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

December 7, 2021

Mr. Ken J. Peters
Senior Vice President and
Chief Nuclear Officer
Attention: Regulatory Affairs
Vistra Operations Company LLC
Comanche Peak Nuclear Power Plant
6322 N FM 56
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNIT NO. 1 – PROPOSED ALTERNATIVE FOR THE CONTINUED USE OF A RISK-INFORMED PROCESS FOR THE SELECTION OF CLASS 1 AND CLASS 2 PIPING WELDS FOR INSERVICE INSPECTION (EPID L-2021-LLR-0025)

Dear Mr. Peters:

By letter dated March 30, 2021, Vistra Operations Company LLC (Vistra OpCo, the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at Comanche Peak Nuclear Power Plant, Unit No. 1 (Comanche Peak, Unit 1).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety. The licensee requested authorization from the NRC to continue use a risk-informed process as an alternative for the selection of Class 1 and Class 2 piping welds for examination for the fourth 10-year inservice inspection interval.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that Vistra OpCo has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes Proposed Alternative 1A4-3 at Comanche Peak, Unit No. 1 for the fourth 10-year inservice inspection interval, which commenced on August 13, 2020, and is scheduled to end on August 12, 2030.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the project manager, Dennis Galvin, at 301-415-6256 or by e-mail at Dennis.Galvin@nrc.gov.

Sincerely,

Jennifer L. Dixon-Herrity

Digitally signed by Jennifer L. Dixon-Herrity
Date: 2021.12.07 14:40:28 -05'00'

Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-445

Enclosure:
Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE TO CONTINUE THE USE OF THE RISK-INFORMED

INSERVICE INSPECTION PROGRAM

VISTRA OPERATIONS COMPANY LLC

COMANCHE PEAK NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-445

1.0 INTRODUCTION

By letter dated March 30, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21089A301), Vistra Operations Company LLC (the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," requirements at Comanche Peak Nuclear Power Plant, Unit No. 1 (Comanche Peak, Unit 1).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety. The licensee requested authorization from the NRC to continue use of a risk-informed process as an alternative for the selection of Class 1 and Class 2 piping welds for examination for the fourth 10-year inservice inspection (ISI) interval.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement for operating plants," the ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components.

Pursuant to 10 CFR 50.55a(z), "Alternatives to codes and standards requirements," alternatives to the requirements of paragraph (g) of 10 CFR 50.55a may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The licensee must demonstrate (1) that the proposed alternative would provide an acceptable level of quality and safety; or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Regulatory Guide (RG) 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated May 2011 (ADAMS Accession No. ML100910006), provides guidance on the use of probabilistic risk assessment (PRA) findings and risk insights to support licensee requests for changes to a plant's licensing basis (LB). The guidance in RG 1.174 also defines an acceptable approach to analyzing and evaluating proposed LB changes. The approach includes traditional engineering evaluations supported by insights derived from the use of PRA methods about the risk significance of the proposed changes. In implementing risk-informed decisionmaking, the NRC expects LB changes to meet the acceptance guidelines and key principles of the risk-informed regulation specified in RG 1.174. Directly relevant to RG 1.174 are:

- RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated March 2009 (ADAMS Accession No. ML090410014).

- RG 1.178, Revision 1, "An approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping," dated September 2003 (ADAMS Accession No. ML032510128).

- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (SRP), Section 3.9.8, "Standard Review Plan for the Review of Risk-Informed Inservice Inspection of Piping," dated September 2003 (ADAMS Accession No. ML032510135).

