BMS	3	2	120	40s	0.154			IWD-1220.a.1
2HCC-2003	6	2210-3	H4	N/A	SWS	3	90	60	STD	0.28			IWD-1220.c
2HCC-2004	6	2210-3	H4	N/A	SWS	3	90	60	STD	0.28			IWD-1220.c
2HCC-201	0.5	2214-1	D6	N/A	BMS	3	2	120	40	0.109			IWD-1220.a.1
2HCC-201	2	2214-1	C6	N/A	BMS	3	2	120	40s	0.154			IWD-1220.a.1
2HCC-209	0.75	2261-1	F7	N/A	CPS	3	25	170	40s	0.113			IWD-1220.a.1
2HCC-210	2	2261-1	F6	N/A	CPS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-211	2	2261-1	E6	N/A	CPS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-212	2	2261-1	F6	N/A	CPS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-213	2	2261-1	F6	N/A	CPS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-214	1	2261-1	F6	N/A	CPS	3	25	170	40s	0.133			IWD-1220.a.1
2HCC-215	1	2261-1	F6	N/A	CPS	3	25	170	40s	0.133			IWD-1220.a.1
2HCC-217	2	2235-1	E2	N/A	CPS	3	100	105	40s	0.154			IWD-1220.a.1
2HCC-219	2	2230-2	B3	2231-1	RCS	3	100	130	40s	0.154			IWD-1220.a.1
2HCC-220	0.75	2231-1	B4	2238-1	CVC	3	5	120	40s	0.113			IWD-1220.a.1
2HCC-221	1	2214-1	G8	2238-1	RCP	3	5	250	40s	0.133			IWD-1220.a.1
2HCC-222	4	2214-1	B8	N/A	BMS	3	10	120	10s	0.12			IWD-1220.a.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCC-223	1	2231-1	G7	N/A	CVC	3	70	120	40s	0.133			IWD-1220.a.1
2HCC-224	2	2261-1	F6	N/A	HPAS	3	25	170	40s	0.154			IWD-1220.a.1
2HCC-225	2	2261-1	E6	N/A	HPAS	3	25	120	40s	0.154			IWD-1220.a.1
2HCC-227	0.75	2214-1	C5	N/A	BMS	3	2	120	40s	0.113			IWD-1220.a.1
2HCC-228	0.75	2214-1	C6	N/A	BMS	3	2	120	40s	0.113			IWD-1220.a.1
2HCC-229	0.75	2214-1	C7	N/A	BMS	3	2	120	40s	0.113			IWD-1220.a.1
2HCC-230	0.75	2214-1	C8	N/A	BMS	3	2	120	40s	0.113			IWD-1220.a.1
2HCC-231	2	2210-2	D6	N/A	SWS	3	52	82	40s	0.154	E		IWD-1220.a.1
2HCC-232	2	2210-2	D6	N/A	SWS	3	10	82	40s	0.154	E		IWD-1220.a.1
2HCC-233	1.5	2210-2	G5	N/A	SWS	3	75	72	40s	0.145	C		IWD-1220.a.1
2HCC-234	2	2210-2	G4	N/A	SWS	3	75	80	40s	0.154	R,E		IWD-1220.a.1
2HCC-235	1	2210-2	F4	N/A	SWS	3	75	72	40s	0.133	R,E		IWD-1220.a.1
2HCC-236	1.5	2210-2	H4	N/A	SWS	3	75	72	40s	0.145	C		IWD-1220.a.1
2HCC-237	2	2210-2	G4	N/A	SWS	3	75	72	40s	0.154	R,E		IWD-1220.a.1
2HCC-238	1.5	2210-2	D5	N/A	SWS	3	67	82	40s	0.145	C		IWD-1220.a.1
2HCC-239	1.5	2210-2	D6	N/A	SWS	3	67	82	40s	0.145	C		IWD-1220.a.1
2HCC-240	2	2210-2	B5	N/A	SWS	3	67	82	40s	0.154	R,E		IWD-1220.a.1
2HCC-241	2	2210-2	D5	N/A	SWS	3	67	82	40s	0.154	R,E		IWD-1220.a.1
2HCC-242	1	2210-2	F3	N/A	SWS	3	67	82	40s	0.133	E		IWD-1220.a.1
2HCC-243	1	2210-2	E2	N/A	SWS	3	67	82	40s	0.133			IWD-1220.a.1
2HCC-244	1	2210-2	D3	N/A	SWS	3	65	82	40s	0.133			IWD-1220.a.1
2HCC-245	2	2210-3	G7	N/A	SWS	3	85	72	40s	0.154			IWD-1220.a.1
2HCC-246	2	2210-3	G7	N/A	SWS	3	86	72	40s	0.154			IWD-1220.a.1
2HCC-247	2	2210-3	H7	2210-2	SWS	3	60	72	40s	0.154			IWD-1220.a.1
2HCC-248	4	2210-3	G4	N/A	SWS	3	75	72	40s	0.237	R		IWD-1220.a.1
2HCC-248	2	2210-3	G4	N/A	SWS	3	75	72	40s	0.154	R		IWD-1220.a.1
2HCC-249	4	2210-3	G4	N/A	SWS	3	75	72	40s	0.237	R		IWD-1220.a.1
2HCC-249	2	2210-3	G4	N/A	SWS	3	75	72	40s	0.154	R		IWD-1220.a.1
2HCC-250	2	2210-3	F6	N/A	SWS	3	70	82	40s	0.154			IWD-1220.a.1
2HCC-251	2	2210-3	E7	N/A	SWS	3	70	82	40s	0.154			IWD-1220.a.1
2HCC-252	2	2210-3	C6	2210-2	SWS	3	70	82	40s	0.154			IWD-1220.a.1
2HCC-253	1	2210-3	B4	N/A	SWS	3	45	82	40s	0.133			IWD-1220.a.1
2HCC-254	1	2210-3	D4	N/A	SWS	3	45	82	40s	0.133			IWD-1220.a.1
2HCC-255	4	2210-3	F3	N/A	SWS	3	65	82	40s	0.237			IWD-1220.a.1
2HCC-255	2	2210-3	F3	N/A	SWS	3	65	82	40s	0.133	R		IWD-1220.a.1
2HCC-256	4	2210-3	G3	N/A	SWS	3	65	82	40s	0.237	R		IWD-1220.a.1
2HCC-256	2	2210-3	G3	N/A	SWS	3	65	82	40s	0.154	R		IWD-1220.a.1
2HCC-257	1	2210-3	C3	N/A	SWS	3	50	82	40s	0.133	R		IWD-1220.a.1
2HCC-258	2	2210-1	H1	2210-2	SWS	3	75	72	40s	0.154	C,R,E		IWD-1220.a.1
2HCC-259	0.5	2210-2	D7	N/A	SWS	3	70	82	40	0.109			IWD-1220.a.1
2HCC-259	1	2210-2	C7	N/A	SWS	3	70	82	40s	0.133			IWD-1220.a.1
2HCC-259	2	2210-2	C7	N/A	SWS	3	70	82	40s	0.154	C,R,E		IWD-1220.a.1
2HCC-260	2	2210-1	H8	2210-2	SWS	3	75	72	40s	0.154	C,R,E		IWD-1220.a.1
2HCC-261	2	2210-2	E7	N/A	SWS	3	70	82	40s	0.154	C,R,E		IWD-1220.a.1
2HCC-261	0.5	2210-2	D7	N/A	SWS	3	70	82	40	0.109			IWD-1220.a.1
2HCC-261	1	2210-2	E7	N/A	SWS	3	70	82	40s	0.133			IWD-1220.a.1
2HCC-262	1.5	2210-3	H4	N/A	SWS	3	75	72	40s	0.145	C,R,E		IWD-1220.a.1
2HCC-263	1	2210-3	E4	N/A	SWS	3	75	72	40	0.133			IWD-1220.a.1
2HCC-263	1.5	2210-3	G2	N/A	SWS	3	75	72	40s	0.145	C,R,E		IWD-1220.a.1
2HCC-264	1.5	2210-3	C5	2210-1	SWS	3	70	72	40s	0.145	C,R,E		IWD-1220.a.1
2HCC-265	0.5	2210-3	A5	N/A	SWS	3	63	82	40	0.109			IWD-1220.a.1
2HCC-265	1.5	2210-3	B5	N/A	SWS	3	63	82	40s	0.145	C,R,E		IWD-1220.a.1
2HCC-267	0.75	2261-3	H6	N/A	CPS	3	70	85	80	0.154			IWD-1220.a.1

