

REGULATORY ANALYSIS

DRAFT REGULATORY GUIDE DG-1387 EVALUATING THE HABITABILITY OF A NUCLEAR POWER PLANT CONTROL ROOM DURING A POSTULATED HAZARDOUS CHEMICAL RELEASE (Proposed Revision 2 of Regulatory Guide 1.78, Revision 1, issued December 2001)

1. Statement of the Problem

Regulatory guide (RG) 1.78, Revision 1, “Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release,” describes an approach that is acceptable to the staff of the U.S. Nuclear Regulatory Commission (NRC) to meet regulatory requirements for evaluating the habitability of a nuclear power plant control room (CR) during a postulated hazardous chemical release. The U.S. NRC is considering revising RG 1.78, Revision 1, to update the technical basis document and references to the appropriate regulations and to incorporate the NRC’s implementation of a risk-informed, performance-based approach to licensing. RG 1.78 is driven by the information for specific licensed reactors in General Design Criterion (GDC) 19, “Control room,” of Appendix A, “General Design Criteria for Nuclear Power Plants,” to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic licensing of production and utilization facilities.”

The NRC first published RG 1.78 in June 1974 to provide licensees and applicants with agency-approved guidance for complying with the then-current version of 10 CFR Part 50. RG 1.78, Revision 1, was issued in December 2001 (Agencywide Document Access and Management System (ADAMS) Accession No. ML013100014) and endorsed the HABIT code in NUREG/CR-6210, “Computer Codes for Evaluation of Control Room Habitability (HABIT),” issued June 1996 (ADAMS Accession No. ML063480558). HABIT is an integrated set of computer codes that the NRC uses to evaluate CR habitability and estimate the control room personnel’s exposure to a chemical release.

Based on lessons learned, the staff believed that an update to RG 1.78, Revision 1 was necessary and published a periodic review in March 2017 (ADAMS Accession No. ML17096A731). As noted in that document, during the technical reviews of several combined license (COL) applications and interactions with stakeholders, the staff found that the toxic chemical release portion of HABIT could benefit from improvements that would allow the code to become a more useful tool for the staff in performing confirmatory analyses of the toxic gas CR habitability evaluations provided by applicants. However, due to limited internal resources, the staff was not able to fully perform the evaluation of improvements and benchmarks for the HABIT v2.2 code and pursue a RG revision at that time. In addition, the HABIT v2.2 code was still under development and only recently completed in 2020. The staff has completed a comprehensive evaluation of the HABIT v2.2 code as described in NUREG 2244, “HABIT 2.2: Description of Models and Methods,” issued May 2021 (ADAMS Accession No. ML21120A069).

2. Objective

The objective of this regulatory action is to evaluate alternatives and assess the need to update NRC guidance to provide applicants and licensees with an evaluation method for the habitability of a nuclear power plant CR during a postulated hazardous chemical release to demonstrate compliance with the requirements of GDC 19. Protecting the CR requires

operators to take actions to operate the nuclear power unit safely under normal or abnormal conditions.

3. Alternative Approaches

The NRC staff considered the following three alternative approaches:

1. Do not revise RG 1.78.
2. Withdraw RG 1.78.
3. Revise RG 1.78 to address the current methods and procedures.

Alternative 1: Do Not Revise RG 1.78

Under this alternative, the NRC would not revise or issue additional guidance, and the current guidance would be retained. If the NRC takes no action, then there would be no changes in costs or benefits to the public, licensees, or the NRC. This alternative is considered the “no action” alternative and provides a baseline condition from which any other alternatives will be assessed. However, the “no action” alternative would not address identified concerns with the current version of the RG.

Alternative 2: Withdraw RG 1.78

Under this alternative, the NRC would withdraw this RG. This would eliminate the problems identified above with the RG. However, it would also eliminate the only readily available description of the methods the NRC staff considers acceptable for demonstrating compliance with Appendix A to 10 CFR Part 50 within the scope of RG 1.78. Although this alternative would be less costly than the recommended alternative, removing this guidance would increase the burden for the NRC, applicants, and licensees by increasing the likelihood that the NRC would need to issue requests for additional information related to the scope of RG 1.78.

Alternative 3: Revise RG 1.78

Under this alternative, the NRC would revise RG 1.78, Revision 1. This revision would incorporate the latest information in the regulatory guidance, as cited in the references to the RG. As such, the NRC would ensure that the RG guidance available in this area is current and accurately reflects the staff's position. The impact to the NRC would be the costs to prepare and issue the RG revision. The impact to the public would be the voluntary costs of reviewing and providing comments to the NRC during the public comment period. Applicants, licensees, and the NRC staff would benefit from the enhanced efficiency and effectiveness of using a common guidance document as the technical basis for developing and reviewing license applications, respectively, and other interactions between the NRC and its regulated entities.

4. Conclusion

Alternative 1 is considered the baseline or “No Action” alternative and, as such, involves no value/impact considerations. By withdrawing the RG, Alternative 2 would make application reviews more burdensome for the staff and very likely make application preparation more burdensome for applicants and licensees. Alternative 3 would impose a onetime additional cost

to the NRC relative to Alternatives 1 and 2 through the costs to prepare and issue the RG revision. The onetime cost would be offset by the avoidance of the burdens anticipated by Alternative 1 and imposed by Alternative 2. Alternative 3 would not impose significant additional costs on applicants and licensees relative to Alternative 1 and could possibly result in reduced costs to applicants and licensees relative to Alternative 2 by enhancing the development of evaluations of the habitability of a nuclear power plant CR during a postulated hazardous chemical release.

Based on this regulatory analysis, the staff recommends that the NRC revise RG 1.78, Revision 1, to reflect the availability of new information and improved methodologies. The staff concludes that the proposed action would enhance nuclear power plant safety by providing up to date guidance and information on evaluating the habitability of a nuclear power plant CR during a postulated hazardous chemical release. Applicants and licensees can use the updated guidance to ensure that designs are constructed to be safe and to help ensure timely review by the NRC staff of the submitted designs. The action will enhance confidence in licensing applications that rely on HABIT v2.2 as part of their technical basis, which is a way to risk-inform licensing applications. It could also lead to cost savings for the industry, especially with regards to more efficient NRC reviews and to the predictability of regulatory outcomes when HABIT v2.2 is used as part of the technical basis.