The guidance in RG 1.200, Revision 2, describes an approach to determine whether the technical adequacy of the PRA used to support a submittal is consistent with accepted practices. The guidance in RG 1.178, Revision 1, describes methods acceptable to the NRC for integrating insights from PRA techniques with traditional engineering analyses into ISI programs for piping. Incorporating risk insights into the programs can focus inspections on the more important locations and reduce personnel exposure, while at the same time maintaining or improving public health and safety. SRP Section 3.9.8 provides guidance for evaluating the licensee's requests for changes to the LB due to use of risk insights.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to authorize the alternative requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Background

In its original submittal for the risk-informed inservice inspection (RI-ISI) program, dated February 15, 2001 (ADAMS Accession No. ML010520269), the licensee stated that the Comanche Peak, Unit 1 RI-ISI program meets the intent and principles of RG 1.174, Revision 0, dated July 1998 (ADAMS Accession No. ML003740133), and RG 1.178, Revision 0, dated September 1998 (ADAMS Accession No. ML003740181), and is consistent with the defense-in-depth philosophy. The Comanche Peak, Unit 1 RI-ISI program is a living program that was developed in accordance with the methodology provided in Electric Power Research Institute (EPRI) Topical Report (TR)-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure (PWRMRP-05)," dated December 1999 (ADAMS Accession

No. ML013470102). The NRC approval of EPRI TR-112657, dated October 28, 1999, is included in EPRI TR-112657, Revision B-A. The Comanche Peak, Unit 1 RI-ISI program was approved by NRC by letter dated September 28, 2001 (ADAMS Accession No. ML012710112), for the second 10-year ISI interval.

During the third 10-year ISI interval at Comanche Peak, Unit 1, the licensee had continued the implementation of the RI-ISI program for the Class 1 piping welds (Examination Categories B-F and B-J) and the Class 2 piping welds (Examination Categories C-F-I and C-F-2) as documented in its request dated August 2, 2011 (ADAMS Accession No. ML11220A261), as supplemented by letters dated February 21, 2012 (ADAMS Accession No. ML12060A348), March 8, 2012 (ADAMS Accession No. ML12082A017), and June 6, 2012 (ADAMS Accession No. ML12172A263). The NRC approved the Comanche Peak, Unit 1 RI-ISI program for the third 10-year ISI interval by letter dated August 14, 2012 (ADAMS Accession No. ML12194A250). During the third 10-year ISI interval, the licensee periodically reviewed and updated the Comanche Peak, Unit 1 RI-ISI program at a minimum on an ASME Code inspection period basis.

3.2 Components Affected

The ASME Code Class 1 and Class 2 piping are affected. In accordance with ASME Code, Section XI, IWB-2500 (Table IWB-2500-1), the Class 1 vessel nozzle-to-pipe dissimilar metal (DM) welds are classified as Examination Category B-F, and the Class 1 piping similar metal and DM welds are classified as Examination Category B-J. In accordance with IWC-2500 (Table IWC-2500-1), the Class 2 austenitic stainless steel or high alloy piping welds are classified as Examination Category C-F-1, and the Class 2 carbon or low alloy steel piping welds are classified as Examination Category C-F-2.

3.3 Applicable Code Edition and Addenda

The Comanche Peak, Unit 1 Code of record for the fourth 10-year ISI interval is the 2007 Edition through 2008 Addenda of the ASME Code, Section XI.

3.4 Duration of Proposed Alternative

The licensee submitted Proposed Alternative 1A4-3 for the fourth 10-year ISI interval which commenced on August 13, 2020, and is scheduled to end on August 12, 2030.

3.5 ASME Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Examination Categories B-F and B-J require the Class 1 welds to be subjected to volumetric and/or surface examinations during successive 120-month (10-year) intervals. According to the above requirements, 100 percent of all nozzle-to-pipe DM welds in Examination Category B-F and 25 percent of all piping welds with more than 1-inch nominal diameter in Examination Category B-J shall be inspected.

ASME Code, Section XI, Table IWC-2500-1, Examination Categories C-F-1 and C-F-2, require the Class 2 piping welds be subjected to the volumetric or surface examination, or both, during successive 120-month (10-year) intervals. According to the above requirements, 7.5 percent of non-exempt piping welds in Examination Categories C-F-1 and C-F-2 shall be inspected.