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HCC-267	1	2261-3	H6	2210-1	CPS	3	70	85	40s	0.133			IWD-1220.a.1
2HCC-268	0.75	2261-3	H3	N/A	CPS	3	70	85	40	0.113			IWD-1220.a.1
2HCC-268	1	2261-3	H3	2210-3	CPS	3	70	85	40s	0.133	C,R,E		IWD-1220.a.1
2HCC-269	0.75	2261-3	G7	N/A	CPS	3	70	115	40	0.113			IWD-1220.a.1
2HCC-269	1	2261-3	G7	2210-1	CPS	3	70	115	40s	0.133			IWD-1220.a.1
2HCC-270	0.75	2261-3	H3	N/A	CPS	3	70	115	40	0.113			IWD-1220.a.1
2HCC-270	1	2261-3	H3	2210-3	CPS	3	70	115	40s	0.133			IWD-1220.a.1
2HCC-271	2	2210-2	G6	N/A	SWS	3	70	80	40s	0.154	E		IWD-1220.a.1
2HCC-272	2	2210-2	G6	N/A	SWS	3	76	72	40s	0.154	E		IWD-1220.a.1
2HCC-273	2	2210-1	C6	N/A	SWS	3			40	0.154			IWD-1220.a.1
2HCC-274	2	2210-1	C4	N/A	SWS	3			40	0.154			IWD-1220.a.1
2HCC-275	2	2210-1	C2	N/A	SWS	3			40	0.154			IWD-1220.a.1
2HCC-276	3	2210-2	F7	N/A	SWS	3	52	82	10s	0.12	C,R,E		IWD-1220.a.1
2HCC-277	3	2210-2	B3	N/A	SWS	3	52	82	10s	0.12	C,R,E		IWD-1220.a.1
2HCC-278	3	2210-2	H7	N/A	SWS	3	76	72	10s	0.12	C,R,E		IWD-1220.a.1
2HCC-279	3	2210-2	H2	N/A	SWS	3	76	72	10s	0.12	C,R,E		IWD-1220.a.1
2HCC-282	10	204-5	E1	N/A	CST	3	26	80	10s	0.18	R	VT-3	N/A
2HCC-282	12	204-5	E3	N/A	CST	3	26	80	10s	0.18	R	Vol.	RISK
2HCC-282	8	2204-4	E2	N/A	CST	3	26	80	10s	0.18	R	Vol.	RISK
2HCC-283	3	2210-3	H4	N/A	SWS	3			40	0.216	R		IWD-1220.a.1
2HCC-284	3	2210-3	D3	N/A	SWS	3			40	0.216	R		IWD-1220.a.1
2HCC-285	6	204-5	F3	N/A	CST	3	18	80	10s	0.134			IWD-1220.c
2HCC-286	6	204-5	F5	N/A	CST	3	18	80	10s	0.134			IWD-1220.c
2HCC-287	3	204-5	F7	N/A	CST	3	13	80	10s	0.12			IWD-1220.a.1
2HCC-287	4	204-5	F7	N/A	CST	3	13	80	10s	0.12			IWD-1220.a.1
2HCC-288	3	204-5	E3	N/A	CST	3	18	80	10s	0.12			IWD-1220.a.1
2HCC-288	4	204-5	E3	N/A	CST	3	18	80	10s	0.12			IWD-1220.a.1
2HCC-289	1	204-5	E7	N/A	CST	3	18	80	40s	0.133			IWD-1220.a.1
2HCC-290	3	2210-2	G4	N/A	SWS	3	75	72	10s	0.12	E		IWD-1220.a.1
2HCC-291	3	2210-2	G4	N/A	SWS	3	75	72	10s	0.12	E		IWD-1220.a.1
2HCC-292	3	2210-2	B3	N/A	SWS	3	75	72	10s	0.12	E		IWD-1220.a.1
2HCC-293	3	2210-2	B3	N/A	SWS	3	75	72	10s	0.12	E		IWD-1220.a.1
2HCC-294	4	2210-2	D2	N/A	SWS	3			10	0.12	C,R,E		IWD-1220.a.1
2HCC-294	14	2210-2	D2	N/A	SWS	3			10	0.25	C,R,E	Vol.	RISK
2HCC-295	14	2210-2	B2	N/A	SWS	3			10	0.25	C,R,E	VT-3	N/A
2HCC-295	4	2210-2	B2	N/A	SWS	3			10	0.12	C,R,E		IWD-1220.a.1
2HCC-296	2	2210-1	F7	N/A	SWS	3			40	0.154			IWD-1220.a.1
2HCC-296	4	2210-1	F7	N/A	SWS	3			40	0.237			IWD-1220.a.1
2HCC-297	2	2210-1	F6	N/A	SWS	3	65	82	40	0.154			IWD-1220.a.1
2HCC-297	4	2210-1	F6	N/A	SWS	3	65	82	40	0.237			IWD-1220.a.1
2HCC-298	2	2210-1	F2	N/A	SWS	3	75	72	40	0.154			IWD-1220.a.1
2HCC-298	4	2210-1	F2	N/A	SWS	3	75	72	40	0.237			IWD-1220.a.1
2HCC-299	2	2210-1	F3	N/A	SWS	3	65	82	40	0.154			IWD-1220.a.1
2HCC-299	4	2210-1	F3	N/A	SWS	3	65	82	40	0.237			IWD-1220.a.1
2HCC-300	3	2210-1	F7	N/A	SWS	3	ATM	82	40	0.216			IWD-1220.a.1
2HCC-301	3	2210-1	F6	N/A	SWS	3	65	82	40	0.216			IWD-1220.a.1
2HCC-302	2	2210-3	H5	2210-1, 2235-1	SWS	3			40	0.154			IWD-1220.a.1
2HCC-307	1	2210-3	G6	N/A	SWS	3			40	0.133			IWD-1220.a.1
2HCC-308	1	2210-3	E6	N/A	SWS	3			40	0.133			IWD-1220.a.1
2HCD-195	8	2204-4	D1	2212-4	EFW	D	23	85	10	0.148	R	Vol.	N/A - Risk Inf.
2HCD-195	10	2212-4	E7	N/A	CST	D			10	0.165	R	Vol.	N/A - Risk Inf.
2HCD-258	6	2212-4	F5	N/A	CST	D			10	0.134	R	Vol.	N/A - Risk Inf.

LINE CLASS	SIZE	ISO	GRID	ISO 2	SYS	CL	OP PR	OP TM	SCH	WTHCK	SAFT	NDE	EX BASIS
2HBD-026	30	2210-2	A8	N/A	SWS	D			10	0.312		Vol.	N/A - Risk Inf.
2HBD-091	8	2204-4	E1	N/A	EFW	D			10	0.148	R	Vol.	N/A - Risk Inf.
2HBD-883	8	2204-4	B1	N/A	EFW	D			40	0.322		Vol.	N/A - Risk Inf.

Notes:
1. Per IWC-1221.d, exempt from valve 2CV-5650-2 to sump.
2. Per IWC-1221.d, exempt from valve 2CV-5649-1 to sump.

SECTION 4.0
INSERVICE INSPECTION SUMMARY TABLES

This section provides a summary listing of all items subject to inservice inspection during the Third Inspection Interval at Arkansas Nuclear One, Unit 2.

4.1 ASME Section XI Inservice Inspections

The ASME Section XI Inservice Inspection Summary Table 4.1 provides the following information:

4.1.1 Examination Category

This column lists the examination category as identified in ASME Section XI, Tables IWB-2500-l, IWC-2500-1, IWD-2500-1, and IWF-2500-l. Only those examination categories applicable to Arkansas Nuclear One, Unit 2 are identified.

4.1.2 Item Number and Description of Components Examined

These columns list the item number and description as defined in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, and IWF-2500-1. Only those item numbers applicable to Arkansas Nuclear One, Unit 2 are identified.

4.1.3 Number of Components

This column lists the population of components potentially subject to examination. The number of components actually examined during the inspection interval will be based upon the Code requirements for the subject item number (excluding Risk Informed piping locations).

4.1.4 Examination Method

The column lists the examination method(s) required by ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, and IWF-2500-1.

4.1.5 Request Number

This column provides a listing of applicable Requests for Alternatives or Relief Requests.

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-A Pressure Retaining Welds in Reactor Vessel	B1.11	Circumferential Shell Welds	3	Volumetric	
	B1.12	Longitudinal Shell Welds	9	Volumetric	
	B1.21	Circumferential Head Welds	2	Volumetric	
	B1.22	Meridional Head Welds	10	Volumetric	
	B1.30	Shell-to-Flange Weld	1	Volumetric	
	B1.40	Head-to-Flange Weld	1	Volumetric & Surface	
B-B Pressure Retaining Welds in Vessels Other Than Reactor Vessels	B2.11	Pressurizer Circumferential Shell-to-Head Welds	2	Volumetric	
	B2.12	Pressurizer Longitudinal Shell-to-Head Welds	4	Volumetric	
	B2.31 B2.32 B2.40	Steam Generators Circumferential Head Welds Steam Generators Meridional Head Welds Steam Generator Tube Sheet-to-Head Weld	10 10 2	Volumetric Volumetric Volumetric	
B-D Full Penetration Welded Nozzles in Vessels	B3.90	Reactor Vessel Nozzle-to-Vessel Welds	6	Volumetric	
	B3.100	Reactor Vessel Nozzle Inside Radius Section	6	Volumetric	
	B3.110	Pressurizer Nozzle-to-Vessel Welds	5	Volumetric	
	B3.120	Pressurizer Nozzle Inside Radius Section	5	Volumetric	
	B3.130	Steam Generator (Primary Side) Nozzle-to-Vessel Welds	6	Volumetric	
	B3.140	Steam Generator (Primary Side) Inside Radius Section	6	Volumetric	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-E Pressure Retaining Partial Penetration Welds In Vessels	B4.11	Vessel Nozzles Partial Penetration Welds	8	Visual, VT-2	
	B4.12	Control Rod Drive Nozzles Partial Penetration Welds	81	Visual, VT-2	
	B4.13	Instrumentation Nozzles Partial Penetration Welds	16	Visual, VT-2	
	B4.20	Heater Penetration Welds, Pressurizer	96	Visual, VT-2	
B-F Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles		Selection made under the Risk Informed Application	2	Volumetric	

**TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)**

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-G-1 Pressure Retaining Bolting Greater Than 2 in. in Diameter	B6.10	Reactor Vessel Closure Head Nuts	54	Visual, VT-1	
	B6.30	Reactor Vessel Closure Studs, when Removed	54	Volumetric & Surface	
	B6.40	Threads in Reactor Vessel Flange	54	Volumetric	
	B6.50	Reactor Vessel Closure Washers, Bushings	54	Visual, VT-1	
	B6.180	Pump Bolts & Studs	64	Volumetric	
	B6.190	Pump Flange Surfaces, When Connection Disassembled	64	Visual, VT-1	
	B6.200	Pump Nuts, Bushings, and Washers	64	Visual, VT-1	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-G-2 Pressure Retaining Bolting, 2 in. & Less in Diameter	B7.10	Bolts, Studs, & Nuts, Reactor Vessel	8	Visual, VT-1	
	B7.20	Bolts, Studs, & Nuts in the Pressurizer	1	Visual, VT-1	
	B7.30	Bolts, Studs, & Nuts in Steam Generators	4	Visual, VT-1	
	B7.50	Bolts, Studs, & Nuts in Piping	7	Visual, VT-1	
	B7.70	Bolts, Studs, & Nuts in Valves	21	Visual, VT-1	
B-H Integral Attachments for Vessels	B8.20	Integrally Welded Attachments, Pressurizer	1	Volumetric or Surface	
	B8.30	Integrally Welded Attachments, Steam Generator	2	Volumetric or Surface	
B-J Pressure Retaining Welds in Piping		Selection made under the Risk Informed Application	66	Volumetric	
B-K-1[1] Integral Attachments for Class 1 Vessels, Piping, Pumps & Valves	B10.10[1]	Integrally Welded Attachments to Vessels	8	Volumetric or Surface	
	B10.20[1]	Integrally Welded Attachments to Piping	16	Volumetric or Surface	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-L-1 Pump Casing Welds	B12.10	Pump Casing Welds	12	Volumetric	
B-L-2 Pump Casings	B12.20	Pump Casings	4	Visual, VT-3	
B-M-2 Valve Bodies	B12.50	Valve Bodies, Exceeding NPS 4	21	Visual, VT-3	
B-N-1 Interior of Reactor Vessel	B13.10	Vessel Interior	1	Visual, VT-3	
B-N-2 Integrally Welded Core Support Structures & Interior Attachments to Reactor Vessels	B13.50	Interior Attachments within Beltline Region in Reactor Vessel	12	Visual VT-1	
	B13.60	Interior Attachments beyond Beltline Region in Reactor Vessel	10	Visual, VT-3	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
B-N-3 Removable Core Support Structures	B13.70	Core Support Structure in Reactor Vessel	10	Visual, VT-3	
B-O Pressure Retaining Welds in Control Rod Housings	B14.10	Welds in CRD Housing	112 Total (28 Peripheral)	Volumetric or Surface	
B-P All Pressure Retaining Components (Class 1)	B15.10	RPV - System Leakage Test	2	Visual, VT-2	
	B15.20	Pressurizer - System Leakage Test	1	Visual, VT-2	
	B15.30	Steam Generator - System Leakage Test	2	Visual, VT-2	
	B15.50	Piping - System Leakage Test	See Note 3	Visual, VT-2	
	B15.60	Pumps - System Leakage Test	See Note 3	Visual, VT-2	
	B15.70	Valves - System Leakage Test	See Note 3	Visual, VT-2	
B-Q Steam Generator Tubing	B16.20	Steam Generator Tubing in U-Tube Design		Volumetric[3]	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
C-A Pressure Retaining Welds in Pressure Vessels	C1.10	Shell Circumferential Welds	17	Volumetric	
	C1.20	Head Circumferential Welds	4	Volumetric	
	C1.30	Tubesheet-to-Shell Welds	8	Volumetric	
C-B Pressure Retaining Nozzle Welds in Vessels	C2.21	Nozzle-to-Shell (or Head) Weld without Reinforcing Plate in Vessels > 1/2" Nominal Thickness	4	Volumetric & Surface	
	C2.22	Nozzle Inside Radius Section	4	Volumetric	
	C2.31	Reinforcing Plate Welds to Nozzle and Vessel	8	Surface	
	C2.33	Nozzle-to-Shell (or Head) Welds When Inside of Vessel is Inaccessible	4	Visual, VT-2	
C-C[1] Integral Attachments for Class 2 Vessels, Piping, Pumps and Valves	C3.10[1]	Integrally Welded Attachments to Pressure Vessels	12	Surface	
	C3.20[1]	Integrally Welded Attachments to Piping	99	Surface	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
C-F-1 Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping		Selection made under the Risk Informed Application	23	Volumetric	
C-F-2 Pressure Retaining Welds in Carbon or Low Alloy Steel Piping		Selection made under the Risk Informed Application	8	Volumetric	
C-H All Pressure Retaining Components (Class 2)	C7.10	Pressure Vessels - System Pressure Test	See Note 2	Visual, VT-2	
	C7.30	Piping - System Pressure Test	See Note 2	Visual, VT-2	
	C7.50	Pumps - System Pressure Test	See Note 2	Visual, VT-2	
	C7.70	Valves - System Pressure Test	See Note 2	Visual, VT-2	

