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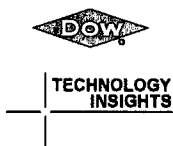
**Subject:** NGNP Industry Alliance Response to NRC Regulatory Issue Summary 2011-02, Revision 1; "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs"

**References:** (A) NRC Regulatory Issue Summary 2011-02, Revision 1; "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs," dated December 27, 2011

On December 27, 2011, the U.S. Nuclear Regulatory Commission (NRC) published Regulatory Issue Summary (RIS) 2011-02, "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs" (Reference A). The RIS seeks voluntary information regarding the content and schedule information for construction permit (CP), early site permit (ESP), combined license (COL), standard design certification (DC), standard design approval (DA), or manufacturing license (ML) for a nuclear power plant that references a small modular reactor (SMR) design under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," or 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." For the purpose of this regulatory issue summary (RIS), SMRs are defined using the International Atomic Energy Agency definition of small- and medium-sized reactors with an electrical output of less than 700 megawatts.

The NGNP Industry Alliance LLC (Alliance) was established with the primary purpose to promote the development and commercialization of the modular High-Temperature Gas-Cooled Reactor (HTGR) technologies through support of the DOE's Next Generation Nuclear Plant (NGNP) Project. Our alliance represents the interests and views of our members that intend to mutually support and direct project plans to design, build, operate and use the modular HTGR technology. Further information about the Alliance and its members can be obtained at <http://www.ngnpalliance.org/>.

This letter provides the voluntary response to NRC RIS 2011-02, Rev 1, for the Alliance. The purpose of this response is to make the NRC staff aware of planned activities that will support the future commercialization of the modular HTGR technology.



[www.ngnpalliance.org](http://www.ngnpalliance.org)

P.O. Box 837 Ridgeland, Mississippi 39158

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The Alliance has selected the AREVA prismatic core modular HTGR in a steam supply configuration for initial applications for co-generation of process heat and electricity. The industrial end-user requirements have been the primary consideration for making this technology selection. This selection has been finalized by the current members of the Alliance. Entergy Nuclear, as a member of the Alliance, has assumed the role of applicant for the HTGR pre-application and licensing activities for the Alliance.

If you have any questions, please contact me; James R. Douet, Vice President Business Development, Entergy Nuclear (601-368-5327, [jdouet@entergy.com](mailto:jdouet@entergy.com)); or George A. Zinke, Manager New Plant Licensing, Entergy Nuclear (601-368-5381, [gzinke@entergy.com](mailto:gzinke@entergy.com)).

Sincerely,



Frederick L. Moore  
Executive Director, NGNP Industry Alliance

and

Global Director Manufacturing & Technology, Energy  
The Dow Chemical Company

Office Telephone: (979) 238-4981  
Email: [FLMoore@dow.com](mailto:FLMoore@dow.com)

Attachment

cc:

S. Asgarpour, Petroleum Technology Alliance Canada  
T. Burkett, SGL Carbon  
J. R. Douet, Entergy Nuclear  
D. Halter, ConocoPhillips  
J. Hamel, EPRI  
M. Haynes, Concordia Power  
P. C. Hildebrandt, INL  
K. Jackson, Westinghouse  
J. Jarrell, Dow Chemical  
J. Kinsey, INL  
J. Lang, SGL Carbon  
J. M. Mahoney, Entergy Nuclear  
D. Mears, Technology Insights  
M. Rencheck, AREVA  
L. Sandell, Westinghouse  
F. Southworth, AREVA  
G. Young, Entergy Nuclear  
G. A. Zinke, Entergy Nuclear

## **ATTACHMENT 1**

### **Response to RIS 2011-02 Rev 1 Specific Questions**

## NGNP Alliance Voluntary Response to NRC RIS 2011-02, Rev. 1

### Design and Licensing Submittal Information

- 1. When (month and year) are applications planned for design-related applications and what NRC action will be requested (i.e., DC, DA, ML, or a COL that does not reference a DC or DA)?**

RESPONSE: The Alliance is advancing business plans and licensing strategy development during 2012. Currently the Alliance is targeting 2015 for submittal of a Construction Permit application in accordance with 10 CFR 50. The Alliance is continuing to evaluate the licensing options of 10 CFR 50 and 10 CFR 52 in order to select the optimum licensing process for the HTGR design and initial site which best advances commercialization.