3.6 Proposed Alternative

The licensee proposed to continue the use of the RI-ISI program for the Class 1 and Class 2 piping welds for the fourth 10-year ISI interval at Comanche Peak, Unit 1. The licensee proposed to implement the RI-ISI process as an alternative to certain requirements of the ASME Code, Section XI, for examination of selected ASME Code Class 1 and Class 2 piping components. Specifically, the licensee proposed to update the existing RI-ISI program authorized by the NRC for the third 10-year ISI interval and apply the updated program to the fourth 10-year ISI interval. The licensee provided the updated RI-ISI program in its letter dated March 30, 2021, and summarized all changes, updates, and comparisons in the "Proposed Alternative and Basis for Use," section of the Enclosure.

3.7 Basis for Use

As stated in its letter dated March 30, 2021, the licensee committed in the original RI-ISI program to reviewing and updating the risk ranking of piping segments on an ASME Code, Section XI inspection period basis, at a minimum. The revisions to the existing RI-ISI program were described in the "Proposed Alternative and Basis for Use," section of the Enclosure. The licensee stated that the current RI-ISI program was initially implemented during the first period of the third 10-year interval. During the period, the RI-ISI risk ranking was converted to a single-line-per-weld format. A new ISI program control system was also implemented. Changes to the risk ranking information and element selections were updated in the database. A column, "Database Revision," was added to the Risk Ranking Report to identify those changes. The evaluation, update, and revisions to the RI-ISI program have been performed during subsequent periods of the third 10-year ISI interval in accordance with the guidance in Nuclear Energy Institute (NEI) 04- 05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs For Nuclear Plant Piping Systems," dated April 2004 (ADAMS Accession No. ML041480432).

In its letter dated March 30, 2021, the licensee stated that 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 10 CFR 50.55a(z)(1), the licensee requested that the proposed alternative be authorized.

3.8 NRC Staff Evaluation

The NRC staff has evaluated this proposed alternative pursuant to 10 CFR 50.55a(z)(1). The NRC staff focused on whether the proposed alternative provides an acceptable level of quality and safety.

For support of this proposed alternative, the licensee used the methodology of the NRC-approved EPRI TR-112657, Revision B-A, to develop the Comanche Peak, Unit 1 RI-ISI program. The EPRI TR provides technical guidance on an alternative for selecting and categorizing the risk significance of piping components for the purpose of developing an RI-ISI program. The guidance in RGs 1.174 and 1.178 defines an approach that is acceptable to the NRC to analyze and evaluate the licensee's proposed LB changes that are supported with risk information. As part of evaluating the proposed change to the Comanche Peak, Unit 1 RI-ISI program, the licensee performed an engineering analysis (i.e., traditional engineering evaluation methods supported by insights derived from the use of PRA methods about the risk significance of the proposed changes) to demonstrate that the proposed changes are in conformance with the key principles of risk-informed decisionmaking in RG 1.174 and will not compromise defense

in depth and safety margins. As part of the RI-ISI process, the licensee performed periodic performance evaluations of the Comanche Peak, Unit 1 RI-ISI program and updated it in accordance with RGs 1.174 and 1.178.

The five key principles of risk-informed decisionmaking in RG 1.174 state:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption (i.e., a specific exemption under 10 CFR 50.12, "Specific Exemptions").

2. The proposed change is consistent with a defense in depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in CDF [core damage frequency] or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored using performance measurement strategies.

In evaluating this proposed alternative, the NRC staff focused on whether the licensee's proposed RI-ISI program conforms to these five key principles of risk-informed decisionmaking. The NRC staff findings are discussed below.

Principle 1

The first principle requires that the RI-ISI program meets the current regulations. The NRC staff determined that the licensee met Principle 1 because the proposed RI-ISI program is an alternative to the ASME Code ISI program that may be requested for NRC approval pursuant to 10 CFR 50.55a(z)(1). This affirms that an exemption request is not required because the licensee's proposed R-ISI is an alternative ISI program.