TABLE 4.1
ASME SECTION XI
INSERVICE INSPECTION SUMMARY TABLE (cont.)

Examination Category	Item Number	Description of Components Examined	Number of Components	Examination Method(s)	Request Number(s)
D-A[1] Integral Attachments for Class 3 Vessels, Piping, Pumps & Valves	D1.20[1]	Integrally Welded Attachments to Piping	99	Visual, VT-1	
D-B All Pressure Retaining Components (Class 3)	D2.10	Pressure Vessels - System Leakage Test	See Note 2	Visual, VT-2	
F-A[6] Supports	F1.10[6]	Class 1 Piping Supports	252	Visual, VT-3	
	F1.20[6]	Class 2 Piping Supports	390	Visual, VT-3	
	F1.30[6]	Class 3 Piping Supports	425	Visual, VT 3	
	F1.40[6]	Supports Other Than Piping Supports (Class 1, 2, and 3)	36	Visual, VT-3	

Notes:

1. The Examination Categories, Item Numbers and Examination methods used for the inservice inspection of integrally welded attachments are in accordance with Code Case N-509.
2. Pressure retaining components (e.g., pressure vessels, pumps, valves, piping, etc.) that are subject to system pressure or hydrostatic tests are those components within the systems identified in the Piping and Instrumentation Drawings listed in Table 2.1 of this ISI Plan.
3. The extent, frequency and acceptance standards for the examination of Steam Generator tubing will be in accordance with Arkansas Nuclear One, Unit 2 Technical Specification 3/4.4.5.
4. The Class 3 system hydrostatic pressure tests will be performed to the alternate rules for 10-year hydrostatic pressure testing delineated in a Request for Alternative which invokes Code Case N-498-1. See Section 5.1.2 of this ISI Plan for details.
5. Snubber assemblies will be tested and inspected in accordance with Arkansas Nuclear One, Unit 2 Technical Specification 3/4.7.8.
6. Individual supports are further classified by support types which are identified by a single letter suffix to the Code Item Number. At Arkansas Nuclear One, Unit 2 the following suffixes are used:

CODE ITEM SUFFIX	SUPPORT TYPE
A	1-Way Restraint
B	Multi-Directional Restraint
C	Variable Spring
D	Constant Force Spring Hanger
E	Anchor
F	Snubber
G	Whip Restraint
H	Other - Guide
I	Other - Grout
J	Other

SECTION 5.0
ALTERNATIVE REQUIREMENTS TO ASME SECTION XI: 1992 EDITION WITH PRESSURE TESTING CRITERIA FROM THE 1993 ADDENDA

This section lists the alternative requirements to ASME Section XI, 1992 Edition with portions of the 1993 Addenda, being adopted for the Third Interval Inservice Inspection Program at Arkansas Nuclear One, Unit 1. The alternative requirements presented are in accordance with ASME Section XI and 10 CFR 50.55a, as applicable.

5.1 Adoption of Code Cases

This Section addresses the adoption of Code Cases during the Third Inservice Inspection Interval at Arkansas Nuclear One, Unit 2. Code Cases adopted for Inservice Inspection use during the Third Interval will be listed in Tables 5.1 and 5.2 of this Inservice Inspection Plan. In all cases, the use and adoption of Code Cases will be in accordance with ASME Section XI, IWA-2440 and 10 CFR 50.55a. The methodology for adopting Code Cases is divided into the four categories clarified below.

5.1.1 Adoption of Code Cases Listed for Generic Use in Regulatory Guide 1.147

Code Cases that are listed for generic use in the latest revision of Regulatory Guide 1.147 and will be adopted for use during the Third Inservice Inspection Interval, or Code Cases that have been approved for use by the NRC and implemented are listed in Table 5.1 of this Inservice Inspection Plan. All conditions or limitations delineated in Regulatory Guide 1.147 for a particular Code Case will apply.

TABLE 5.1
LIST OF ADOPTED CODE CASES from REGULATORY GUIDE 1.147

CODE CASE NUMBER	TITLE	REG. GUIDE 1.147 REVISION
N-416-1	Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1	12 **Limitations**
N-435-1	Alternative Examination Requirements for Vessels with Wall Thickness 2 in. or Less	12

N-460	Alternative Examination Coverage for Class 1 and 2 Welds	12
CODE CASE NUMBER	**TITLE**	**REG. GUIDE 1.147 REVISION**
N-461	Alternative Rules for Piping Calibration Block Thickness	12 **Limitations**
N-481	Alternative Examination Requirements for Cast Austenitic Pump Casings	12
N-498-1	Alternative Rules for 10-Year Hydrostatic Pressure Testing for Class 1, 2, and 3 Systems, Section XI, Division 1	12
N-509	Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1	12 **Limitations**
N-521	Alternative Rules for Deferral of Inspections of Nozzle-to-Safe End of a Pressurized Water Reactor (PWR) Vessel, Section XI, Division 1	12
N-524	Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping	12

5.1.2 Adoption of Code Cases Not Listed for Generic Use in Regulatory Guide 1.147

Adoption of Code Cases that have been approved by the Board of Nuclear Codes and Standards, but that have not been listed for generic use in Regulatory Guide 1.147, may be submitted in the form of a Request for Alternative in accordance with 10 CFR 50.55a(a)(3). Once approved, these Requests for Alternatives will be available for use at Arkansas Nuclear One, Unit 2 until such time that the Code Cases are adopted into Regulatory Guide 1.147, at which time Arkansas Nuclear One will comply with any limitations stated therein.

Table 5.2 lists those Code Cases which have been previously submitted for use at Arkansas Nuclear One, Unit 2. Requests for Alternatives for the Code

Cases listed in the table were submitted by Entergy Operations, Inc. in letter number
0CAN069606, dated June 6, 1996 and letter number 0CAN109504, dated October 6, 1995. In addition to the requirements stated in the Code Cases, criteria may be stipulated in the Request for Alternative or may be agreed upon through subsequent correspondences with the NRC.

TABLE 5.2
CODE CASES SUBMITTED THROUGH REQUESTS FOR ALTERNATIVES

CODE CASE NUMBER	TITLE	SUBMITTAL LETTER NUMBER	APPROVED BY THE NRC
N-508-1 N-532 N-546	Request for use of ASME Code Cases N-508-1, N-532, and N-546	2CAN060008 June 15, 2000	Waiting

5.1.3 Adoption of Code Cases Issued Subsequent to Filing this Inservice Inspection Plan

Code Cases issued by ASME Section XI subsequent to filing this Inservice Inspection Plan will be proposed for use in amendments to this Plan in accordance with ASME Section XI, IWA-2441(d).

5.2 **Use of Subsequent Editions of ASME Section XI**

In accordance with 10 CFR 50.55a(g)(3)(v), components (including supports) may meet the requirements set forth in subsequent editions of Codes and Addenda, or portions thereof, which are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed therein. This Section of the Inservice Inspection Plan provides for alternative requirements from approved subsequent Code editions that may be adopted during the Third Inservice Inspection Interval. This Inservice Inspection Plan will be amended for adoption of subsequent Code rules.

5.3 Inservice Inspection Request for Alternative and Relief Request Index

This section provides a summary listing and revision status of all Requests for Alternatives and Relief Requests related to inservice inspections at Arkansas Nuclear One, Unit 2.

TABLE 5.3
INSERVICE INSPECTION REQUEST FOR ALTERNATIVES AND RELIEF REQUEST INDEX

Request No.	Page(s)	Rev.	Submittal Date	APPROVED BY THE NRC	Topic
2CAN099706 0CAN039809 2CAN109801 2CAN119804 2CAN129803	N/A		09/30/97 03/31/98 10/08/98 11/25/98 12/08/98	2CNA129805 December 28,1998	Risk-Informed Alternative to the Requirements of ASME Code Section XI, Table IWB-2500-1 Arkansas Nuclear One, Unit 2

5.4 Inservice Inspection Requests for Alternatives and Relief Requests

5.4.1 Alternatives to Code required examinations may be authorized by NRR, as allowed by 10 CFR 50.55a (a)(3), provided that design, fabrication, installation, testing and inspection performed in compliance with Codes and Section XI requirements would result in hardship without a compensating increase in the level of quality and safety, or provided that the proposed alternative examination will assure an acceptable level of quality and safety. Specific exceptions shall be documented in the form of a Request for Alternative and included in this Section, as applicable.

5.4.2 This section shall include Relief Requests written in accordance with 10 CFR 50.55a(g)(5) when specific ASME Section XI requirements for inservice inspection are considered impractical. If examination requirements are determined to be impractical during the course of the interval, relief requests shall be submitted in accordance with 10 CFR 50.55a(g)(5).

5.4.3 Relief Requests for incomplete examinations shall be submitted in accordance with 10 CFR 50.55a(g)(5)(iv) throughout the interval as limitations are identified. Due to ongoing changes in nondestructive examination procedures, techniques and requirements, Arkansas Nuclear One, Unit 2 considers that submitting Relief Requests for incomplete examinations when they are evaluated will provide a more accurate representation of the limitations.

