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

August 17, 2016

MEMORANDUM TO: Brian E. Thomas, Director
Division of Engineering
Office of Nuclear Regulatory Research

FROM: Istvan Frankl, Chief ***/RA/***
Corrosion & Metallurgy Branch
Division of Engineering
Office of Nuclear Regulatory Research

SUBJECT: RESULTS OF PERIODIC REVIEW OF REGULATORY GUIDE (RG) 1.87

This memorandum documents the U.S. Nuclear Regulatory Commission (NRC) periodic review of regulatory guide (RG) 1.87, "Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors." The RG references general design criteria (GDC) associated with high temperature gas reactors (HTGRs), liquid-metal fast breeder reactors (LMFBRs), and gas-cooled fast breeder reactors (GCFBRs), published in June, 1975. As discussed in Management Directive 6.6, "Regulatory Guides," the NRC staff reviews RGs approximately every 5 years to ensure that the RGs continue to provide useful guidance. Documentation of the NRC staff review is enclosed.

Based on the results of the periodic review, the staff concludes that no changes to RG 1.87 Revision 0 are warranted at this time. However, the staff identified technical and regulatory issues in the review that could warrant addressing in a future revision or withdrawal to coincide with the progress in actions to develop advanced reactor GDC.

Enclosure:
Regulatory Guide Periodic Review: Guidance
For Construction of Class 1 Component in
Elevated-Temperature Reactors

CONTACT: Amy B. Hull, Ph.D., RES/DE/CMB
301-415-2435

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NAME	AHull	AHull	IFrankl
DATE	8/15/16	8/15/16	8/17/16

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Regulatory Guide Periodic Review

Regulatory Guide Number:	**1.87**
Revision number:	**1**
Title:	**Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors**
Office/division/branch:	**RES/DE/CMB**
Technical Lead:	**Amy B. Hull, Ph.D.**
Staff Action Decided:	**Reviewed with issues identified for future consideration**

1. What are the known technical or regulatory issues with the current version of the Regulatory Guide (RG)?

The June 1975 version of RG 1.87 references general design criteria (GDC) associated with high temperature gas reactors (HTGRs), liquid-metal fast breeder reactors (LMFBRs), and gas-cooled fast breeder reactors (GCFBRs). The Office of New Reactors is developing GDC and advanced reactor design criteria (ARDC) for the several advanced reactor designs including, sodium fast reactor design criteria (SFR-DC), and modular high-temperature gas reactor design criteria (mHTGR-DC). Known issues include:

- Formatting and reference issues to align with the current format for RGs.
- The RG may need to be updated to address criteria in the current ASME Section III Div. 5 Code (for example, see O'Donnell, W. J., A. B. Hull, and S. N. Malik, "Regulatory Safety Issues in Structural Design Criteria of ASME Section III Subsection NH," PVP2008-61870).
- Documentation from a recent NRC-DOE meeting may provide insights for a future revision (Proceedings, NRC and DOE Co-Hosted Workshop on Advanced Non-Light Water Reactors, September 1-2, 2015, ML15265A165).
- ASME activities to create a roadmap for the development of ASME Code Rules for HTGRs are in progress and may impact the guidance in the future.
- The draft RG titled, "Guidance for Developing Principal Design Criteria for Advanced Non-Light Water Reactors," which is being developed by the Advanced Reactor Guidance Team may encompass the guidance within RG 1.87 and support withdrawal of this RG; this is a long term project anticipated to be completed in several years.
- Resolution of the method for capturing the GDC of advanced reactor designs as regulation or staff guidance may support the withdrawal of this RG or combining it with the draft guide titled, "Guidance for Developing Principal Design Criteria for Advanced Non-Light Water Reactors."

2. What is the impact on internal and external stakeholders of <u>not</u> updating the RG for the known issues, in terms of anticipated numbers of licensing and inspection activities over the next several years?

Regulatory Guide 1.87 only pertains to the design of new HTGRs. The NRC is not expecting any licensing applications or amendments for any HTGR designs, there is no need to update, modify or otherwise change RG 1.87 at this time. The guidance in RG 1.87 is outdated as evidenced by the evolution of the ASME Code, Section III (Committee of Nuclear Facility Components), Division 5 on HTRs which is undergoing the code committee's approval process and is expected to be released in the 2017 edition of the code.

3. What is an estimate of the level of effort needed to address identified issues in terms of full-time equivalent (FTE) and contractor resources?

NRC staff may require up to approximately 0.5 FTE to either withdraw or incorporate this information in RG 1.87 with new guidance under development. It is estimated that the staff requires 1 to 2 FTE if at a future date it is determined that RG 1.87 needs to be revised to endorse the ASME Code that is currently under development.

4. Based on the answers to the questions above, what is the staff action for this guide (Reviewed with no issues identified, Reviewed with issues identified for future consideration, Revise, or Withdraw)?

Reviewed with issues identified for future consideration.

5. Provide a conceptual plan and timeframe to address the issues identified during the review.

Although the NRC does not currently plan to revise this RG, the NRC plans to complete a detailed GDC evaluation of general design criteria for advanced reactors in 2018 (or 2018 through 20##), after the 2017 edition of the ASME code is released. The evaluation of the need to revise or withdraw RG 1.87 will occur concurrently with the development of new guidance anticipated to be titled, "Guidance for Implementing Principal Design Criteria for Advanced Non-Light Water Reactors." The plan to do a detailed evaluation of the new guidance is expected to be completed in the first half of FY17. This evaluation will be aligned with the NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness (ML16130A812, draft revision 1, June 2016). The further evaluation of RG 1.87 will await resolution of the method for capturing the GDC for advanced reactor designs as regulation or staff guidance may support the withdrawal of this RG or combining it with the draft guide titled, "Guidance for Developing Principal Design Criteria for Advanced Non-Light Water Reactors." This activity should ultimately result in capturing the elements of this RG with the new GDC for advanced reactors and the withdrawal or revision of RG 1.87.

NOTE: This review was conducted in August 2016 and reflects the staff's plans as of that date. These plans are tentative and are subject to change.