- 2. Will the applicants be organized into DCWGs? If known, what is the membership of the DCWG and which party is the primary point of contact designated for each DCWG? Have protocols been developed to provide coordinated responses for requests for additional information with generic applicability to a design center?**

RESPONSE: The Alliance supports the DCWG concept; however the Alliance currently does not anticipate initial multiple parallel license applications necessitating a DCWG. The Alliance will continue to coordinate its efforts and work with the DOE-Idaho National Laboratory (INL), in support of HTGR licensing framework development, currently under way between INL and the NRC for the NNGP.

- 3. Which applicant that references the design will be designated as the reference COL applicant or, alternately, how will various applications (e.g., CP, DC, or COL) be coordinated to achieve the desired design-centered licensing review approach?**

RESPONSE: The Alliance currently does not anticipate initial multiple parallel license applications requiring the coordination of a DCWG. The initial application would be structured to support the philosophy of "one issue, one review, one position" and design standardization for subsequent HTGR applications.

- 4. When (month and year) will CP, COL or ESP applications be submitted for review? In addition, what are the design, site location, and number of units at each site?**

**RESPONSE:** Currently the Alliance is targeting CY 2015 for submittal of a Construction Permit application in accordance with 10 CFR 50. Several preliminary assessments have been conducted evaluating external hazards and other environmental characteristics or constraints and their potential impact on deployment of the NNGP reactor technology. The Alliance anticipates the initial licensing would support construction and operation of the initial single module of a multiple module unit. A site location for the initial unit has not been selected. See response to Questions #1 and #5.

- 5. Are vendors or consultants assisting in the preparation of the application(s)? If so, please describe roles and responsibilities for the design and licensing activities.**

**RESPONSE:** The Alliance has selected the AREVA prismatic core modular HTGR in a steam supply configuration for initial applications for co-generation of process heat and electricity. The industrial end-user requirements have been the primary consideration for making this technology selection. AREVA is the lead designer supported by other Alliance members for needed technical competencies. Entergy Nuclear, as a member of the Alliance, has assumed the role of applicant for the HTGR pre-application and licensing activities for the Alliance. Licensing application preparation has not commenced.

Alliance members continue to interact with the DOE-INL NNGP Project regarding HTGR technology development and licensing activities. As the Alliance plans are further refined and implemented, it is recognized that the HTGR licensing framework development activities that are currently being led by the DOE/INL via the NNGP Project may transition to the Alliance effort in the future. If that transition occurs, the details and timing of this transition would be the subject of future interactions with the NRC.

**Design, Testing, and Application Preparation**

- 6. What is the current status of the development of the plant design (i.e., conceptual, preliminary, or finalizing)? Has the applicant established a schedule for completing the design? If so, please describe the schedule.**

**RESPONSE:** Some conceptual design work has been completed through the DOE-INL NGNP Project. AREVA-specific conceptual design work is expected to commence during the first quarter in CY 2012. The current completion schedule is as follows:

Conceptual design: 2.5 years  
Preliminary design: 2 years  
Final design: 3 years

During the conceptual design phase the specifics of the nuclear safety case are defined, the systems that are considered safety related or important to safe plant operations are designed, the plant licensing strategy is finalized, and the remaining plant systems, structures, and components will be further defined. The conceptual design phase includes many other activities including: a) convergence on main design requirements, general plant functions, configuration, and layout, b) completion of key trade studies to settle major design features, c) definition of functions and main requirements for all plant systems, d) selection of the governing design codes and establishment of relevant required code cases, e) specification of research & development (R&D) needs and development of R&D plans, f) completion of detailed calculations for main systems, g) completion of analysis methods development, and h) identification of key suppliers. These design activities will support development of the initial license application.

- 7. What is the applicant's current status (i.e., planning, in progress, or complete) for the qualification of fuel and other major systems and components? Has the applicant established a schedule for completing the qualification testing? If so, please describe the schedule.**

**RESPONSE:** Tristructural-isotropic (TRISO) fuel qualification plans are complete. Fuel irradiation and characterization is underway at the Idaho National Lab. TRISO fuel qualification testing plans are described in NGNP white paper INL-EXT-17686. This document has been submitted to the NRC and is under review.

- 8. What is the applicant's status (i.e., planning, in progress, or complete) in developing computer codes and models to perform design and licensing analyses? Has the applicant defined principal design criteria, licensing basis events, and other fundamental design/licensing relationships? Has the applicant established a schedule for completing the design and licensing analyses? If so, please describe the schedule.**

**RESPONSE:** AREVA HTGR computer codes and HTGR models are being evaluated for licensing work in the USA. Principal design criteria, licensing-basis events, and other fundamental design/licensing relationships will be defined as part of normal

conceptual design process. The schedule for completing the design and licensing analyses will be confirmed during the conceptual design.