2CNA129805

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 29, 1998

Mr. C. Randy Hutchinson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: REQUEST TO USE A RISK-INFORMED ALTERNATIVE TO THE REQUIREMENTS OF ASME CODE SECTION XI, TABLE IWX-2500 AT ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M99756)

Dear Mr. Hutchinson:

By letters dated September 30, 1997 (2CAN099706), March 31, 1998 (OCAN039809), October 8, 1998 (2CAN109801), November 25, 1998 (2CAN119804), and December 8, 1998 (2CAN129803), you requested that the NRC approve a risk-informed alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section XI, Division 1 for the inservice inspection of piping welds at Arkansas Nuclear One, Unit No. 2 (ANO-2). This submittal proposed an alternative to ASME Section XI Table IWX-2500 which was based on ASME Code Case N-578, "Risk-Informed Requirements for Class 1, 2, and 3 Piping - Method B," and the Electric Power Research Institute (EPRI) Technical Report No. TR-106706, "Risk-informed Inspection Evaluation Procedure, Interim Report," as augmented by ANO-2 plant-specific methodologies. Specifically, you proposed to redistribute the piping inspections to focus on high-risk piping segments of safety-related piping systems while minimizing the number of inspection performed on low-risk systems and piping segments. In addition, the types of inspections were considered from a risk-informed perspective favoring volumetric examinations over surface exams. The result of this redistribution was an overall reduction in the number of piping examinations performed from the original value of 336 examinations conducted in accordance with the current ASME Section XI inservice inspection program to the 167 examinations that you have proposed.

We have reviewed the proposed request as a site-specific alternative applicable only to ANO-2. The results of our review indicated that you have provided an acceptable alternative to the requirements of ASME Section XI and have shown that implementation of this program would result in an insignificant change in risk even with fewer inspections, since the inspections will take place where degradation mechanisms are more likely to occur, and procedures and personnel will target these specific locations using improved techniques and

expanded volumes. We have determined that the alternative method described in your submittal provides equivalent or better examination criteria for piping inspections than the method provided by the current Section XI requirements.

We therefore conclude that authorization of your proposed alternative for piping systems would provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), the alternative is authorized. It should be noted that the EPRI report is still under development and is the subject of a separate evaluation and that this safety evaluation does not constitute approval of the EPRI methodology in any manner. In addition, this authorization does not constitute an NRC approval of Code Case N-578 for generic use. The suitability of Code Case N-578 for generic use will be determined following the staff's review of the case. It is expected that the results of the staff's review will be documented in Regulatory Guide 1.147, "Inservice Inspection Code Case Applicability - ASME Section XI, Division 1." Our detailed evaluation and conclusions are documented in the enclosed safety evaluation.

Sincerely,

Original signed by

John N. Hannon, Director
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure: As stated

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
PROPOSAL TO USE ASME CODE CASE N-578 AS AN ALTERNATIVE
TO ASME CODE SECTION XI, TABLE IWX-2500
ENTERGY OPERATIONS, INC.
ARKANSAS NUCLEAR ONE, UNIT NO. 2
DOCKET NO. 50-368

1.0 INTRODUCTION

Current requirements for conducting inspections at commercial nuclear power plants are contained in the 1989 Edition of Section XI, Division 1 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, entitled Rules for Inservice Inspection of Nuclear Power Plant Components (hereinafter called the Code). In letters dated September 30,1997[1], and March 31,1998[2], the licensee, Entergy Operations, Inc., proposed an alternative to the current requirements for the examination of piping welds at Arkansas Nuclear One, Unit No. 2 (ANO-2). In response to requests for additional information (RAIs) from the NRC, the licensee sent additional information by letters dated October 8, 1998[3], November 25, 1998[4] , and December 8, 1998[5], to address certain items in support of the risk-informed inservice inspection pilot application at ANO-2. The licensee's submittals were reviewed for information with NRC guidance documents[6,7] and applicable portions of the Electric Power Research Institute (EPRI) risk-informed topical report No. TR-106706[8] as appropriate. It should be noted that (1) the EPRI report is still under development and is the subject of a separate evaluation and (2) this safety evaluation does not constitute approval of the EPRI methodology in any manner. Additionally, it should be noted that although the licensee's alternative includes the use of ASME Code Case N-578, this evaluation does not provide generic approval or endorsement of this Code Case as written. This evaluation applies only to piping systems at ANO-2. All Code-required inspections of other non-piping safety-related components shall continue to be performed in accordance with the ASME Section XI inservice inspection program, as required by the licensee's Technical Specifications.

2.0 SUMMARY OF PROPOSED APPROACH

The licensee is required to perform inservice inspection (ISI) of ASME Code Category B-J and C-F piping welds during successive 120-month (10-year) intervals. Currently, 25% of all Category B-J piping welds greater than 1-inch nominal diameter are selected for volumetric or surface examination or both on the basis of the existing stress analyses. For Category C-F piping welds, 7.5% of non-exempt welds are selected for surface or volumetric examination or both.

Pursuant to 10 CFR 50.55a(3)(i), the licensee has proposed to implement Code Case N-578[7], Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, augmented with the more detailed provisions of Reference 8, and other methodology enhancements described in this report, as an alternative to the Code requirements for the examination of Class 1 and 2 piping welds at ANO-2. By letter dated September 30, 1997, the licensee submitted separate risk evaluations for the following systems:

(1) High-Pressure Safety Injection
(2) Reactor Coolant
(3) Chemical and Volume Control
(4) Containment Spray
(5) Low-Pressure Safety Injection and Shutdown Cooling
(6) Emergency Feedwater
(7) Main Feedwater
(8) Main Steam

The licensee submitted a formal request for NRC review by letter dated March 31, 1998. This letter also contained a risk evaluation for the service water system. In effect, the alternative proposed by the licensee would significantly reduce and re-target inservice examinations, based on the consequences of various piping failure(s) in conjunction with expected degradation mechanisms. In response to RAIs from the NRC, the licensee sent a letter on October 8, 1998, addressing specific items of concern in support of the risk-informed inservice inspection (RI-ISI) pilot application at ANO-2.

In accordance with 10 CFR 50.55a(a)(3)(i), the NRC may authorize a proposed alternative to regulatory requirements when the applicant demonstrates that the alternative provides an acceptable level of quality and safety. In this case, the licensee must demonstrate that the proposed alternative provides protection comparable to the requirements of ASME Section XI, which prescribes the how, when, where, and number of examinations to be performed on Class 1 and 2 piping systems. The licensee has requested approval of this alternative for implementation during the January 1999 refueling outage. ANO-2 is currently in its second 10-year ISI interval, which is scheduled to end on March 26, 2000.

The licensee has submitted the proposed alternative on the grounds that RI-ISI will provide an acceptable level of quality and safety. The licensee stated

> The principal objective of a risk-informed inservice inspection (ISI) approach is to focus resources on higher risk elements. Entergy believes that achieving this objective will result in increased plant safety and a significant reduction in worker radiation exposure, while also reducing plant operating and maintenance costs.

The licensee's proposed alternative applies specifically to the nondestructive examination (NDE) of Class 1 and 2 piping, but also includes Class 3 systems and certain non-Code-classed piping in the risk evaluations.

The fundamental basis for the proposed alternative is that the overall plant risk associated with the new process for selection of piping inservice examination locations is essentially the same, or less than the plant risk resulting from the current ASME Section XI piping ISI selection requirements.

3.0 EVALUATION

The licensee's submittals were reviewed with respect to criteria contained in the Standard Review Plan (SRP) Chapter 3.9.8, "Standard Review Plan For Trial Use for the Review of Risk-Informed Inservice Inspection of Piping, September 1998." The SRP describes the review process and acceptance guidelines for NRC staff reviews of proposed plant-specific, risk-informed changes to a licensee's ISI program for piping. Further guidance in defining acceptable methods for implementing an RI-ISI program is described in Regulatory Guide 1.178, "An Approach for Plant-Specific Risk-informed Decisionmaking Inservice Inspection of Piping," which has been issued for trial use and is consistent with the review procedures contained within the SRP. Each section of the SRP, and how the licensee addressed it, is discussed in the sections below.

3.1 Proposed Changes to ISI Program

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed to implement Code Case N-578[9], Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, augmented with the more detailed provisions of EPRI TR-106706, as an alternative to the Code examination requirements for piping systems at the ANO-2 plant. The proposed changes to the ISI program are described in Section 2 of the licensee's submittal. Details of the proposed changes involving the specific pipe systems, segments, numbers of welds selected and revisions to inspection scope, locations, and techniques are given in Section 7 and Appendix C of each submittal. This information was further presented and summarized for all of the RI-ISI systems in the October 8, 1998, response to an NRC RAI. In this same response, Entergy also confirmed that the inspection frequency will be the 10-year inspection interval currently required by Section XI, supplemented with augmented inspections for specific degradation mechanisms, i.e., flow accelerated corrosion (FAC), with a frequency as specified, in the existing plant program.

Critical plant safety functions and associated success criteria are common to all of the submittals when determining the number of backup trains that are available for the consequence rankings of each pipe segment failure, as identified in Figure 3-1 in conjunction with Table 3-1 of the Service Water Analysis. A more detailed discussion and presentation of each critical safety function was submitted by the licensee in response to an NRC RAI. The simplified success criteria diagrams were expanded to more clearly depict the relationship between the critical safety functions and the systems that provide these functions.

In Section 6 of each submittal, plant-specific experience was evaluated (1) to identify any potential degradation mechanisms in the piping pressure boundary associated with particular plant configurations and service conditions, (2) to supplement the EPRI industry experience

review, and (3) to confirm susceptibility to degradation mechanisms. The licensee used a separate independent evaluation[10], in conjunction with the EPRI methodology, to determine applicable degradation mechanisms appropriate for ANO-2. These determinations serve to assess the potential for failure-specific and target-specific examination locations within each piping system, in lieu of current Code selection processes.

In consideration of the information supplied by the licensee in the original submittals and in the responses to NRC RAIs, the licensee has met the SRP requirement to adequately define the proposed changes to the current ISI program with respect to implementation of Code Case N-578 as augmented by EPRI TR-106706, and the methodology enhancements discussed herein.

3.2 Engineering Analysis

An engineering analysis of the proposed changes is required using a combination of traditional engineering analysis with supporting insights from the probabilistic risk assessment (PRA). The licensee further elaborated on how the engineering analyses conducted for the ANO-2 RI-ISI program ensures that the proposed changes are consistent with the principles of defense-in-depth and that adequate safety margins will be maintained. The licensee does this by evaluating a location's susceptibility to a particular degradation mechanism, which should increase the likelihood of finding flaws or indications that may be precursors to leak or rupture, and then performing an independent assessment of the consequence of a failure in that location. Further details regarding the engineering analysis and risk-based evaluations are discussed in the next sections.

