



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

January 6, 2019

MEMORANDUM TO: Michael X. Franovich, Director
Division of Risk Assessment
Office of Nuclear Reactor Regulation

FROM: Michael J. Wentzel, Acting Chief /RA/
PRA Licensing Branch A
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION REPORT ON
OBSERVATIONS OF IMPLEMENTATION OF AN INDUSTRY
INDEPENDENT ASSESSMENT TEAM CLOSE-OUT OF FACTS
AND OBSERVATIONS FOR THE COMANCHE PEAK NUCLEAR
POWER PLANT, PROBABLISTIC RISK ASSESSMENT

Regulatory Guide (RG) 1.200, Revision (Rev.) 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090410014) describes one acceptable approach for determining whether a Probabilistic Risk Assessment (PRA) is acceptable for use in regulatory decision-making for light-water reactors. RG 1.200, Rev. 2, endorses, with clarifications, technical requirements described in the American Society of Mechanical Engineers (ASME) and the American Nuclear Society (ANS) ASME/ANS RA-Sa-2009, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications" (ASME/ANS PRA Standard).

Section 1-6 of the ASME/ANS PRA Standard provides requirements for peer review of a PRA. The industry peer review guidance in Nuclear Energy Institute (NEI) 05-04, NEI 07-12 and NEI 12-13 indicates that the peer review assessment is done against the technical requirements for Capability Category (CC) II in the ASME/ANS PRA Standard. The documentation of differences or deficiencies that do not allow a CC II to be assigned are generally labeled facts and observation (F&Os) in the industry peer review guidance documents.

By letter dated February 21, 2017 (ADAMS Accession Package No. ML17086A431), the NEI submitted Appendix X to NEI 05-04, NEI 07-12, and NEI 12-13, "*Close-out of Facts and Observations*" to the U.S. Nuclear Regulatory Commission (NRC). Appendix X describes the use of an industry independent assessment (IA) team to close out Facts and Observations (F&Os) from previous full- or focused-scope peer reviews of PRAs.

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By letter dated May 3, 2017 (ADAMS Accession Package No. ML17079A427), the NRC accepted the process described in Appendix X with limitations and conditions. In the acceptance letter, NRC stated that “in order for the NRC to consider the F&Os closed so that they need not be provided in submissions of future risk-informed licensing applications, the licensee should adhere to the guidance in Appendix X in its entirety.” The letter also clarified that additional observation of Appendix X F&O closure reviews, and audits to support licensing actions, may be performed to provide continued monitoring and oversight of PRA acceptability.

The enclosure to this memorandum documents NRC observations of the implementation of the IA team F&O closure process for Comanche Peak Nuclear Power Plant PRA which occurred November 5-8, 2018, at the Comanche Peak Nuclear Power Plant near Glen Rose, TX.

While NRC staff sought broad observations of the Appendix X implementation, specific attention was devoted to issues highlighted by previous observations as potential areas of concern to the NRC (e.g., assessment of PRA upgrades vs. maintenance, independence of members of the IA team, IA team interactions, and review of underlying supporting requirements).

Enclosure:
As stated

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION REPORT ON OBSERVATIONS OF
IMPLEMENTATION OF AN INDUSTRY INDEPENDENT ASSESSMENT TEAM
CLOSE-OUT OF FACTS AND OBSERVATIONS FOR THE COMANCHE PEAK
NUCLEAR POWER PLANT, PROBABLISTIC RISK ASSESSMENT
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U.S. NUCLEAR REGULATORY COMMISSION OBSERVATIONS
OF AN INDUSTRY INDEPENDENT ASSESSMENT TEAM CLOSE-OUT
OF FACTS AND OBSERVATIONS FOR THE
COMANCHE PEAK NUCLEAR POWER PLANT
PROBABILISTIC RISK ASSESSMENT

DATE: November 5, 2018 – November 8, 2018

LOCATION: Comanche Peak Nuclear Power Plant, Glen Rose, Texas (TX)

NRC STAFF OBSERVER:

Jigar J. Patel, Reliability and Risk Analyst
Division of Risk Assessment
Office of Nuclear Reactor Regulation

BACKGROUND:

By letter dated February 21, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession Package No. ML17086A431), the Nuclear Energy Institute (NEI) submitted Appendix X to NEI 05-04, NEI 07-12, and NEI 12-13, “*Close-out of Facts and Observations*,” to the U.S. Nuclear Regulatory Commission (NRC). Appendix X allows for the use of an industry independent assessment (IA) team to close out Facts and Observations (F&Os)¹ from previous full- or focused-scope peer reviews of probabilistic risk assessments (PRAs). Appendix X addresses items such as the selection of IA team members, the scope of IA team review, preview preparation activities, the conduct of the on-site review including the treatment of new methods and the use of remote reviewers, and post-review activities including the development of the F&O closure final report.

