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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Ref 10 CFR 50.55a

Subject: Comanche Peak Nuclear Power Plant (CPNPP)
Docket No. 50-445
Relief Request 1A4-3 for Continued Use of a Risk-Informed Process as an Alternative for the Selection of Class 1 and 2 Piping Welds for Unit 1 Inservice Inspection

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(z)(1), Vistra Operations Company LLC (Vistra OpCo) hereby submits the enclosed Relief Request 1A4-3 for Comanche Peak Nuclear Power Plant (CPNPP) Unit 1 for the fourth ten-year inservice inspection interval. Vistra OpCo is requesting the continued use of a risk-informed process as an alternative for the selection of Class 1 and Class 2 piping welds for examination. The alternative process provides an acceptable level of quality and safety as determined by the included Probabilistic Risk Assessment model.

Vistra OpCo requests approval by April 1, 2022; in advance of the scheduled April 2022 start of the next Unit 1 refueling outage.

This communication contains no new commitments regarding CPNPP Unit 1.

Should you have any questions, please contact Jim Barnette at (254) 897-5866 or James.barnette@luminant.com.

Sincerely,

Jack C. Hicks

Jack C. Hicks

Enclosure: 10CFR50.55a Request Number 1A4-3

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10CFR50.55a Request Number 1A4-3

Proposed Alternative
in Accordance with 10CFR50.55a(z)(1)

-Alternative Provides Acceptable Level of Quality and Safety-

ASME Code Components Affected

ASME Code Classes:	Class 1 and Class 2
Examination Categories:	B-F and B-J in Table IWB-2500-1
	C-F-1 and C-F-2 in Table IWC-2500-1
Components:	Piping Welds
Systems:	Reactor Coolant System (RCS)
	Chemical and Volume Control System (CVCS)
	Safety Injection System (SIS)
	Residual Heat Removal System (RHRS)
	Containment Spray System (CSS)
	Feedwater System (FWS)
	Main Steam System (MSS)
	Auxiliary Feedwater System (AFW)

Applicable Code and Edition

The Comanche Peak Nuclear Power Plant (CPNPP) Unit 1 ISI Program is based on the 2007 Edition of ASME Section XI with the 2008 Addenda.

Applicable Code Requirements

Table IWB-2500-1, Examination Category B-F and Examination Category B-J
Table IWC-2500-1, Examination Category C-F-1 and Examination Category C-F-2

Reason For Request

The continued use of a Risk-Informed process as an alternative for the selection of Class 1 and Class 2 piping welds for examination is requested.

Proposed Alternative and Basis for Use

As an alternative to the Code Requirements, a Risk-Informed process will continue to be used for the selection of Class 1 and Class 2 piping welds for examination.

The CPNPP Unit 1 RI-ISI Program for the examination of Class 1 and Class 2 piping welds is currently in accordance with a risk-informed process submitted August 2, 2011 (Accession Number ML11220A261), supplemented in responses to Requests for Additional Information on February 21, 2012 (ML12060A348), March 8, 2012 (ML12082A017), and June 6, 2012 (ML12172A263). NRC approved this request on August 14, 2012 (Accession Number

ML12194A250). In the previous submittal, TXU Electric, now Vistra OpCo, committed to review and adjust the risk ranking of piping segments as a minimum on an ASME period basis. To satisfy the periodic review requirements, evaluations and updates were performed after each period in accordance with the Nuclear Energy Institute document 04-05, "Living Program Guidance To Maintain Risk-Informed Inservice Inspection Programs For Nuclear Plant Piping Systems", published April, 2004. These evaluations and updates for the Third Interval were documented in project documents CPSE-009-C01 and CPSE-009-C02 for the First Period, CPSE-014-001 and CPSE-014-002 for the Second Period, and CPSE-021-001 and CPSE-021-002 for the Third Period. The updated RI-ISI Program resulting from these evaluations and updates is the subject of this proposed alternative.

In accordance with the guidance provided by NEI 04-05, a table is provided as Attachment 1 identifying the number of welds added to and deleted from the previously approved RI-ISI Program. The changes from the previous program are attributable to the specific issues identified in each periodic evaluation and update as discussed below.

During the evaluation conducted after the First Period the following changes were identified:

1. The Comanche Peak probabilistic risk assessment (PRA) model used to evaluate the consequences of pipe rupture for the Second Interval RI-ISI update was Revision 3D. The PRA Model of Record was revised to Revision 4B during the First Period of the Third Interval. Risk Rankings, Element Selections, and Risk Impact Analyses were updated to reflect the PRA Model changes during the First Period update.