3.2.1 Traditional Analysis

The objectives of ISI and ASME Section XI are to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary that may affect plant safety. Therefore, the RI-ISI program must meet this objective to be found acceptable for use as an alternative to the requirements in ASME Section XI. The current licensing basis for ISI at ANO-2 includes augmented examinations as a result of NRC-issued notifications. The process for assessing degradation mechanisms includes the consideration of such attributes as thermal fatigue and stress corrosion cracking in defining a piping segment's susceptibility to these and to other damage processes. For this reason, several of the currently applied augmented examination programs will no longer be separately implemented, but are enveloped by the RI-ISI program. These include augmented examinations as a result of the following:

- NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant Systems," Supplements 1, 2, and 3,

- NRC Bulletin 88-1 1, "Pressurizer Surge Line Thermal Stratification",

- NRC Information Notice 93-020, "Thermal Fatigue Cracking of Feedwater Piping to Steam Generators", and

- IE Bulletin 79-17, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants."

However, the licensee has confirmed that, on the basis of the RI-ISI degradation assessment, the following two existing augmented examinations will be maintained at ANO-2:

- Flow Accelerated Corrosion (FAC) Inspection Program, and
- The classification of "no-break zones", as described in Branch Technical Position MEB 3-1, "Postulated Rupture Locations in Fluid Systems Inside and Outside Containment."

The licensee has also clarified which portions of the Code the proposed ISI changes are intended to replace, and identified the specific changes in moving from the current Section XI program to the RI-ISI program.

The licensee has encompassed appropriate degradation mechanisms within the RI-ISI piping segment evaluations. In addition, certain augmented programs will remain intact on the basis of these determinations. Therefore, the licensee has met the intent of the SRP requirement to confirm that existing augmented examination programs that are part of the current licensing basis for ANO-2, pertaining to the integrity management of piping, will not be adversely impacted by implementation of the proposed alternative.

3.2.2 PRA

The ANO-2 Individual Plant Examination (IPE) was completed in August, 1992 (ANO-2 PRA 94-R-2005-01, Rev. 0). The IPE estimated a core damage frequency (CDF) of 3.4E-5/yr. A limited scope Level 11 analysis considered all relevant plant damage states, containment systems states, and containment failure modes. Detailed phenomena and structural analysis were not performed. ANO-2 design features were considered in the IPE via limited engineering calculations or on the basis of a reference plant. The licensee defined large early release frequency (LERF) as early containment failure without source term mitigation and reported that this is expected to occur in about 7% of all severe accidents. No LERF was reported, although a frequency of 2.4E-6/yr can be estimated from the findings.

Internal floods were evaluated through a seven-step screening process. The licensee estimated a CDF of 5E-7/yr from the one zone (of 78 zones) to survive up to the last screening step, but claimed that this estimate was still conservative. This estimate fell below the licensee's 1E-6/yr cut-off criteria for individual sequences, so the licensee reported that all flooding sequences had been screened out.

According to the licensee's October 8, 1998, submittal, the licensee updated the PRA between the original RI-ISI submittals in 1997 and the October 1998 submittal. The updated PRA was used to perform confirmatory calculations to ensure that systems interactions and common cause failures are appropriately reflected in the equivalent number of trains assigned to different systems.

The methodology provides guidance on assigning consequence categories to segment breaks on the basis of the number of available trains, broad categories of initiating event frequencies, and exposure times. As discussed in Section 3.2.6, however, use of the methodology requires confidence that the train unavailabilities, initiating event frequency, and associated conditional core damage probabilities (CCDPs) are consistent with the bounding values assumed by the methodology. The licensee used quantitative PRA results to support the following plant-specific evaluations:

(1) The licensee uses PRA results to estimate the CCDP for those segment failures that cause only initiating events and that do not cause any loss of mitigating functional capability. The CCDP was obtained by dividing the CDF for each relevant initiating event by the initiating event frequency. The CCDP result can be directly compared to the CCDP guidelines to place the segment in the appropriate consequence category. The guidelines are discussed in Section 3.2.6.

(2) For those segment failures that only fail mitigating systems and do not cause a plant trip, the licensee used the matrix process described in Section 3.2.6. The PRA was used, however, to calculate several system and function unavailabilities by setting the basic events representing the equipment and functions failed by the segment rupture to "failed" in the baseline PRA. The results were compared to the 0.01 unavailability per train (as defined in the methodology) to ensure that an equivalent number of "back-up trains" deterministically assigned is consistent with the PRA results.

(3) For those system failures that fail mitigating system(s) and that cause a plant trip, the licensee used the matrix process described in Section 3.2.6. The PRA was used, however, to calculate several CCDPs (after setting the equipment and functions failed by the segment rupture to failed in the baseline PRA) to ensure that system and equipment interactions between the initiating event and the credited, mitigating systems trains were appropriately accounted for.

Recovery actions credited in the baseline PRA but no longer applicable because of equipment damage caused by the segment rupture are factored out of all the CCDPs calculated. The PRA was not directly used to determine any LERF values. LERF considerations were evaluated as described in Section 3.2.6.

The staff finds that the results of the IPE and from the updated PRA were used in a manner consistent with their definitions. The staff also finds that the use of the updated PRA to perform the requested confirmatory calculations provides additional assurance that the result of the RI-ISI evaluations reflect the current as-operated state of the plant.

Quality of PRA

Licensee personnel performed the majority of the analytical work during the development of the IPE. The IPE program included an independent review team consisting of ANO

Operations, Design Engineering, Training, and Licensing staff supplemented with contractor engineers. The detailed review methodology included the review of initiating events, accident sequences, success criteria, system models and fault trees, human reliability analysis, data evaluation, and containment response evaluation. The licensee also performed a separate detailed review of the PRA to provide assurance that assessment data are traceable to reliable or controlled design documentation and information sources to facilitate future updating efforts.

The IPE review was completed in May 1996. The review concluded that the study met the intent of Generic Letter 88-20, but identified concerns that "post-initiator" human reliability analysis (HRA) yielded overly optimistic (small) HRA probabilities and that dependencies among multiple actions were not fully considered. As stated by the licensee and illustrated by several examples in the ISI submittal, the licensee screened the PRA models for initiating events where a recovery was credited in the baseline PRA but is no longer feasible given the segment rupture. In these cases, the probability of successful recovery was factored out of the CCDP. Removal of such recovery actions ensures that the impact of potentially optimistic HRA recovery probabilities for an initiating event caused by the failure of a segment is not a factor in the segment's categorization. For the segment failures that only failed mitigating systems, the licensee used primarily functional level PRA results coupled with deterministic considerations.

An overly optimistic HRA estimate could easily place a marginally High segment in Medium, or a marginally Medium segment in Low, but the HRA estimate would have to be underestimated by two orders of magnitude before a marginally High segment would drop to Low. The staff recognizes that the use of overly optimistic recovery factors in the baseline PRA may have some minor influence on the consequence categorization of a few segments. However, the staff finds that removal of the recovery factors that are no longer possible because a pipe segment has failed, and the coupling of functional level and deterministic considerations for mitigating system failures, provide assurance that any impact on the consequence categories will be minor and will not invalidate the general results or conclusions. The licensee's analysis of possible RI-ISI specific recovery actions from the effects of segment failure are discussed in Section 3.2.6.

As described in the licensee's IPE submittal, the flooding analysis began with the identification of the location of the equipment credited in the PRA and designation of the Appendix R fire zones as flood zones. A preliminary flood hazard source-location was developed, and mitigating features such as curbs, watertight doors, sump pumps, floor drainage systems, and other flood runoff paths were identified. A walkdown was performed to confirm the collected information and to verify the location (including distance above the floor level) of equipment, components, and controls. The walkdown was documented with notes on scenario tables and selected fire zone drawings. The inspection was also documented by photographing each accessible plant flood zone, including significant component locations, flood propagation paths, and flood mitigation/isolation features.

The results of the ISI evaluation reported in the submittal by the licensee were reviewed, and those parts of the IPE used extensively to support the evaluation in the submittal were identified. The PRA update between the September 30, 1997, submittal and the confirmatory calculations submitted in the October 8, 1998 response to the staff's RADS complicated the review of the IPE and its use to support the submittal. The update does, however, demonstrate the licensee's commitment to maintaining a quality PRA which corresponds to the as-operated plant. A focused review of selected parts of the IPE, supplemented by the licensee's October 8, 1998, submittal, uncovered no shortcomings that might invalidate the results of the evaluation used to support the submittal.

The staff did not review the IPE or the flooding analysis to assess the accuracy of the quantitative estimates. The staff recognizes that the quantitative results of the IPE are used as order-of-magnitude estimates for several risk and reliability parameters used to support the assignment of segments into three broad consequence categories. Additional estimates are used to confirm parts of the methodology whereby segments are assigned to consequence categories on the basis of the number of back-up trains available versus demand occurrence frequency categories. Inaccuracies in the models, or assumptions large enough to invalidate the broad categorizations developed to support RI-ISI, should have been identified in the licensee or staff reviews. Minor errors or inappropriate assumptions will only affect the consequence categorization of a few segments and will not invalidate the general results or conclusions. The staff finds the quality of the PRA sufficient to support the submittal.

Scope of PRA

Segments in the High consequence category are not further differentiated, so any segment categorized as High in the internal event evaluation need not be further evaluated for other types of initiating events. The licensee evaluated the shutdown modes of operation and operating conditions for each of the systems included in the evaluation. The submittal contains a detailed discussion of the segments involved in shutdown operational functions.

Fires and seismic initiating events are also evaluated and discussed for each system in the submittal. As with shutdown, only pipe segments with medium and low consequence need to be reviewed. In general, the licensee determined that the frequency of transients related to Class 1 piping and induced by external events is less than the frequency of internal events-induced transients. No relationship between reduced inservice inspections and increased vulnerability to segment failure arising from the occurrence of external events was identified.

The staff finds the scope of the IPE acceptable because initiating events and operational modes outside of the scope of the [PE were systematically included in the RI-ISI evaluation and not neglected.

3.2.3 Scope of Piping Systems

The scope of the piping systems included in the ANO-2 RI-ISI program is broader than that required by the Code Case or the SRP since the licensee has included the current Section XI

systems as well as Code-exempt and non-Code portions of these systems, due to their potential safety-significance. In its response to an NRC RAI, the licensee more clearly presented the entire scope of the RI-ISI assessment, and provided the rationale for why certain systems that were analyzed in the ANO-2 PRA were not included in the RI-ISI program. For these systems, such as component and auxiliary cooling water, instrument air, and auxiliary feedwater, it was shown that loss of the systems has a negligible impact on CCDF and are therefore, of low safety importance, and do not warrant inclusion into the RI-ISI program.

The licensee also noted that the piping scope for the RI-ISI assessment goes beyond what would be required by Code Case N-578. The Code Case mandates inclusion of piping within the Section XI Class 1, 2, and 3 examination boundaries. However, the Code Case allows for piping evaluated as part of the PRA but outside the existing Section XI examination boundaries to be included at the owner's option. Therefore, the scope of the piping systems that were included in the RI-ISI program meets the minimum requirements of N-578, and adequately identifies the High safety-significant piping at ANO-2.