By letter dated May 3, 2017 (ADAMS Accession Package No. ML17079A427), the NRC accepted the process described in Appendix X with limitations and conditions. In this letter the NRC stated that “in order for the NRC to consider the F&Os closed so that they need not be provided in submissions of future risk-informed licensing applications, the licensee should adhere to the guidance in Appendix X in its entirety.” The letter also stated that additional observations of Appendix X F&O closure reviews, and audits to support licensing actions, may be performed to provide continued monitoring and oversight of PRA acceptability.

¹ Industry PRA peer-reviews are performed against Capability Category (CC) II of American Society of Mechanical Engineers (ASME) and the American Nuclear Society (ANS) ASME/ANS RA-Sa-2009, “Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications.” The documentation of differences or deficiencies that do not allow a CC II to be assigned are generally identified as facts and observations, or F&Os.

Enclosure

Previous NRC staff observations related to the development and implementation of the Appendix X process are documented in memoranda dated May 1, 2017, September 6, 2018, and October 12, 2018 (ADAMS Accession Nos. ML17095A252, ML18095A990, and ML18269A252 respectively).

These observations highlighted aspects such as the assessment of PRA upgrades vs. maintenance, independence of IA team members, IA team member interactions, and review of underlying PRA standard supporting requirements (SRs).

OBSERVATIONS:

The Comanche Peak PRA IA F&O closure review was performed by five contractors comprised of staff from Westinghouse, Jensen Hughes and Fauske and Associates. Four IA team members remained on-site at Comanche Peak Nuclear Power Plant in Glen Rose, TX during the review, and there was one remote reviewer. Focused-scope peer reviews were also performed by the same individuals comprising the IA F&O closure team.

The full-scope internal events peer review for the Comanche Peak PRA was conducted in 2011, against the American Society of Mechanical Engineers (ASME)/American Nuclear Society (ANS)-RA-Sa-2009 Standard (2009 ASME/ANS PRA Standard) which is endorsed, with conditions, by the NRC in Regulatory Guide 1.200, Revision (Rev.) 2, "An Approach for Determining the Technical Adequacy of PRA Results for Risk-Informed Activities" (ADAMS Accession No. ML090410014). After the 2011 full-scope peer review, two independent reviews were performed in 2015 and 2016 for the internal events and flooding PRA. In January 2016, a full scope Fire PRA peer review was performed followed by a self-assessment to address the full scope peer review findings.

The IA team was provided with all F&Os from Internal Events and Fire peer reviews along with affected ASME/ANS PRA Standard SRs, the host utility's dispositioning of F&Os, and an assessment of whether resolution of F&Os was considered to be PRA maintenance or upgrade. The IA team was tasked with assessing 90 F&Os total which included 64 fire F&Os and 26 internal events and internal flooding F&Os. The licensee categorized all F&Os as PRA maintenance activities except for one fire F&O which was classified as PRA upgrade.

While the peer review team determined that a substantial fraction of F&Os were associated with PRA maintenance activities, a number of F&Os were associated with PRA upgrades and were addressed as part of the focused-scope peer review. The focused-scope peer review covered topics such as human reliability analysis, PRA treatment of control room abandonment scenarios, and fire modeling methodology changes. The NRC staff conducted several investigations on various technical elements and inquired about the merits of team disposition regarding the closure of specific F&Os. Specific discussion items involved the absence of plant walk downs and validation of calculations. These items are further discussed in the observations below.