   As a result of the PRA update, twenty-nine Risk Groups changed from Risk Category Medium to Risk Category Low. Another twenty-nine Risk Groups changed from Risk Category 6 to Risk Category 7, but both are considered as Risk Category Low. Based on these changes, the overall number of elements selected for inspection decreased to 82.

   The CPNPP Risk Impact Analysis was revised to reflect the updated element selections and the Upper Bound Conditional Core Damage Probability (CCDP) of 1.98E-03 and Upper Bound Conditional Large Early Release Probability (CLERP) of 1.65E-03, both associated with a Large Break Loss of Coolant Accident (LBLOCA). The Bounding Estimates of Risk Impact remained negative for both Core Damage Frequency (CDF) and Large Early Release Frequency (LERF), thereby indicating an overall decrease in risk as a result of the RI-ISI application.

2. During the First Period of the Third ISI Interval, the RI-ISI Risk Ranking was converted to a single-line-per-weld format. The previous format utilized Risk Segments. The updated Risk Ranking was re-organized as Risk Groups to group all welds in the same System, same Risk Category, with similar Degradation Mechanisms. This was an administrative change to implement a more efficient format and had no technical impact on the RI-ISI Program.

3. Also, during the First Period a new ISI Program Control system was implemented. Changes to the Risk Ranking information and element selections were updated in that database. A column, "Database Revision," was added to the Risk Ranking Report to identify those changes.

4. Inspections for Primary Water Stress Corrosion Cracking (PWSCC) were referenced parenthetically in the RI-ISI Program in a manner like the Flow Accelerated Corrosion (FAC) program. This change was implemented to recognize that PWSCC examinations were conducted in a separate Augmented Program implementing Code Case N-770-1. (Note that for the Fourth Interval CPNPP will utilize the version of Code Case that is stipulated in the most recent version of 10CFR50.55a, which currently is Code Case N-770-5). The Risk Ranking, Summary, Matrix, and Risk Impact Analysis were revised to reflect this change.

5. During the First Period, welds selected for examination that were found to have limited coverage were exchanged with suitable replacement selections within the same system. The following tables list the re-selections made to the list of Risk-Informed examinations to address coverage issues.

Deleted	Added	Update Period	Note
TBX-1-4501-22	TBX-1-4505-3	1	Both welds are in the same Risk Group, but only single-sided coverage could be achieved for TBX-1-4501-22
TBX-1-4502-12	TBX-1-4500-5	1	TBX-1-4502-12 is in Risk Group 1-RCS-05 and there was no suitable substitute in that Risk Group. TBX-1-4500-5 was chosen from Risk Group 1-RCS-02 (higher Risk) to achieve full coverage.
TBX-1-4502-28	TBX-1-4500-6	1	TBX-1-4502-28 is in Risk Group 1-RCS-05 and there was no suitable substitute in that Risk Group. TBX-1-4500-6 was chosen from Risk Group 1-RCS-02 (higher Risk) to achieve full coverage

6. Although the original Third Interval element selections satisfied the requirements of the RI-ISI Program, the following additional welds were selected in December 2014 to better match the selections between Unit 1 and Unit 2. This also served to increase the Class 1 selection percentage at Unit 1.

Additional Selected Welds	
Risk Category	**Component IDs**
2	TBX-1-4401-6
4	TBX-1-4102-2, TBX-1-4100-2, TBX-1-4300-7, TBX-1-4203-11, TBX-2-2532-14, TBX-2-2532-17, TBX-2-2501-29, TBX-2-2501-34, TBX-2-2537-6
5a	TBX-1-4304-4, TBX-1-4109-7

During the evaluation conducted after the Second Period the following changes were identified:

1. The Comanche Peak probabilistic risk assessment (PRA) model used to evaluate the consequences of pipe rupture was revised to Revision 5. As a result of the update in the PRA Model, the Consequence Ranking and Risk Categories changed for welds in four Consequence segments.

   As a result of this PRA update, all RI-ISI piping in the Auxiliary Feedwater (AFW) system changed from a Consequence Rank of Medium to a Consequence Rank of High. This resulted in an overall change in Risk Ranking of the AFW system from Low (High) to Medium (High). There are seventy-five welds in the RI-ISI AFW scope. This change from a Low Risk Ranking to a Medium Risk Ranking results in an additional eight welds to be selected from the AFW system. Nine AFW welds (which had previously been examined) were selected for examination to satisfy this additional selection requirement. These nine welds are: AF-1-SB-025-38, AF-1-SB-025-39, AF-1-SB-026B-36, AF-1-SB-026B-41, AF-1-SB-026B-42, AF-1-SB-027B-53A, AF-1-SB-027B-54, AF-1-SB-029C-2 and AF-1-SB-029C-3B. The overall number of elements selected for inspection increased from 82 to 91.