3.2.4 Piping Segments

Piping systems defined by the scope of the RI-ISI program were divided into piping segments. Pipe segments are defined as lengths of pipe whose failure lead to the same consequence and which are exposed to the same degradation mechanism. That is, some lengths of pipe whose failure would lead to the same consequences may be split into two or more segments when two or more regions are exposed to different degradation mechanism. The staff finds this appropriate, and necessary, because the methodology combines separate consequence categories with degradation mechanism categories and therefore the two characteristics should not be mixed within a segment. In some cases the licensee performed a screening analysis for welds in pipe segments that interfaced with a main flow path to determine if they could be characterized as Low safety-significant. Safety-significance was qualitatively evaluated by assessing the direct and indirect consequences of pipe segment failure. Those pipe segments that interface with a main flow path and were found to be of low safety-significance, i.e., Risk Category 6 or 7, were excluded from further detailed evaluation.

The licensee's October 8, 1998, submittal indicated that the following screening criteria were used:

(1) The segment was included in an augmented program and no other degradation mechanisms identified within the segment,

(2) Segment failure (including direct and indirect effects) would not result in an initiating event and the segment is not located in the main flow path of any system performing a plant safety function that would be required to respond to a design-basis event, and

(3) The segment is normally isolated or there is a high degree of confidence that the failure would be detected and isolated because:

  (a) The room is equipped with level indicators that alarm in the control room or the room is large enough that flooding is not a hazard to equipment in the room, and

  (b) The valve used to isolate the break is not affected by the break (e.g., the valve is in the same room but is high enough above the floor not to be flooded and environmentally protected against spraying or jet impingement if in close proximity to the break).

A discussion is provided on the consequence degradation mechanism, isolation capabilities, and justification for placing segments in Low for each pipe section. The staff finds that the screening process to reduce the analysis effort needed for clearly Low-safety significant segments acceptable because hazard and consequence information of sufficient detail to support the justification is collected, evaluated, and documented.

The SRP requires that segments prone to the same degradation mechanism be systematically identified. The licensee used an enhancement to the currently published EPRI and Code Case methodologies by assessing the degradation mechanisms in accordance with an independently written report (Structural Integrity Associates Report SIR-96-097[10]). Although the criteria of the EPRI guideline are very similar, the independent analysis presents a more refined set of degradation mechanisms with clearly defined attributes. These will be incorporated into the next revision of EPRI TR-106706 and Code Case N-578 as part of the lessons learned during application of the methods in the pilot studies. The licensee presents additional information to highlight the differences between degradation mechanisms and associated attributes that were considered in the Structural Integrity report and the EPRI methodology.

The licensee has met the SRP requirement to confirm that a systematic process was used to identify and group pipe systems into segments with common failure consequences and susceptibility to common degradation mechanisms. Considering the supporting information presented by the licensee, the basis for defining piping segments has been adequately justified.

3.2.5 Piping Failure Potential

Piping failure potential was determined on the basis of the degradation mechanism evaluation as described previously in Section 3.2.4. The licensee used a methodology enhancement different from the currently published EPRI and Code Case methodologies by assessing the degradation mechanisms using Structural Integrity Associates Report SIR-96-097[10]. A general description of this process is included in Sections 4.1, 5.0, and Appendix B of each submittal.

In the EPRI methodology, although the consequences of piping failures are evaluated assuming a large break, the pipe break failure potential rankings are based upon specific degradation mechanisms for which the pipe segment is postulated to be susceptible. Only a pipe segment that is susceptible to FAC receives a High pipe failure potential, unless that segment is susceptible to a different degradation mechanism, other than FAC, and also has the potential for water hammer. The licensee conducted a plant-specific and industry evaluation of water hammer events for applicability to ANO-2 using EPRI/NRC guidelines. The licensee contends that, unlike degradation mechanism evaluations, water hammer is a plant-specific phenomenon because of due to individual system configurations and operating practices. In early plant operating cycles, ANO-2 experienced a small number of these events, primarily in feedwater and main steam systems. In addition, the service water system was initially believed to be susceptible to water hammer. Plant modifications were made to eliminate condensation collection areas, and operating procedures were revised to mitigate the potential for water hammer in these systems. No events have occurred since these alterations were implemented. Therefore, on the bases of plant system reviews and an absence of recent events, the licensee has eliminated water hammer from consideration for all of the systems included in the proposed alternative.

The licensee has met the SRP requirement to confirm that a systematic process was used to identify pipe segment susceptibility to common degradation mechanisms, and to place these

degradation mechanisms into the appropriate degradation categories with respect to their potential to result in a postulated large pipe break.

3.2.6 Consequence of Failure

The results of the consequence analyses of postulated pipe segment failures are presented in Section 4, Table 2, and Appendix A of the submittals, except for the service water study, which is found in Section 5, Table 5-1 and Appendix A. As required by the SRP, the consequence of the postulated pipe failure considered both direct and indirect effects of each segment failures. The direct effects always include a diversion of flow large enough to either disable the system or lead to isolation (automatic if available, manual if feasible). Indirect effects include spatial effects caused by flooding, spray, and pipe whip as well as depletion of water source, such as draining tanks.

The analysis is performed assuming a large break, unless a smaller break would result in more severe consequences. Large breaks are generally more limiting since, for a small break, the transient and environmental effects on the plant are less severe, and the plant operators have more time to respond to the break. No credit is given to leak-before-break. The staff finds that the use of large break, or more limiting small break, and all associated direct and indirect effects to bound the impact of each break can be used to characterize the risk from each segment and is acceptable.

The methodology used by the licensee is based on the number of trains available (e.g., backup trains) to mitigate an event. In some cases, the equipment and functions lost as a result of a pipe rupture can vary greatly if an automatic (e.g., check valve closure and automatic isolation valves) or remote manual isolation succeeds or fails. It is necessary to represent the potential for the operators to isolate a break and recover mitigating capability within this backup train framework. In general, if successful operator action to isolate of the break would recover one or more mitigating trains, the potential for isolation was credited as one backup train. Credit for one backup train corresponds, in this methodology, to a failure probability of 0.01 and, as discussed below, the licensee provided justification for generally using a human error probability of this magnitude. In some specific scenarios, 0.5 and 2 backup trains, corresponding to human error probabilities of 0.1 and 1E-4 respectively, are discussed and used in the submittal. Following successful isolation, the backup train might fail to operate, so isolation and backup failure should be added. That is, failure to isolate or failure of the mitigating train given successful isolation would, for example, be 0.02, but this difference is negligible within the bounding values used in this methodology.

In the October 8, 1998, submittal, the licensee gave detailed descriptions of the manual recovery actions credited in the RI-ISI evaluation. The descriptions included alarm indications used by the operators to identify that a rupture has occurred and where the rupture is located, a list of procedures and annunciator response actions directing the operators to locate and isolate the leak, and an estimate of the time available to recover. The license also reported an exercise at the site in which an operator responded quickly to a reported (but, unknown to the operator, not real) leak alarm. Manual recovery was only credited when there is a control

room alarm indicating leakage to which the operator will respond by investigating, each alarm's response is directed by the corresponding procedure, and all isolation actions can be taken from the control room. Rupture of one of the four HPSI lines inside containment is the exception because no leakage alarms are tripped following this event. In this case, the license described the alarms indicating improper system operation. Response to these alarms would lead to remote manual isolation of the ruptured line. The staff finds that crediting isolation potential as described in the submittal is acceptable because it provides for including isolation (which has a substantial impact on the consequence of pipe rupture), and the impact of not adding the recovered train's failure probability to the operator error probability is negligible when compared to the order-of-magnitude analyses upon which the methodology is based.

Because of the potential for interactions between the system trains and between different systems, a physical train is not always a full backup train. That is, two parallel pump trains may have an estimated unavailability of 2.4E-4 to provide flow from at least one pump. Two backup trains with an unavailability of 0.01 each would have, at most, an unavailability of 1E-4. Therefore, these two physical trains would then represent 1.5 backup trains. The licensee performed a number of PRA calculations for the more complex failures, confirming that the number of backup trains assigned to various functions was consistent with the PRA estimates. Additionally, the licensee's October 8, 1998, submittal included a systematic evaluation of support system dependencies between systems and system trains to further ensure that the assigned number of backup trains was appropriate.

Each segment not screened out was evaluated with a comprehensive failure mode and effects analysis (FMEA). Aside from the reactor coolant system and parts of other systems that are located inside the containment [and designed to operate following a loss of coolant accident (LOCA)], the FMEA included a walkdown of each system. A full evaluation and discussion for each segment is presented in the submittal. The description includes the direct consequence, indirect spatial effects, flood propagation paths, safety functions failed due to the segment failure as well as safety functions not affected by the segment failure (used to determine the number of backup trains remaining), alarms and instrumentation arising from the rupture, and associated automatic and manual isolation possibilities. The submitted documentation indicates that the licensee identified equipment in the various areas that could be susceptible to the environmental impact of the pipe rupture and the environmental qualification of the equipment. Furthermore, the flood propagation paths are identified, described, and evaluated. The staff finds that the process described by the licensee, and as illustrated by the submitted results, is acceptable as it allows for the development of direct and indirect effects of pipe ruptures because appropriate information is collected, evaluated, and documented.

Consequence Categorization

The specific decision criteria used to determine the consequence category depend on the type of impact the segment failure has on the plant. In general, however, the criteria are derived from guidelines applied to the CCDP given the segment failure. That is, given a segment failure and all the associated spatial effects, the CCDP is the probability that the resulting

scenario will lead to core damage. If the failure of a segment is estimated to lead to a core damage event with a probability greater the 1E-4, the segment is categorized as High consequence. An estimated CCDP within the range of 1E-6 to 1E-4 is categorized as Medium consequence. CCDPs less than 1E-6 are categorized as Low consequences.

If the segment failure only causes an initiating event and does not cause any mitigating system functions to fail, the CCDP guidelines can be directly applied. Otherwise, the methodology provides guidance on assigning consequence category to segment breaks based on the number of available (e.g., backup) mitigating trains remaining, broad categories of initiating event frequencies, and exposure times. The guidance, in the form of a matrix, is based on the assumption that each backup train left to mitigate an event has an unavailability of 0.01. That is, in order for the CCDP of the matrix elements to be assigned High, Medium, and Low to correspond to the 1E-4, between 1E-4 and 1E-6, and less than 1E-6 guidelines, each backup train must provide an availability of at least 0.99.

The following decision criteria are used to support the CCDP-related categorization of each type of segment failure consequence:

(1) When the segment failure causes only an initiating event (e.g., no mitigating system failures caused by segment rupture), the CCDP can be estimated and directly compared to the guideline values.