Principles 2 and 3

The second and third principles require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected. In accordance with RG 1.174, the engineering analysis should evaluate whether the impact of the proposed RI-ISI program (i.e., the proposed change to the ISI program) is consistent with the defense in depth philosophy, and sufficient safety margins are maintained.

The NRC staff confirmed that as part of the RI-ISI process, the licensee performed a plant-specific engineering analysis according to the guidance in the NRC approved EPRI TR-112657, Revision B-A, to develop the RI-ISI program for Comanche Peak, Unit 1. The NRC staff also confirmed that the licensee has periodically reviewed the Comanche Peak, Unit 1 RI-ISI program, at a minimum, on an ASME Code inspection period basis, as specific new information was identified or became available, and therefore, the risk ranking of piping segments has been adjusted to determine the risk significant locations and the number of locations to inspect. Furthermore, the NRC staff notes that there are no changes made by the

RI-ISI process to the evaluation of design-basis accidents in the final safety analysis report, as discussed in EPRI TR-112657, Revision B-A. Therefore, the NRC staff determined that the licensee met Principles 2 and 3 of RG 1.174, and that the proposed RI-ISI program is consistent with a defense in depth philosophy and maintains sufficient safety margins.

Principle 4

The fourth principle requires an evaluation of the change in risk between the proposed RI-ISI program and the program the licensee would otherwise be required to implement. The licensee stated that the current RI-ISI program resulted in an overall reduction in CDF of 2.61E-09 and a reduction in large early release frequency of 1.88E-09 from the original analysis. These small reductions in the overall risk in the current RI-ISI application are primarily due to a decrease in the upper bound conditional core damage probability and conditional large early release probability values used in the risk impact analysis.

The fourth principle also requires demonstration of the technical adequacy of the PRA. As discussed in RGs 1.178 and 1.200, an acceptable change in risk evaluation (and risk ranking evaluation used to identify the most risk significant locations) requires the use of a PRA of appropriate technical quality that models the as-built and as-operated plant. In accordance with RG 1.200 and ASME RA-Sb-2009, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," February 2009, the licensee stated that Comanche Peak Unit 1 PRA Model, Revision 4, was subjected to an industry peer review in March 2011. In addition, an independent assessment of the closure of the findings and observations (F&Os) generated from the peer review of the Comanche Peak internal events and internal flooding PRAs was completed in January 2019 as documented in the Pressurized Water Reactors Owners Group (PWROG) report PWROG-18060-P, Revision 0, "Independent Assessment of Facts & Observations Closures of the Comanche Peak Probabilistic Risk Assessment," dated January 2019. The assessment was performed following the guidance of Appendix X to NEI 05-04/07-12/12-[13], "Close-out of Facts and Observations (F&Os)," dated February 21, 2017 (ADAMS Package Accession No. ML17086A431). Appendix X was accepted by the NRC in a letter dated May 3, 2017 (ADAMS Accession No. ML17079A427). The licensee stated that for each model scope, all finding level and selected suggestion level peer review F&Os were "CLOSED" based on current or approved PRA documents. The current Comanche Peak PRA Model of Record, Revision 5, is considered a maintenance update, introducing no new models or upgrades.

Based on the technical adequacy evaluations described above, in addition to the PRA maintenance and update processes, which incorporate identified issues into the risk ranking, summary, and matrix through periodic evaluations, the NRC staff concludes that the licensee has assessed the technical adequacy of its PRA using the appropriate version of RG 1.200. Further, the NRC staff concludes that the revised program continues to satisfy the acceptance guidelines of RG 1.174 and EPRI TR-112657, Revision B-A, when compared to the last deterministic ASME Code, Section XI, inspection program, and the PRA quality is sufficient to support the proposed RI-ISI program. Thus, the NRC staff concludes that the licensee has provided adequate assurance that Principle 4 of RG 1.174 is met.