   The Risk Ranking, Element Selection, and Risk Impact Analysis were updated to incorporate these changes. The CPNPP Unit 1 Risk Impact Analysis was revised to reflect the updated element selection and the Upper Bound CCDP of 1.53E-03 and Upper Bound CLERP of 1.14E-03. The Bounding Estimates of Risk Impact remained negative for both CDF and LERF, thereby indicating an overall decrease in risk as a result of the RI-ISI application.

2. Work Order 4803405 (Flex modification) added three new Class 2 Safety Injection welds to the RI-ISI scope as seen on isometric drawing BRP-SI-1-SB-036A. These welds are TBX-2-2564-55, TBX-2-2564-56 and TBX-2-2564-57. The RI-ISI Program was updated to include these additional welds.

3. Work Order 4950609 replaced valve 1CS-8480B. Welds TBX-2-2570-50 and TBX-2-2570-51 were replaced with TBX-2-2570-50NW and TBX-2-2570-51NW. The RI-ISI Program was updated to replace these welds.
4. During the Second Period, welds selected for examination that were found to have limited coverage were exchanged with suitable replacement selections within the same system and Risk Category. Applicable changes were made to the Risk Ranking Report and Element Selection listing. These were like-for-like reselections, so there were no changes required to the Risk Impact Analysis.

During the evaluation conducted after the Third Period the following changes were identified:

1. The Comanche Peak probabilistic risk assessment (PRA) model was unchanged during the Third Period. However, the PRA model change at the beginning of First Period resulted in 75 auxiliary feedwater welds moving from Risk Category 4 (1) to Risk Category 6 (3). Because of this, 9 AFW welds were no longer required to be examined during the Second Period. During the course of the Second Period, the PRA model again changed, resulting in these welds moving from Risk Category 6 (3) back to Risk Category 4 (1) and the examinations being required again for 9 welds in the Third Period. It was not clear how the RI-ISI Program should handle returning welds to the population with regard to scheduling percentages in accordance with IWB-2411. In order to be conservative, Vistra OpCo scheduled and examined all 9 AFW welds during the Third Interval.
2. During the Third Period, welds selected for examination that were found to have limited coverage were exchanged with suitable replacement selections. They were as follows:
   A) TBX-1-4401-4 was selected and examined instead of TBX-1-4401-6 to achieve a full coverage examination.
   B) TBX-1-4101-5 was selected and examined instead of TBX-1-4500-8OL because the latter has received a full structural overlay during 1RF12 and could not be examined for RI-ISI purposes.
   C) TBX-1-4405-6 was selected and examined instead of TBX-1-4109-7 to increase the number of butt welds selected in lieu of socket welds.
3. During the Third Period Evaluation, weld TBX-1-4401-5 was identified as not being assigned to the Thermal Stratification and Cycling (TASCS) degradation mechanism during the interval. This appeared to be an inadvertent error made at the start of the Third Interval. The Risk Ranking Spreadsheets and Risk Impact Analysis were updated to address this issue. The degradation mechanism was changed from None to TASCS, its Failure Potential changed from Low to Medium, its Risk Ranking changed from 4 (Medium) to 2 (High), its Risk Group changed from 1-RCS-05 to 1-RCS-01 and its Item No. changed from R1.20 to R1.11. The Element Selection was not impacted.
4. During a drawing review, 224 weld configuration types were found to be misidentified in the ISI database as well as the Risk Ranking spreadsheet. The Risk Ranking Report spreadsheet was updated to document these changes to the weld configurations. The Risk Ranking Summary, Matrix, Element Selection and Risk Impact Analysis were not impacted by these changes.

5. It was discovered that 235 CVCS welds were incorrectly listed in Risk Group 1-CVCS-03 instead of 1-CVCS-01. This moved these welds from Risk Category 7 to Risk Category 6. Since neither Risk Category 6 nor 7 require examination, there was no technical impact. The Risk Ranking Summary, Matrix and Report spreadsheets and Risk Impact Analysis were updated to document these administrative changes to the RI-ISI Program. The Element Selection spreadsheets were not impacted by these changes.
6. In previous RI-ISI applications, CPNPP referenced that the RI-ISI application was performed in accordance with EPRI Topical Report No. TR-112657 with additional guidance taken from Code Case N-578. For the Fourth Interval, the RI-ISI application is still in accordance with TR-112657, but ASME Section XI, Nonmandatory Appendix R is used for additional guidance because it is more current than Code Case N-578.