(2) Segment failures that only fail mitigating functions but do not cause a plant trip increase the likelihood that, following an unrelated initiating event, the sequence of events will lead to a core damage event. In some cases (for example, normally isolated segments), the segment failure may occur before the event but only become manifest upon demand. In other cases, the failure may be detected and the repair initiated (up to the allowed outage time limits of the equipment), and the event may occur during the repair. The licensee uses a matrix supplied in the submittal that specifies consequence categories according to categories of initiating events based on expected frequencies, the number of equivalent, backup trains left to mitigate the event, and exposure time. The consequence category for each matrix entry was developed by estimating a CCDP from the bounding values of all three contributing factors, and comparing that bounding value to the CCDP guidelines.

(3) Segments that both cause an initiating event and fail mitigating systems are the last type of segment failure consequences. The licensee used a matrix supplied in the submittal, whereby the number of equivalent, unaffected trains available for mitigation determines the consequence. The consequence category for these matrix entries was developed by estimating a CCDP assuming the bounding unavailability of 0.01 for each backup train, and comparing the result to the CCDP guidelines.

The staff finds the definition and use of the methodology and the matrices acceptable because the matrix elements are derived from bounding values, and because the licensee performed

evaluations to provide reasonable assurance that each assigned backup train corresponds to at least the availability of the bounding values.

The licensee addresses the potential for large early release for containment bypass sequences, and for containment failure following non-bypass core damage sequences. The licensee does not provide a set of quantitative guidelines relating High, Medium, and Low safety significance to large early release likelihood. The staff has accepted an RI-ISI proposal in which conditional large early release probabilities (CLERPs guideline values are a factor of 10 less than the CCDP values, reflecting the increased severity of release over core damage and consistent with the difference between CDF and LERF guidelines in RG 1.174. That is, a CLERP greater than 1E-5 is a High consequence, between 1E-5 and 1E-7 is a Medium consequence, and less than 1E-7 is a Low consequence. A segment rupture is assigned the higher of the CCDP and CLERP category.

Segment failures followed by isolation valve failures that result in a LOCA outside the containment (e.g., containment bypass) are the most likely large early release contributors. In the IPE, the licensee discuses the possibility of preventing core damage by depressurizing the reactor cooling system (RCS) to terminate the leak, and using shutdown cooling for long-term core cooling. Due to the generally low initiating event frequency of LOCAs outside the containment, the licensee (and most licensees) did not estimate the CCDP given such an event in the IPE. The few pressurized water reactor IPEs that did evaluate the possibility estimated CCDPs from between 0.1 and 1E-4 given that a LOCA had occurred outside the containment. As discussed below, the licensee's methodology for categorizing these segments is generally conservative, even assuming a CCDP of 1.0 given the segment rupture and the isolation failure. For serial motor-operated and serial check isolation valves, however, common cause failure (CCF) considerations indicate that a CCDP of around 0.1 is needed to make the CLERP consistent with the Medium category assigned by the methodology.

The licensee's methodology defines "active" isolation valves as valves that must close, and ,.passive" isolation valves as valves that must remain closed. The methodology recommends that if one or less active or passive isolation valve is available to isolate a rupture, the segment failure consequence is High. If two active, or one active and one passive, valves are available, the recommended consequence is Medium. Two passive valves yield a Low recommended consequence. All other combinations yield a None consequence category. Plant-specific data analysis for the IPE developed estimates of 6E-3 and 3E-3 for the (active) failure to close for motor-operated valves (MOVs) and check valves (CVs) respectively. Similarly, the IPE developed estimates of 4E-7 and 4E-5 for the (passive) failure to remain closed for MOVs and CVs, respectively. NUREG/CR-5497 provides CCF estimates of 1.4E-2 for high pressure, MOVs failing to close, 7E-2 for a low pressure CV failing to close, and 4.5E-2 for a low pressure CV failing to remain closed (the most conservative CCFs for each scenario).

On the basis of these estimates, a segment isolated by only a single active isolation valve has a probability that the valve will not close, and that segment failure will develop into a LOCA outside containment of 6E-3 or 3E-3. Since a CCDP of almost 0.01 is needed to bring the CLERP to less than 1E-5, the High designation for these segments is appropriate. Similarly,

the passive failure of a single isolation CV at 4E-5 is also assigned High. The passive failure of an MOV at 4E-7 is conservatively assigned High. Two active failures yield LOCA probabilities (given the pipe rupture) of 9E-5 for paired MOVs and 2E-4 for paired CVs, with other combinations being substantially lower. If the core damage probability given a LOCA outside containment is around 0.1, assigning Medium to these scenarios is, within the precision of the methodology, consistent with the accepted CLERP guidelines that Medium is between 1E-5 and 1E-7. One active and one passive failure yield LOCA probabilities of 2E-7, 1E-7, and 1E-9 depending on which combination of valves is present. Assigning these scenarios to Medium is consistent with the acceptable CLERP guidelines. The maximum LOCA probability for two serial CVs failing to remain closed is 2E-6, and a CCDP of around 0.1 would also make the assignment of these scenarios as Low generally consistent with the accepted CLERP guidelines.

The staff finds that the methodology used by the licensee to determine that consequence category with respect to containment bypass is generally conservative with respect to the acceptable CLERP guidelines. In three specific configurations, a CCDP given a LOCA outside of containment of around 0.1 is needed to be consistent with the acceptable CLERP guidelines.

On the basis of the evaluations from other PWRs indicating that CCDPs following a LOCA outside containment are usually less than 0.1 and the fact that the licensee discussed a success path in its IPE indicating that a process and equipment should be available at ANO-2 to recover from such an event, the staff finds that the methodology's assigned consequence categories based on isolation valve failure is consistent with the intent of previously approved guidelines. However, use of the methodology's recommended consequences may not, in general, meet the intent of previously accepted LERP guidelines and acceptance of this methodology for use in the ANO-2 RI-ISI analysis does not constitute acceptance of the methodology in general.

The licensee addresses the possibility of non-bypass containment failure in the November 25, 1998, submittal. The licensee stated that the IPE analysis indicated that only scenarios involving the loss of containment spray and containment cooling or containment isolation coincident with station blackout contributed to large early release. Of these sequences, only the loss of service water, which would fail both containment spray and containment cooling, had the potential to affect the categorization of the segments for ISI. All segments failures which lead to total loss of service water are categorized as High with respect to core damage. Segment failures leading to loss of one train of service water are categorized as Medium with respect to core damage, and enough margin in the CCDP exists that containment performance would not change the category. That is, the CCDP is already less than 1E-5, so even a conditional containment failure probability of 1.0 would not cause the CLERP to exceed 1E-5. The staff finds that there is reasonable assurance that the methodology as applied by the licensee to ANO-2 is consistent with the CLERP guidelines and, therefore, acceptable.

3.2.7 Safety Significance Determination

The safety significance of pipe segments is based on categorizing (1) the consequence of segment failure into High, Medium, or Low; and (2) categorizing the failure potential of the piping as High, Medium, or Low. Once the individual elements of risk (consequence and failure potential) are developed, they are combined in a risk matrix that has nine elements, corresponding to various combinations of failure potential and consequence rankings.

These combinations define the basis for categorizing the pipe segments into various risk categories 1 through 7. Risk categories 1, 2, and 3 are designated as belonging to the High safety-significant group, risk categories 4 and 5 belong to the Medium safety-significant group, and risk categories 6 and 7 belong to the Low safety-significant group. The N-578 Code Case methodology requires that for Risk Category 1 the number of inspection locations be at least 50% of the total number of elements in this category; for Risk Category 2 and 3, the number of inspection locations be at least 25% of the total number of elements in each risk category; and for Risk Category 4 and 5, the number of inspection locations be at least 10% of the total number of elements in each risk category. For those segments in Risk Category 6 or 7, volumetric and surface element examinations are not required.

Quantitative uncertainty calculations are not included in the methodology. The placing of segments into broad safety-significant categories tends to reduce the sensitivity of the eventual decision on the specific values developed from the PRA, with the exception of values near the border between the categories. The sensitivity of the values near the borders is addressed by defining a Medium safety-significance category. The Medium safety-significance category ensures that segments that are not clearly High or Low, will receive an intermediate level of inspection activity. The Medium safety-significance category ensures that segments whose failures which are not obviously High or Low safety-significant are treated as Medium (intermediate) severity segments, both during the final safety-significance determination and in the assignment of weld elements to inspect. The staff finds that the performance of quantitative uncertainty calculations would not produce information that would significantly change the results of the submittal.

The staff finds that the assignment of the safety-significance to the nine matrix elements as detailed in the submittal is internally consistent and logically compelling. The staff finds that the use of the reported categories, along with other evaluation and confirmation steps detailed in this safety evaluation, provides reasonable assurance that the safety-significance of each segment is appropriately assigned.

3.2.8 Risk Impact of Changes

The ANO-2 submittal proposes to reduce the volumetric examination of ASME Code, Section XI welds from 220 welds to 100 welds (the 100 inspections do not include an increase of 63 wall thickness and 4 visual inspections in the service water system). In the new program, the 100 inspections have been preferentially redistributed in the High and Medium risk category segments. In addition, the 220 weld examinations referenced do not include the 116 surface examinations that were categorically eliminated.

The licensee performed a boundary calculation on the change in CDF and LERF which might be associated with replacement of the current Section XI program by the proposed RI program. The bounding calculation only includes the potential increase in CDF and LERF that might arise from no longer inspecting those locations that would be removed from the program. Including only the potential increases, the licensee estimated an increase in CDF of 1E-8/yr. Using a similar approach, the increase in LERF due to removing inspection locations that could potentially contribute to containment bypass is on the order of 1E-9/yr.

The licensee also evaluated the impact of changing the ISI program, including the risk decrease associated with the addition of new (e.g., redistributed) locations or enhanced inspections at some locations in the High and Medium risk category segments. Only considering the decrease in CDF that might arise from the new (e.g., redistributed to High and Medium) locations, the licensee estimated a net CDF decrease on the order of -l E-8/yr. Including credit for new improved inspection techniques that will be applied as part of the new inspection program as well as the new locations, the licensee estimated a CDF decrease on the order of -5E-8/yr. The licensee estimated the change in LERF by estimating that the conditional containment failure probability of 0.1 is an average, bounding value, which can be generally applied to convert CDF to LERF. Thus the licensee estimates the change in LERF as -5E-9/yr.

The staff finds the licensee's process to evaluate and bound the potential change in risk reasonable because it accounts for the change in the number and location of elements inspected, recognizes the difference in degradation mechanism related to failure likelihood, and considers the effects of enhanced inspection. The staff finds that the improved inspection techniques will substantially increase the fraction of potential weld ruptures that would be identified by the inspection before the flaw develops into an actual rupture. The staff also finds that re-distributing the welds to be inspected with consideration of the safety-significance of the segments provides assurance that segments whose failure would have a significant impact on plant risk receive an acceptable and often improved level of inspection. Therefore, the staff concludes that the implementation of the RI-ISI program as described in the application should be risk neutral or a risk decrease, and thus will not cause the NRC Safety Goals to be exceeded.