- 9. *What is the applicant's status in designing, constructing, and using thermal-fluidic testing facilities and in using such tests to validate computer models? Has the applicant established a schedule for the construction of testing facilities? If so, please describe the schedule. Has the applicant established a schedule for completing the thermal-fluidic testing? If so, please describe the schedule.***

RESPONSE: As part of the conceptual design phase the need for testing will be identified and facilities necessary for such testing will be identified if available or built and utilized. Schedules will be established following the identification of testing needs.

- 10. *What is the applicant's status in defining system and component suppliers (including fuel), manufacturing processes, and other major factors that could influence design decisions? Has the applicant established a schedule for identifying suppliers and key contractors? If so, please describe the schedule.***

RESPONSE: The reference fuel supplier is planned to be Babcock & Wilcox (B&W). The reference graphite supplier is planned to be SGL Group. Other component supplier candidates have been identified; supplier selections will be made during the conceptual design phase.

- 11. *What is the applicant's status in the development and implementation of a quality assurance program?***

RESPONSE: Design work will be performed under the AREVA Quality Assurance (QA) program. A project specific QA manual will be developed for the subsequent phases of the design. The owner/operator Quality Assurance Program will be developed prior to development of the licensing application.

- 12. *What is the applicant's status in the development of probabilistic risk assessment (PRA) models needed to support applications (e.g., needed for Chapter 19 of safety analysis reports or needed to support risk-informed licensing approaches)? What are the applicants' plans for using the PRA models in the development of the design? At what level will the PRA be prepared and when will it be submitted in the application process?***

RESPONSE: PRA will be central to the Risk-Informed Performance-Based design and licensing of the modular HTGR. A design phase PRA will be initiated during the conceptual design phase. This PRA will evolve as the design matures. Insights from the PRA will be factored into the design during the Preliminary Design phase, prior to completing the Safety Analysis Report (SAR) for the licensing application. The PRA will continue to be maintained as the detailed design is finalized, allowing risk insights to continue to guide the design process.

**13. What is the applicant's status in the development, construction, and use of a control room simulator?**

RESPONSE: Due to the early stage of the design, plans for a simulator have not been started and a schedule has not been established.

**14. What are the applicant's current staffing levels (e.g., full time equivalent staff) for the design and testing of the reactor design? Does the applicant have plans to increase staffing? If so, please describe future staffing plans.**

RESPONSE: The conceptual design staffing plans are being evaluated by the Alliance management executive committee. Staffing levels will vary significantly as appropriate for each stage of the conceptual, preliminary, and detailed design project. AREVA plans to take advantage of the experience of its French and German teams who have been involved in different HTGR development programs.

**15. What are the applicant's plans on the submittal of white papers or technical/topical reports related to the features of their design or the resolution of policy or technical issues? Has the applicant established a schedule for submitting such reports? If so, please describe the schedule.**

RESPONSE: The Alliance applicant will utilize topical and technical reports to obtain resolutions to specific technical or policy issues. At this early stage of the design, the topics and a schedule for submittal have not been prepared. The applicant will start from the whitepapers already developed by the DOE-INL NNGNP project.

**16. Will ESP applicants seek approval of either "proposed major features of the emergency plans" in accordance with 10 CFR 52.17(b)(2)(i), or "proposed complete and integrated emergency plans" in accordance with 10 CFR 52.17(b)(2)(ii)?**

RESPONSE: The decision for preparation of an ESP is pending the identification of the site for the initial plant location. Also, see response to Question #1.

**17. Describe possible interest in the use of the provisions in Subpart F, "Manufacturing Licenses," of 10 CFR 52 instead of, or in combination with, other licensing approaches (e.g., DC or DA).**

RESPONSE: At this time the Alliance does not have an interest in use of the provisions in Subpart F, "Manufacturing Licenses," of 10 CFR 52.

**18. Describe the desired scope of a possible ML and what design or licensing process would address the remainder of the proposed nuclear power plant. For example, would the ML address an essentially complete plant or would it be limited to the primary coolant system that basically comprises the integral reactor vessel and internals?**

RESPONSE: See response to Question #17.



**19. Describe the expected combination of manufacturing, fabrication, and site construction that results in a completed operational nuclear power plant. For example, what systems, structures, and components are being fabricated and delivered? Which of these are being assembled on site? Which of these are being constructed on site?**

RESPONSE: See response to Question #17.