All issues identified in the Periodic Evaluations have been incorporated into the Risk Ranking, Summary, and Matrix. A new Risk Impact Analysis was performed, and the revised RI-ISI Program continues to represent a risk reduction when compared to the last deterministic Section XI inspection program. The original RI-ISI Program resulted in an overall reduction in CDF of 9.27E-09 and a reduction in LERF of 3.74E-09. The current RI-ISI Program results in an overall reduction in CDF of 2.61E-09 and a reduction in LERF of 1.88E-09. These small reductions in the overall risk in the current RI-ISI application are primarily due to a decrease in the Upper Bound CCDP and CLERP values used in the Risk Impact Analysis. Since the original RI-ISI application, the Upper Bound CCDP decreased from 1.16E-02 to 1.53E-03 and the Upper Bound CLERP decreased from 4.70E-03 to 1.14E-03.

The Risk-Informed process continues to provide an adequate level of quality and safety for selection of the Class 1 and Class 2 piping welds for examination. Therefore, pursuant to 10CFR50.55a(z)(1) it is requested that the proposed alternative be authorized.

Impact on Augmented Examination Programs

The RI-ISI application has not changed or subsumed any augmented examination programs since the previously approved application for the Third Interval.

Welds in the existing Flow Accelerated Corrosion (FAC) Program and Primary Water Stress Corrosion Cracking (PWSCC) Program are acknowledged in the RI-ISI application administratively by including the information in parentheses, but the augmented examinations are conducted in accordance with the FAC and PWSCC Programs.

In the Third Interval Response to the NRC Request for Additional Information dated June 6, 2012 (ML12172A263), Luminant Power (now Vistra OpCo) stated the following:

> "In accordance with 10CFR50.55a(g)(6)(ii)(F), welds subject to PWSCC are selected for examination per Code Case N-770-1 and examined under that program. Welds for which no other degradation mechanism has been postulated will be examined solely under the Code Case N-770-1 Program and will be removed from consideration during the RI-ISI element selection process. Welds for which a degradation mechanism in addition to PWSCC has been identified during the RI-ISI process may be additionally selected and

examined in accordance with the RI-ISI process such that the secondary degradation mechanism is also monitored."

Vistra OpCo will continue using this approach for the Fourth Interval to make sure that all potential degradation mechanisms are monitored, but will utilize the revision of Code Case N-770 that is stipulated in the most recent version of 10CFR50.55a, which at the start of the Fourth Interval is Code Case N-770-5.

PRA Quality

For confirmation of the quality of the PRA used to support the RI-ISI application, see the "Summary Statement of CPNPP PRA Capability Assessment Relative to Regulatory Guide 1.200" in Attachment 2.

Duration of Proposed Alternative

The alternative will be used for CPNPP Unit 1 until the end of the Fourth ISI Interval, subject to the review and update guidance of NEI 04-05. ISI interval information:

Unit 1 ISI Third Interval

- Start date – August 13, 2010
- End date – Prior to August 12, 2022 - reference Relief Request 1A3-2 as approved by the NRC [ML21012A128]

Unit 1 ISI Fourth Interval

- Start date – August 13, 2020
- End date – August 12, 2030

Attachment 1

CPNPP Unit 1 - Inspection Location Selection Comparison Between Previous Approved (Interval 3) and Revised (Interval 4) RI-ISI Program by Risk Category

System[1]	Risk		Consequence Rank	Failure Potential		Code Category	Previous (Interval 3)			Updated (Interval 4)		
	Category[2]	Rank[2]		DMs[2]	Rank[2]		Weld Count[3]	RI-ISI[4]	Other[5]	Weld Count[3]	RI-ISI[4]	Other[5]
RCS	2	High	High	TASCS, TT	Medium	B-J	7	3		7	5	
RCS	2	High	High	TASCS	Medium	B-J	13	4		14[6]	6	
RCS	2	High	High	TT	Medium	B-J	11	2		11	2	
RCS	2 (2)	High (High)	High	TT (PWSCC)	Medium (Medium)	B-F	1	1	1	1	0	1
RCS	4	Medium	High	None	Low	B-F	10	6		10	0	
						B-J	212	20		211[6]	31	
RCS	4 (2)	Medium (High)	High	None (PWSCC)	Low (Medium)	B-F	12	0	12	12	0	12
RCS	5	Medium	Medium	TASCS	Medium	B-J	20	2		17	2	
RCS	5	Medium	Medium	TT	Medium	B-J	44	5		44	4	
RCS	5 (5)	Medium (Medium)	Medium	TT (PWSCC)	Medium (Medium)	B-F	1	1	1	1	1	1
RCS	6	Low	Medium	None	Low	B-J	61	0		64	0	
RCS	7	Low	Low	None	Low	B-J	15	0		15	0	
CVCS	6	Low	Medium	None	Low	B-J	47	0		47	0	
						C-F-1	18	0		253[7]	0	
CVCS	6	Low	Low	TT	Medium	B-J	8	0		8	0	
CVCS	7	Low	Low	None	Low	B-J	30	0		30	0	
						C-F-1	235	0		0[7]	0	
SIS	4	Medium	High	None	Low	B-J	79	7		0	0	
						C-F-1	136	18		94	13	

