August 17, 2015

Mr. Craig Welling
Deputy Director
Office of Advanced Reactor Technologies
U.S. Department of Energy
NE-74, Germantown Building
19901 Germantown Road
Germantown, Maryland 20874

SUBJECT: QUESTIONS ON THE U.S. DEPARTMENT OF ENERGY REPORT, "GUIDANCE FOR DEVELOPING PRINCIPAL DESIGN CRITERIA FOR ADVANCED (NON-LIGHT WATER) REACTORS"

Dear Mr. Welling:

By letter dated December 8, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14353A245), the U.S. Department of Energy (DOE) submitted the report titled, "Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors," (ML14353A246 and ML14353A248). By letter dated June 5, 2015 (ML15154B575), the U.S. Nuclear Regulatory Commission (NRC) transmitted questions on the report to the DOE. By letter dated July 15, 2015 (ML15204A579), the DOE responded to the NRC's questions. The staff has developed some additional questions on General Design Criteria 17,18, 33, and 34.

The attached enclosure contains the staff's questions. The NRC staff looks forward to receiving a timely response to the questions in order to continue working to develop guidance for non-light water reactor technologies.

Should you have any questions, please contact Jan Mazza, Project Manager, at (301) 415-0498 or Jan.Mazza@nrc.gov.

Sincerely,

/RA/

Jan Mazza, Project Manager
Advanced Reactor and Policy Branch
Division of Advanced Reactors and Rulemaking
Office of New Reactors

Project No.: 0814
Enclosure: NRC Staff Questions on DOE Report
cc w/encl: Distribution via GovDelivery

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Letter to Craig Welling from Jan Mazza dated August 17, 2015

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NRC Staff Questions on the DOE Report:
Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors
Department of Energy – Idaho National Laboratory
Docket No. PROJ 0814

For Questions 1 - 40 see ADAMS ML15154B575

41. **ARDC 17 and ARDC 18**

As currently written, Title 10 Code of Federal Regulations (CFR) Part 50, Appendix A, General Design Criterion (GDC) 17, establishes electrical system requirements for a design-independent support system that can be applied to any reactor design. Among other things, GDC 17 requires that each plant have access to an offsite power electric system and an onsite electric power system. To inform its position with respect to non-light water reactors, the NRC staff would benefit from DOE's answers, comments and insights on the following questions:

a. Current GDC 17 establishes a set of power sources that a nuclear plant would utilize to meet its needs. If offsite power is considered fundamental to defense-in-depth, offsite power is a necessary element of electrical power systems requirements. Given that proposed Advanced Reactor Design Criterion (ARDC) 17 deletes offsite power from GDC 17, please explain why the DOE does not believe offsite power is a necessity for defense-in-depth for non-light water reactor designs.

b. If a new nuclear power plant design has connections to the offsite power system (grid), the design could be vulnerable to any disturbances or transients within the grid. For example, the onsite power system could be vulnerable to degraded grid voltage and loss-of-phase events. GDC 17 clarifies the NRC's requirements for specific protective measures to address these and other vulnerabilities and gives the NRC staff a firm regulatory basis to be able to enforce such requirements. GDC 18 outlines the inspection and testing requirements of electric power systems. How would the proposed ARDC 17 and 18 as currently worded provide the same level of protection and basis for enforcement of electrical systems?

42**. HTGR-DC 33**

In HTGR-DC 33, the following statement is made in the rationale, "…specified core radionuclide release design limits (SARRDLs) are not assured by the system addressed by this ARDC; adequate core cooling is maintained even with a depressurized primary circuit." Does this mean the SARRDLs are met with a depressurized circuit and hence no inventory control is necessary? Note in the first paragraph of the HTGR-DC 33 rationale discusses postulated accidents and not SARRDLs so it is unclear if inventory maintenance is needed for meeting the SARRDLs.

Enclosure

43. **HTGR-DC 34**

In HTGR-DC 34, the third paragraph of the rationale does not seem to correspond to any specific changes in the DC language. Please indicate which changes to the DC are made based on the third paragraph and provide additional discussion as to why the "design conditions of the reactor coolant pressure boundary" was deleted from the first paragraph of the DC.