

February 15, 2012

Mr. Jim Kinsey, Director,  
Regulatory Affairs  
Next Generation Nuclear Plant Project  
Idaho National Laboratory  
P.O. Box 1625  
2525 North Fremont Ave  
Idaho Falls, ID 83415

SUBJECT: NEXT GENERATION NUCLEAR PLANT–ASSESSMENT OF WHITE PAPERS ON FUEL QUALIFICATION, MECHANISTIC SOURCE TERMS, DEFENSE-IN-DEPTH APPROACH, LICENSING BASIS EVENT SELECTION, AND SAFETY CLASSIFICATION OF SYSTEMS, STRUCTURES, AND COMPONENTS

Dear Mr. Kinsey:

This letter forwards two reports assessing the contents of five white papers submitted by the Next Generation Nuclear Plant (NGNP) Project. Specifically, the respective reports assess the Project's white papers on (i) fuel qualification (FQ) and mechanistic source terms (MST) and (ii) defense-in-depth approach (DID), licensing basis event selection (LBE), and safety classification of systems, structures, and components (SSC). The assessment reports were developed by working groups composed of staff from the Nuclear Regulatory Commission (NRC) Offices of New Reactors (NRO) and Nuclear Regulatory Research (RES). Brookhaven National Laboratory and Sandia National Laboratories assisted the working groups in assessing the fuel qualification and mechanistic source terms white papers. Note that these assessment reports reflect the considered opinions of the members of the working groups but should not be construed as formal staff positions in the context of future licensing activities.

The enclosed assessment reports have not identified any obvious fundamental issues that would prevent development of related licensing submittals that meet regulatory requirements. However, these assessments are necessarily preliminary, consistent with the high level at which the approaches are presented, the ongoing status of the associated development and testing programs, and the lack of available detail on the proposed NGNP design itself and how its safety-related performance will be analyzed for evaluation against appropriate criteria.

The working groups have nevertheless noted a number of areas where the proposed approaches could be strengthened and where technical and policy issues could affect implementation of the approaches. With regard to the framework of risk-informed, performance-based approaches described in the DID, LBE, and SSC white papers, the assessment finds that the approaches could be strengthened by increased use of deterministic elements. Accordingly, the assessment discusses how appropriate conservatism in the deterministic selection of bounding events can facilitate demonstration of compliance with regulatory requirements and enhance defense-in-depth by assuring plant equipment is capable of mitigating a wider range of events.

Assessment of the FQ and MST white papers has identified several technical issues that may possibly be resolved with further information, analysis, and assessment. Chief among these issues are those associated with needs for additional fuel irradiation testing, potential needs for additional fuel accident testing, and potential needs for additional data to support mechanistic calculations of release source terms from the proposed functional containment system. With regard to irradiation testing, the working group's preliminary assessment is that fuel performance and fuel radionuclide transport data derived from the ongoing series of accelerated irradiations in the Advanced Test Reactor should be verified and supplemented with data derived from real-time irradiations in a high temperature gas-cooled reactor environment.

Many of the issues identified in the assessments can be addressed within the context of the Project's ongoing and planned development activities. As the working groups' preliminary assessments note, however, some of the more challenging issues might be most effectively resolved by conducting prototype-specific programs of operational testing, monitoring, surveillance, and inspection in the NGNP prototype reactor.

Please contact Jeffrey Cruz ([Jeffrey.Cruz@nrc.gov](mailto:Jeffrey.Cruz@nrc.gov), 301-415-0599) or Donald Carlson ([Donald.Carlson@nrc.gov](mailto:Donald.Carlson@nrc.gov), 301-415-0109) if you have questions regarding the enclosed assessment reports or proposed next steps.

Sincerely,

*/RA/*

Michael E. Mayfield, Director  
Division of Advanced Reactors and  
Rulemaking  
Office of New Reactors

Project No.: 0748

Enclosures:

1. Assessment of White Paper Submittals  
on Fuel Qualification and Mechanistic Source Terms
2. Assessment of NGNP Proposed Risk-Informed,  
Performance-based Regulatory Framework

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**\*via e-mail**

**NRO-002**

OFFICE	PM:NRO/DARR/APRB	PM:NRO/DARR/APRB	PM:NRO/DARR/APRB
NAME	DCarlson (JCruz for)	JWilliams	JCruz
DATE	01/25/2012	01/25/2012	01/25/2012
OFFICE	OGC*	D:NRO/DARR	
NAME	SVrahoretis	MMayfield	
DATE	02/8/2012	02/15/2012	

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