Attachment 1 (Cont'd)

CPNPP Unit 1 - Inspection Location Selection Comparison Between Previous Approved (Interval 3) and Revised (Interval 4) RI-ISI Program by Risk Category

System[(1)]	Risk		Consequence Rank	Failure Potential		Code Category	Previous (Interval 3)			Updated (Interval 4)		
	Category[(2)]	Rank[(2)]		DMs[(2)]	Rank[(2)]		Weld Count[(3)]	RI-ISI[(4)]	Other[(5)]	Weld Count[(3)]	RI-ISI[(4)]	Other[(5)]
SIS	5	Medium	Medium	IGSCC	Medium	B-J	12	2		0	0	
SIS	6	Low	Medium	None	Low	B-J	95	0		79	0	
						C-F-1	425	0		508	0	
SIS	6	Low	Low	IGSCC	Medium	B-J	22	0		34	0	
SIS	7	Low	Low	None	Low	B-J	119	0		214	0	
						C-F-1	246	0		201	0	
RHRS	2	High	High	TASCS	Medium	B-J	0	0		3	1	
RHRS	4	Medium	High	None	Low	B-J	12	2		9	2	
						C-F-1	120	12		120	13	
RHRS	6	Low	Medium	None	Low	C-F-1	134	0		134	0	
CSS	4	Medium	High	None	Low	C-F-1	176	18		10	2	
CSS	6	Low	Medium	None	Low	C-F-1	125	0		178	0	
CSS	7	Low	Low	None	Low	C-F-1	122	0		235	0	
FWS	4 (1)	Medium (High)	High	None (FAC)	Low (High)	C-F-2	100	12		0	0	
FWS	5 (3)	Medium (High)	Medium	TASCS (FAC)	Medium (High)	C-F-2	8	1		0	0	
FWS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	277	0		0	0	
FWS	6 (5)	Low (Medium)	Low	TASCS (FAC)	Medium (High)	C-F-2	0	0		8	0	
FWS	7 (5)	Low (Medium)	Low	None (FAC)	Low (High)	C-F-2	0	0		373	0	

Attachment 1 (Cont'd)

CPNPP Unit 1 - Inspection Location Selection Comparison Between Previous Approved (Interval 3) and Revised (Interval 4) RI-ISI Program by Risk Category

System[1]	Risk		Consequence Rank	Failure Potential		Code Category	Previous (Interval 3)			Updated (Interval 4)		
	Category[2]	Rank[2]		DMs[2]	Rank[2]		Weld Count[3]	RI-ISI[4]	Other[5]	Weld Count[3]	RI-ISI[4]	Other[5]
MSS	6	Low	Medium	None	Low	C-F-2	170	0		0	0	
MSS	7	Low	Low	None	Low	C-F-2	0	0		170[8]	0	
AFW	4 (1)	Medium (High)	High	None (FAC)	Low (High)	C-F-2	81[3]	9		75[3]	9	
						TOTALS	3204[3]	125	14	3190[3]	91	14

Notes:

1. Systems are described in the "ASME Code Components Affected" section at the beginning of this Request.
2. The data provided in parenthesis under "Category", "Rank" and "DMs" is for information only. Welds in the existing Flow Accelerated Corrosion (FAC) Program and Primary Water Stress Corrosion Cracking (PWSCC) Program are acknowledged in the RI-ISI application administratively by including the information in parentheses, but the augmented examinations are conducted in accordance with the FAC and PWSCC Programs.
3. During the course of the Third Interval an independent project was performed to compare the ISI Database to the ISI Sketches and resolve any discrepancies. Any minor mismatches in the number of welds per system between the Third and Fourth Intervals are due to the resolution of these discrepancies. For example, during this project 6 of the welds previously listed in the AFW population were determined to be exempt branch connection welds. Therefore, the total number of AFW welds dropped from 81 to 75.
4. In accordance with 10CFR50.55a(g)(6)(ii)(F), welds subject to PWSCC are selected for examination per Code Case N-770-5 and examined under that program. Welds for which no other degradation mechanism has been postulated will be examined solely under the Code Case N-770-5 Program and will be removed from consideration during the RI-ISI element selection process. Welds for which a degradation mechanism in addition to PWSCC has been identified during the RI-ISI process may be additionally selected and examined in accordance with the RI-ISI process such that the secondary degradation mechanism is also monitored.
5. The column labeled "Other" is generally used to identify augmented inspection program locations that are credited beyond those locations selected per the RI-ISI process, as addressed in Section 3.6.5 of EPRI TR-112657. At CPNPP this column represents those inspections performed in accordance with Code Case N-770-5, as mandated by 10CFR50.55a.

Notes:

6. Weld No. TBX-1-4401-5 moved from Risk Category 4 to Risk Category 2 during the Third Period of the Third Interval.

7. During the evaluation after the Third Period, it was identified that 235 CVCS welds (ASME Category C-F-1) were incorrectly listed in Risk Group 1-CVCS-03 instead of 1-CVCS-01 which moved them from Risk Category 7 to Risk Category 6. Since neither Risk Category 6 nor 7 require examination, there was no technical impact.

8. The entire Main Steam system moved from Risk Category 6 to Risk Category 7 due to the PRA update in the First Period of the Third Interval.

Attachment 2

Summary Statement of CPNPP PRA Capability Assessment Relative to Regulatory Guide 1.200

This attachment provides the description of the CPNPP PRA and its assessment relative to RG 1.200 and EPRI TR-1021467 for its acceptability in use for the RI-ISI program. This attachment contains a Reference list separate from that in the main document.

Summary Statement of Comanche Peak Nuclear Power Plant (CPNPP) PRA Model Capability for Use in Risk-Informed Inservice Inspection Program Licensing Actions

Introduction

Comanche Peak Nuclear Power Plant (CPNPP) employs a multi-faceted approach to establishing and maintaining the technical adequacy and plant fidelity of the PRA models for the operating CPNPP units. This approach includes both a proceduralized PRA maintenance and update process, and the use of self-assessments and independent peer reviews. The following information describes this approach as it applies to the CPNPP PRA.

PRA Maintenance and Update

The CPNPP risk management process ensures that the applicable PRA model remains an accurate reflection of the as-built and as-operated plants. This process is defined in the CPNPP risk management program, which consists of a governing procedure ECE-2.15 “Risk and Reliability Functions” [Reference 6] and subordinate implementation documents. CPNPP desktop instruction R&R-DI-009, "Maintenance and Update of PRA Models" [Reference 7] delineates the responsibilities and guidelines for updating the full power internal events PRA models at CPNPP. The overall CPNPP risk management program, including R&R-DI-009 [Reference 7], defines the process for implementing regularly scheduled and interim PRA model updates, for tracking issues identified as potentially affecting the PRA models (e.g., due to changes in the plant, errors or limitations identified in the model, industry operational experience), and for controlling the model and associated computer files. To ensure that the current PRA model remains an accurate reflection of the as-built, as-operated plant, the following activities are routinely performed:

- Design changes and procedure changes are reviewed for their impact on the PRA model.
- Impacts to the design basis documents (or calculations when specifically cited by the PRA) are reviewed for their potential impact on the PRA model.
- Maintenance unavailabilities are captured.
- Plant specific initiating event frequencies, failure rates, and maintenance unavailabilities are updated approximately every 5-7 years.

In addition to these activities, CPNPP risk management procedures/desktop instructions provide the guidance for particular risk management and PRA quality and maintenance activities. This guidance includes:

- Documentation of the PRA model, PRA products, and bases documents.
- The approach for controlling electronic storage of Risk Management (RM) products

including PRA update information, PRA models, and PRA applications.

- Guidelines for updating the full power, internal events PRA models for CPNPP.

- Guidance for use of quantitative and qualitative risk models in support of the On-Line Work Control Process Program for risk evaluations for maintenance tasks (corrective maintenance, preventive maintenance, minor maintenance, surveillance tests and modifications) on systems, structures, and components (SSCs) within the scope of the Maintenance Rule [10CFR50.65 (a)(4)].