Principle 5

The fifth principle requires that the RI-ISI program is a living program that is monitored for performance measurement strategies. In accordance with RGs 1.178 and 1.174, implementation and performance monitoring strategies should be planned to ensure that the

engineering evaluation conducted to examine the impact of the proposed changes continues to reflect the actual reliability and availability of systems that have been evaluated. When the examination of a weld under the proposed RI-ISI program is not practical or is limited because of physical constraints or radiation hazards, alternative inspection intervals, scope, and methods should be developed to ensure that piping degradation is detected and structural integrity is maintained. From the review of Proposed Alternative 1A4-3, the NRC staff found that the licensee has considered the Comanche Peak, Unit 1 RI-ISI program as a living program. In its March 30, 2021, letter, the licensee stated that it will require feedback of new relevant information and adjust the proposed RI-ISI program as a minimum on an ASME Code inspection period basis to ensure the appropriate identification of high safety significant piping locations. The licensee will require more frequent adjustments and updates if significant changes are directed by the NRC, industry, or plant-specific feedback. Therefore, the NRC staff determines that the licensee demonstrated that its proposed RI-ISI program is a living program that will be periodically reviewed and updated, and that Principle 5 of RG 1.174 is met.

Augmented Inspection Program

The NRC staff verified that the licensee implemented augmented inspection programs to address generic piping degradation problems, as required either by the NRC to preclude piping failure or by the industry's good practice guidelines. The augmented inspection programs that will not be changed by the proposed RI-ISI program and will continue to be implemented, and those that will be subsumed by the RI-ISI program, are as follows.

> *Flow Accelerated Corrosion:* The augmented examination program for flow accelerated corrosion (FAC) per Generic Letter 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning, dated May 2, 1989, is relied upon to manage this damage mechanism but is not otherwise affected or changed by the RI-ISI program.
>
> *Augmented Inspection Program for the Primary Water Stress Corrosion Cracking (PWSCC) Susceptible Alloy 600/82/182 DM Butt Welds Pursuant to 10 CFR 50.55a(g)(6)(ii)(F):* This program addresses examinations of Alloy 600/82/182 DM butt welds for PWSCC in accordance with the requirements of ASME Code Case N-770 subject to conditions in 10 CFR 50.55a(g)(6)(ii)(F)(1). The requirement of 10 CFR 50.55a(g)(6)(ii)(F) takes precedence, even though the examination of Alloy 600/82/182 DM butt welds due to PWSCC is considered administratively in the RI-ISI program. The licensee will remove the Alloy 600/82/182 DM butt welds that are not susceptible to other degradation mechanisms from the RI-ISI program. The licensee will consider the Alloy 600/82/182 DM butt welds that are susceptible to another degradation mechanism other than PWSCC in the RI-ISI program in the same population as those subject to the additional degradation mechanism. This augmented inspection will remain in effect.

Based on the above, the NRC staff concludes that the proposed RI-ISI program for the fourth 10-year ISI interval met the five key principles of risk-informed decisionmaking, and therefore, provides an acceptable level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the licensee has demonstrated that the proposed alternative provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements

set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of Proposed Alternative 1A4-3 at Comanche Peak, Unit 1 for the fourth 10-year ISI interval, which commenced on August 13, 2020, and is scheduled to end on August 12, 2030.

All other requirements of ASME Code, Section XI for which relief was not specifically requested and authorized herein remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: Bart Fu
Thinh Dinh

Date: December 7, 2021

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNIT NO. 1 – PROPOSED ALTERNATIVE FOR THE CONTINUED USE OF A RISK-INFORMED PROCESS FOR THE SELECTION OF CLASS 1 AND CLASS 2 PIPING WELDS FOR INSERVICE INSPECTION (EPID L-2021-LLR-0025) DATED DECEMBER 7, 2021

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ADAMS Accession No. ML21322A103 ***via e-mail**

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