Although the results and formal documentation of the IA F&O closure team were not complete, a presentation during the IA team and host utility final debrief indicated that of the 90 F&Os provided to the IA team, 74 F&Os were identified as resolved (i.e., closed), 4 were closed and superseded due to being addressed as part of the focused-scope peer review, and 12 were partially resolved or partially resolved with open documentation. The Appendix X guidance recognizes that F&Os may be closed between the end of the on-site review and issuance of the final report. Additional remote consensus sessions were tentatively planned to address three

outstanding issues that will be addressed prior to the final report closure otherwise established as new F&Os.

Specific observations are described below:

1. The IA reviewers conducted their individual assessment of F&Os with significant collaboration. Each reviewer, even if not assigned, generally contributed to consensus discussions. During non-consensus sessions, F&Os were reviewed individually by each reviewer and for more complex elements reviewers worked collaboratively in groups.
2. The host utility provided a written assessment and justification of whether each F&O constituted a PRA upgrade or maintenance update as defined in the 2009 ASME/ANS PRA Standard. Using this information as a starting point, the IA team discussed whether it agreed or disagreed with the host utility assessment and provided the bases for its determinations.
3. A low number of upgrades were identified by the host-utility and therefore, a low portion of the on-site review was planned for focused-scope peer reviews. The IA team however determined that closure of additional F&Os constituted an upgrade therefore the scope of the upgrades was greater than anticipated.
4. The host utility generally identified and documented the SRs impacted by the subject F&O to ensure that the aspects of the underlying SR(s) that were previously not met, or met at CC I, are now met at CC II. During the consensus sessions, the IA team considered whether the underlying aspects of the SRs associated with each F&O were met at CC II. This is consistent with the Appendix X guidance to ensure that the aspects of the underlying SR that were previously not met, or met at CCI, are now met, or met at CCII.
5. The IA team requested comments, questions, and concurrence from each of the reviewers participating in the review on each F&O. While the IA team did not encounter a situation that warranted documenting a dissenting opinion, there were discussions involving differing opinions that were resolved through additional IA team discussion or host utility interaction.
6. The IA team concluded each F&O was open, closed or partially closed. Partially closed F&Os were further distinguished by those that the utility could complete before the final report (e.g., enhanced documentation, sensitivity) and those that required transfer from draft to formal documentation (e.g., supervisor signature).
7. The IA team was organized into sub teams such that the review of F&Os was based on technical elements, therefore the focused-scope peer review and F&O closure processes were performed in conjunction. This approach appeared to work well.
8. The IA was primarily composed of staff from Westinghouse, Fauske and Associates, and Jensen Hughes. The NRC staff questioned the host utility regarding the selection of IA team members and how independence, as defined in Section 1.6 of the 2009 ASME/ANS Standard was confirmed. One IA member was involved with a prior review of the internal flooding PRA and this member refrained from voting and participating in the consensus sessions pertaining to the three F&Os related to internal flooding.

9. The five member IA team met the requirements for both an IA F&O closure and focused scope peer review team composition as detailed in Appendix X and the 2009 ASME/ANS PRA Standard. Despite the large scope of the review, the IA team completed both the F&O closures and the focused-scope peer reviews in the time allotted.
10. The IA team identified general trends in host utility documentation. In these cases there was open dialogue between the IA team and the host utility during daily debriefs. In general IA team and host utility interactions were frequent and productive.
11. In lieu of the IA team physically performing walk downs at Comanche Peak, the host utility furnished detailed electronic photos. This was consistent with past reviews the peer review team performed at other facilities. During a technical evaluation, the NRC staff noted that for an internal flooding F&O, credit was taken by host utility for maintaining a flood resistant door. However, the peer review team's scope did not include verification of the proper characteristics, installation or maintenance of the door to validate the assumption. The NRC staff notes that the limited scope of the evaluation aligns with prior reviews conducted at different facilities as well as time resources available for the peer review team. However, a more detailed vertical approach as those normally conducted by NRC inspection teams on sampling basis may highlight deficiencies in assumptions that are credited in plant PRAs.
12. The NRC staff investigated the treatment of components in the PRA affected by loss of room cooling. The methodology utilized by the host utility was approved by the peer review team. However, due to the scope of the peer review, the host utility's calculation was not confirmed as the methodology requires room measurements and other measured variables. Similar to the observation above, the NRC staff notes that the limited scope of the evaluation aligns with prior reviews conducted at different facilities as well as time resources available for the peer review team. However, a more detailed inspection may highlight deficiencies in calculations that are credited in plant PRAs.