3.3 Integrated Decision-making

The SRP requires that an integrated approach be used in determining the acceptability of the proposed RI-ISI program by considering in concert the traditional engineering analysis, risk evaluation, and the implementation and performance monitoring of piping under the program.

As noted by the licensee, the EPRI RI-ISI methodology is a process-driven approach, i.e., the process results in the identification of safety-significant pipe segment locations to be inspected without reliance on an expert panel. However, the licensee reviewed the ANO-2 RI-ISI applications results primarily to ensure that the process was correctly and comprehensively applied. ANO-2 made use of a multi-disciplined plant team as well as an independent plant review to verify the final risk results. In a response to an NRC RAI, the licensee submitted

further detail about reviews that were performed by the plant project team and the independent, integrated plant review team. The independent plant review did not offer any new insights that changed the pipe segment risk categorizations from application of the original methodology.

3.3.1 Selection of Examinations

The selection of pipe segments to be inspected is described in Section 7 of each submittal using the results of the risk category rankings and other operational considerations. Table 1 compares the number of inspections required under the existing ASME Section XI ISI program with the alternative RI-ISI program. Safety-significant segments are identified in Section 8 of each submittal. With the exception of the service water system, the licensee used the methodology described in the EPRI topical report to guide the selection of examination elements within High and Medium ranked piping segments. This requires that existing FAC programs be maintained, and that where other degradation mechanisms are identified, a minimum 25% of all elements within High safety-significant segments (Categories 2 and 3 - no segments were identified as Category 1 at ANO-2), and 10% of all elements with a Medium safety-significant ranking (Categories 4 and 5), be examined during each interval. The EPRI report describes targeted examination volumes (typically associated with welds) and methods of examination based on the type(s) of degradation expected. The staff has reviewed these guidelines and has determined that, if implemented as described, the RI-ISI's should result in improved detection of service-related discontinuities beyond what is currently required by ASME Section XI.

For the service water system, the licensee elected to depart from the EPRI methodology because of the type of expected degradation. The piping integrity in this system is primarily influenced by raw water from a shallow lake, and it is expected that local degradation in the form of microbiologically influenced corrosion (MIC), pitting, and flow-induced erosion-cavitation, will dominate. Approximately 20 years of operational history validates this contention at ANO-2. The licensee has stated that for a system such as service water, the EPRI approach is not practical, because localized corrosive attack can occur within substantially large portions of the piping, and is not necessarily associated with a structural discontinuity such as a weld. For these reasons, selecting a random percentage of locations is considered arbitrary and excessive. The licensee has performed what has been termed a "finer screening," to determine potential degradation sites, and to target examinations appropriately. This analysis incorporated operational parameters such as temperature, flow, water chemistry, and treatment variations, as well as results from previous monitoring and inspections, to ascertain a relative ranking of piping

Table No. 1

Safety Significance	ASME Code Class	Current Section XI Inspections	Proposed RI-ISI Inspections[(1)]	Inspection Nos. Changed

High	1	33	28	-5
	2	23	6	-17
	3	0	20	+20
	Non-class	0	2	+2
Medium	1	101	40	-61
	2	19	27	+8
	3	0	37	+37
	Non-class	0	0	0
Low	1	59	0	-59
	2	101	0	-101
	3	0	7	+7
	Non-class	0	0	0

1) New inspections are in addition to existing flow-accelerated corrosion (FAC) program.

subsystems within the service water system, in terms of expected susceptibility to localized corrosion. The risk categorization performed previously (High, Medium, or Low) was not initially considered during this susceptibility determination; therefore, a list of examination locations within various segments from all risk categories resulted. However, piping locations rated as
"worst case" were subsequently screened to determine if any High safety-significant (based on failure consequence) elements with similar degradation susceptibility might be substituted for any Medium and Low safety-significant segments that resulted from the susceptibility review.

This approach resulted in the selection of 67 "typical" and "worst case" locations for examination. These examinations will be performed during each inspection period, because of the aggressive nature expected for localized corrosion phenomena. In addition, 26 separate locations will be inspected every 2 years in accordance with the Service Water Integrity Program, a licensee-controlled augmented program currently in place at ANO-2. The licensee has also described conditions under which the 67 locations would be expanded, based primarily on the guidelines in NRC Generic Letter 90-05.

It is noted that the licensee's distribution of examination locations does not entail all piping segments in High and Medium safety-significant categories. For instance, of 8 High safety-significant segments in the service water system, 20 of the 67 examination locations will be performed on only 4 of the piping segments. However, on the basis of the expectation that degradation will be initially manifested in the "worst case" locations, and because a sample expansion method has been described, it is concluded that generic degradation due to localized corrosion of service water piping will be detected and the scope of affected piping will be adequately defined, to provide reasonable assurance of the continued structural integrity of this system. Further, it is expected, that, if new potential degradation information is found as a result of ANO-2 specific data or other generic industry issues, the licensee will

factor these findings into the current program for the service water system, as described in Section 3.4, which follows. However, any change that would reduce the number of examinations will require review and approval by NRC staff.

For the service water system, it is concluded that the degradation susceptibility review process, augmented with the selection of higher risk locations for those locations with equivalent susceptibility rankings, has resulted in a reasonable method for establishing a program to assess service-induced degradation caused by localized corrosion. Further, for the remaining systems, it is concluded that the overall risk-ranking process has resulted in the systematic identification of safety-significant pipe segments, and the approach found in the EPRI methodology provides adequate justification for the locations to be examined.

3.4 Implementation and Monitoring

Implementation and performance monitoring strategies require careful consideration by the licensee, and are addressed in Element 3 of the SRP. The objective of Element 3 is to assess performance of the affected piping systems under the proposed RI-ISI program by implementing monitoring strategies that confirm the assumptions and analysis used in development of the RI-ISI program. To satisfy 10 CFR 50.55a(a)(3)(i), implementation of the RI-ISI program, including inspection scope, examination methods, and methods of evaluation for examination results, must provide an adequate level of quality and safety. In a response to an NRC RAI, the licensee has indicated that "implementation of the ANO-2 RI-ISI program will be consistent with existing ASME Section XI performance monitoring requirements," including pressure and leak testing of all Class 1, 2, and 3 piping components, comparison of inspections results to PSI and prior ISI, and adherence to IWX-3500 for flaws that exceed acceptance criteria.

As stated by the licensee, "An inspection for cause process shall be implemented utilizing examination methods and volumes defined specifically for the degradation mechanism postulated to be active at the inspection location." The examination methods and volumes are to be based upon the requirements defined in Section 7 of the EPRI methodology. In order to support a finding that the proposed alternative is acceptable, the licensee has provided in its responses to NRC RAIs the following items:

- Effective January 1, 1998, Entergy at ANO uses only UT personnel that meet the qualification requirements of the 1992 Edition of ASME Section XI, Appendix VII, and only UT personnel who have successfully completed the PDI qualification will be used for ultrasonic examinations.

- Inspection intervals are based on the current Section XI 10-year inspection interval, supplemented with augmented inspections for specific degradation mechanisms based on NRC-mandated inspection schedules or the plant's own program.

- Inclusion of vessel nozzle dissimilar metal welds is in the scope of the RI-ISI program.

- Monitoring of industry trends to assure that identification of new degradation mechanisms or component susceptibility to existing mechanisms will result in changes to the RI-ISI program to incorporate these changes, as well as any changes mandated by the NRC and industry owners groups.

In consideration of the implementation and monitoring program proposed by the licensee, the reliability and monitoring of the examinations to be performed under the RI-ISI program is acceptable.

4.0 CONCLUSIONS

In accordance with 10 CFR 50.55a(a)(3)(i), proposed alternatives to regulatory requirements may be used when authorized by the NRC when the applicant demonstrates that the alternative provides an acceptable level of quality and safety. In this case, the licensee's proposed alternative for piping systems is to use Code Case N-578, augmented by EPRI TR-106706, and the methodology enhancements discussed herein. These enhancements include commitments by the licensee to do the following:

- Use ultrasonic testing (UT) personnel who meet the qualification requirements of the 1992 Edition of ASME Section XI, Appendix VII by successfully completing the industry's Performance Demonstration Initiative qualification.

- Continue to implement augmented examinations in the areas of (1) flow accelerated corrosion (FAC) and (2) classification of "no-break zone" examinations in accordance with MEB 3-1.

- Use expanded examination volumes as described by the methodology in EPRI Topical Report-106706.

The alternative is documented in the licensee's RI-ISI program submittals, supplemented by the licensee's responses to the NRC's RAIs. On the basis of the review of these documents, it is concluded that the licensee's risk-informed approach should result in a risk-neutral to risk-reduction status when compared to the current ASME Section XI program, and should significantly reduce the number of examinations performed.

In addition, the licensee has met the applicable criteria in SRP Chapter 3.9.8. Therefore, on the basis of risk considerations and the criteria of the SRP, it is concluded that the licensee's proposed alternative to use Code Case N-578, with the specific augmentations described in this report, will provide an acceptable level of quality and safety. Therefore, the proposed alternative is authorized for use at ANO-2. It should be noted that, although the licensee's alternative includes the use of ASME Code Case N-578, this evaluation is not endorsing the Code Case as currently written. This evaluation applies only to piping systems at ANO-2; all Code-required inspections of other safety-related components shall continue to be performed in accordance with ASME Section XI and as required by the licensee's Technical Specifications. The use of this alternative is authorized for the remaining license term of the

plant. However, any deviations that would decrease the scope of examination, or change the overall plant risk will require staff review and approval.

5.0 REFERENCES

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2. Letter, dated March 31, 1998, D. C. Mims (Entergy Operations, Inc.) to Document Control Desk (NRC), requesting approval of a risk-informed alternative for examination of piping systems at ANO-2.

3. Letter, dated October 8, 1998, J. D. Vandergrift (Entergy Operations, Inc.) to Document Control Desk (NRC), containing additional information in support of risk-informed ISI pilot application at ANO-2.

4. Letter, dated November 25, 1998, J. D. Vandergrift (Entergy Operations, Inc.) to Document Control Desk (NRC), containing additional information in support of risk-informed ISI pilot application at ANO-2.

5. Letter, dated December 8, 1998, J. D. Vandergrift (Entergy Operations, Inc.) to Document Control Desk (NRC), containing additional information in support of risk-informed ISI pilot application at ANO-2.

6. NRC Regulatory Guide 1. 1 78, An Approach for Plant-Specific, Risk-Informed Decision Making: Inservice Inspection of Piping, Issued for Trial Use, U. S. Nuclear Regulatory Commission, September 1998.

7. Standard Review Plan (SRP) Chapter 3.9.8, Standard Review Plan for Trial Use for the Review of Risk-Informed Inservice Inspection of Piping, U. S. Nuclear Regulatory Commission, September 1998.

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9. ASME Code Case N-578, Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1, American Society of Mechanical Engineers.

10. SIR-96-097, Review of Degradation Mechanisms in EPRI Risk-Informed Inservice Evaluation Procedure, Structural Integrity Associates, Inc., November 1996.

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