In accordance with this guidance, regularly scheduled PRA model updates nominally occur with a periodicity of approximately 5-7 year; longer intervals may be justified if it can be shown that the PRA continues to adequately represent the as-built, as-operated plant.

In 2016, the PRA model underwent a complete model update. This update accomplished two (2) objectives, the first updated the model to reflect the as-built, as-operated plant and included updating the data and human reliability assessments. The second objective was to maintain the PRA model in compliance with Regulatory Guide 1.200, Revision 2 [Reference 8]. The resulting revision to the CPNPP PRA was revision 5 model of record (MOR). The current revision of the PRA model is Revision 5 (October 2016) which was performed to incorporate various items in the continuous update database.

<u>PRA Peer Review</u>

In accordance with USNRC R.G. 1.200 [Reference 8] and the ASME PRA Standard [Reference 9], the CPNPP Revision 4 PRA model was the subject of an industry peer review in March 2011. The six-member team had a significant amount of industry and utility experience. As a result, the CPNPP peer review [Reference 10] was more in-depth than is typical for a peer review. The peer review team also shared a number of insights from team members' interactions with the NRC.

The ASME PRA Standard requirements can be categorized into 1 to 3 levels of capability. The Capability Categories are described in terms of applicability to risk-informed applications, with III being the highest (i.e. most stringent) requirements. Capability category II is recognized, in general, as being the required category for the current risk-informed applications being implemented by the industry.

The peer review team evaluated 325 PRA Standard requirements and found that 94% met Category II or better. One of those three Category I requirements would require crediting equipment in containment for operation beyond the design requirements. There is currently no analysis to support this position and would be a non- conservatism. The other 2 Category I requirements are related to internal flooding and as the RI- ISI program uses deterministic flooding, these do not impact the use of the PRA for this program.

An independent assessment of the closure of the F&Os generated from peer reviews of the CPNPP Internal Events and Internal Flooding PRAs was completed in January 2019 [Reference 11]. The assessment was performed following the guidance of Appendix X of the Nuclear

Energy Institute guidance for Internal Events and Internal Flooding PRA PRA, NEI 05-04 [Reference 12]. For each model scope, all finding level and selected suggestion level peer review findings and observations (F&O's) were CLOSED based on current or approved PRA documents.

The current CPNPP Model of Record, Revision 5, is considered to be a maintenance update, introducing no new models or upgrades.

General Conclusion Regarding PRA Capability

The CPNPP PRA maintenance and update processes and technical capability evaluations described above provide a robust basis for concluding that the PRA is suitable for use in risk-informed licensing actions. Further, the following quote is from the peer review report. "Overall, the CPNPP PRA was found to substantially meet the ASME PRA Standard at Capability Category II and can be used to support risk-informed applications"

As specific risk-informed PRA applications are performed, remaining gaps (including Category I SRs) to specific requirements in the PRA standard will be reviewed to determine which, if any, would merit application-specific sensitivity studies in the presentation of the application results. The specific gaps that could impact the RI-ISI are discussed later in this Appendix.

Assessment of PRA Capability Needed for Risk-Informed Inservice Inspection
In the risk-informed in-service inspection (RI-ISI) program at CPNPP, the EPRI RI-ISI methodology [Reference 4] is used to define alternative in-service inspection requirements. Plant-specific PRA-derived risk significance information is used during the RI-ISI plan development to support the consequence assessment, risk ranking and delta risk evaluation steps.

The importance of PRA consequence results, and therefore, the necessary scope of PRA technical capability, is tempered by two processes in the EPRI methodology.
First, PRA consequence results are binned into one of three conditional core damage probability (CCDP) and conditional large early release probability (CLERP) ranges before any welds are chosen for RI-ISI inspection. Table 2 illustrates the binning process.

Table 2 – Consequence Results Binning Groups

Consequence Category	CCDP Range	CLERP Range
High	CCDP > 1E-4	CLERP > 1E-5
Medium	1E-6 < CCDP < 1E-4	1E-7 < CLERP < 1E-5
Low	CCDP < 1E-6	CLERP < 1E-7

The risk importance of a weld is therefore not tied directly to a specific PRA result. Instead, it depends only on the range in which the PRA result falls. The wide binning provided in the methodology generally reduces the significance of specific PRA results. Secondly, the influence of specific PRA consequence results is further reduced by the joint consideration of the weld failure potential via a non-PRA-dependent damage mechanism assessment. The results of the consequence assessment and the damage mechanism assessment are combined to determine the risk ranking of each pipe segment (and ultimately each element) according to the EPRI Risk Matrix. The Risk Matrix, which equally takes both assessments into consideration, is reproduced below.

POTENTIAL FOR PIPE RUPTURE PER DEGRADATION MECHANISM SCREENING CRITERIA	**CONSEQUENCES OF PIPE RUPTURE** IMPACTS ON CONDITIONAL CORE DAMAGE PROBABILITY AND LARGE EARLY RELEASE PROBABILITY			
	NONE	**LOW**	**MEDIUM**	**HIGH**
HIGH FLOW ACCELERATED CORROSION	**LOW** **Category 7**	**MEDIUM** **Category 5**	**HIGH** **Category 3**	**HIGH** **Category 1**
MEDIUM OTHER DEGRADATION MECHANISMS	**LOW** **Category 7**	**LOW** **Category 6**	**MEDIUM** **Category 5**	**HIGH** **Category 2**
LOW NO DEGRADATION MECHANISMS	**LOW** **Category 7**	**LOW** **Category 7**	**LOW** **Category 6**	**MEDIUM** **Category 4**

These facets of the methodology reduce the influence of specific PRA results on the final list of candidate welds.

The limited use of specific PRA results in the RI-ISI process is also reflected in the risk-informed license application guidance provided in Regulatory Guide 1.174 [Reference 5]. Section 2.2.6 of Regulatory Guide 1.174 provides the following insight into PRA capability requirements for this type of application:

> *There are, however, some applications that, because of the nature of the proposed change, have a limited impact on risk, and this is reflected in the impact on the elements of the risk model.*
>
> *An example is risk-informed inservice inspection (RI-ISI). In this application, risk significance was used as one criterion for selecting pipe segments to be periodically examined for cracking. During the staff review it became clear that a high level of emphasis on PRA technical acceptability was not necessary. Therefore, the staff review of plant-specific RI-ISI typically will include only a limited scope review of PRA technical acceptability.*

Further, Table 1.3-1 of the ASME PRA Standard' [Reference 13] identifies the bases for PRA capability categories. The bases for Capability Category I for scope and level of detail attributes of the PRA states:

> *Resolution and specificity sufficient to identify the relative importance of the contributors at the system or train level including associated human actions.*

Based on the above, in general, Capability Category I should be sufficient for PRA quality for a RI-ISI application.

However, based on the EPRI TR-1021467 [Reference 2] a more specific list of capability category requirements has been developed for the RI-ISI program defining which of the ASME PRA Standard [Reference 13] supporting requirements should fall under categories I, II, or III. Table 2.2 of the EPRI TR provides identifies which attributes of the standard (SRs) must meet which capability category. Reviewing the list of supporting requirements for the RI-ISI program listed in the TR table it was noted that the internal flooding requirements are included only for the EPRI Streamlined RI-ISI approach. The CPNPP RI-ISI program is based on the Traditional RI-ISI approach and was developed using insights from the plant's deterministic flooding analysis in lieu of the PRA internal flooding model and its results. Therefore, the internal flooding technical supporting requirements are not applicable to the PRA analysis for the CPNPP RI-ISI program.

Reviewing the CPNPP Regulatory Guide 1.200 compliance analysis [Reference 3] against the EPRI TR-1021467 [Reference 2], there are three SRs that currently do not meet Category 2. Two are related to internal flooding and as previously stated do not directly impact this application. The third dealt with crediting equipment in containment for operation beyond the design requirements. This SR attribute if credited would lead to the lowering of CLERP values calculated due to providing additional mitigating equipment, resulting in a lower consequence bin.

Conclusion Regarding PRA Capability for Risk-Informed ISI

The CPNPP PRA model continues to be suitable for use in the RI-ISI application. This conclusion is based on:

- the PRA maintenance and update processes in place,
- the PRA technical capability evaluations that have been performed and are being planned, and
- the RI-ISI process considerations, as noted above, that demonstrate the relatively limited sensitivity of the EPRI RI-ISI process to PRA attribute capability beyond ASME Capability Category I.

References

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4. Revised Risk-Informed Inservice Inspection Evaluation Procedure, EPRI TR-112657, Revision B-A, December 1999.

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10. LTR-RAM-II-11-038, RG 1.200 PRA Peer Review Against the ASME/ANS PRA Standard Requirements for the Comanche Peak Nuclear Power Plant Probabilistic Risk Assessment, May 2011.

11. PWROG-18060-P, Revision 0, "Independent Assessment of Facts & Observations Closures of the Comanche Peak Probabilistic Risk Assessment," Pressurized Water Reactors Owners Group, January 2019.

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