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TOSHIBA CORPORATION

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U.S. Nuclear Regulatory Commission
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Subject: Toshiba Corporation (Toshiba) Response for the 4S Reactor (4S) to Regulatory Issue Summary (RIS) 2011-02

Reference: NRC Regulatory Issue Summary 2011-02, "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs", February 2, 2011.

The purpose of this letter is to provide the NRC with information on 4S project licensing submittals in response to RIS 2011-02. Toshiba responses to the NRC requests indicated in RIS 2011-02 are shown below.

1. Design and Licensing Submittal Information

NRC request 1.1: When (month and year) are applications planned for design-related applications and what NRC action will be requested (i.e., DC, DA, ML, or COL that does not reference a DC or DA)?

Toshiba response 1.1: Toshiba plans to submit the Design Approval Application (DAA) in the 3rd quarter of FY2012. Toshiba also plan to submit the Technical Reports listed in Table 1 prior to the DAA.

NRC request 1.2: 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 RAIs with generic applicability to a design center?

Toshiba response 1.2: We are not currently using a DCWG approach. Toshiba will consider the value of a DCWG approach after several customers have committed to 4S.

NRC request 1.3: Which applicant that references the design will be designated as the reference COL applicant or, alternatively, how will various applications (e.g., CP, DC, COL) be coordinated to achieve the desired design-centered licensing review approach?

Toshiba response 1.3: Toshiba is not currently projecting a date for submission of a COL to complement our DAA. Toshiba will consider how multiple applications will be coordinated after several customers have committed to 4S.

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NRC request 1.4: 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?

Toshiba response 1.4: Toshiba is not currently projecting a date for submission of a COL or ESP to complement our DAA.

NRC request 1.5: 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.

Toshiba response 1.5: The partners and their roles in the preparation of 4S DAA are indicated below.

Central Research Institute of Electric Power Industry (CRIEPI) - Technology research support

Westinghouse Electric Company, LLC - Licensing lead

Argonne National Laboratory (ANL) - Technology support on metallic fuel

The Cameron Group - Consultant

2. Design, Testing, and Application Preparation

NRC request 2.1: 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.

Toshiba response 2.1: The 4S design is in the finalizing phase. Toshiba plans to substantially complete the design prior to submittal of the DAA.

NRC request 2.2: 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.

Toshiba response 2.2: Toshiba submitted the technical report on the 4S fuel pin design (ADAMS ML082050556) to the NRC in June, 2008. Toshiba has also demonstrated the electro-magnetic pump (EM pump) performance at Toshiba's Sodium Loop Test Facility using the 4S full-scale EM pump in 2010. Furthermore, Toshiba has established the base technology of manufacturing and inspection on the double-wall-tube steam generator. The qualification of some other major systems and components are in progress. Toshiba would like to discuss these matters with the NRC in greater detail prior to submittal of the DAA as part of the ongoing pre-application review of the 4S design.

NRC request 2.3: 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.

Toshiba response 2.3 : Toshiba has developed codes and models to perform design and licensing analyses to support the 4S design. The validation and verification (V&V) of the plant dynamics analysis code for licensing is in progress using Toshiba's sodium component test facility. Regarding the licensing framework, Toshiba has defined a set of principal design criteria (PDC) and the licensing basis events for 4S. However, the general design criteria (GDC) standard for liquid metal-cooled reactors has not yet been established. Therefore, Toshiba is participating in the ANS 54.1 Standards Committee on "Nuclear Safety Criteria and Design Process for Liquid-Metal-Cooled Nuclear Power Plants" to establish the appropriate GDC and process for safety analysis evaluation in cooperation with other industry interested parties. The ANS committee projects completion of the standard by 2012. Toshiba will continue to perform the design and the safety analysis for 4S in parallel with the above activities. The design and licensing analyses will be completed before submittal of the DAA in FY2012.

NRC request 2.4: What is the applicant's status in designing, constructing, and using thermal-fluidic testing facilities and using such tests to validate computer models? Has the applicant established a schedule for construction of test 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.

Toshiba response 2.4: Toshiba has constructed a sodium test loop in our Yokohama engineering facility. The validation of the thermal hydraulic computer code used in the 4S safety analyses is in progress using a 1/3 scale reactor internals mock-up test facility with water. The thermal-fluidic testing will be completed before submittal of the DAA in FY2012. In addition, Toshiba also plans to perform a mock-up test with sodium. These activities are ongoing; the completion date has not been established.

NRC request 2.5: What is the applicant's status in defining system and component suppliers (including fuel), manufacturing processes, and other major factors that can influence design decisions? Has the applicant established a schedule for identifying suppliers and key contractors? If so, please describe the schedule.

Toshiba response 2.5: Toshiba intends to fabricate the major plant components in Toshiba's Keihin Works and at other vendor locations. Regarding the 4S fuel supply, Toshiba will be establishing a manufacturing and supply framework based on the technology and support of ANL and the Idaho National Laboratory. The schedule for these activities has not been established.

NRC request 2.6: What is the applicant's status in the development and implementation of a quality assurance program?

Toshiba response 2.6: The Nuclear Energy Systems and Services Division in Toshiba has an ASME N Certificate, an ISO9001 Certificate and utilizes Toshiba's Quality Assurance (QA) Program. The USNRC inspected Toshiba's Isogo Nuclear Engineering Center which is the core of Toshiba nuclear engineering in Japan, to assess if Toshiba is capable of providing the certified ABWR for South Texas Project. As the result, Toshiba's qualification has been confirmed by the USNRC. The 4S project is being conducted in compliance with the QA Program.

NRC request 2.7: What is the applicant's status in the development of probabilistic risk assessment 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 probabilistic risk assessment models in the development of the design?

Toshiba response 2.7: Toshiba performed the preliminary probabilistic risk assessment for chapter 19. We are now revising the PRA report for chapter 19. Our design is based on deterministic methods and we are using the PRA as a supplement.

NRC request 2.8: What is the applicant's status in the development, construction, and use of a control room simulator?

Toshiba response 2.8: The Instrumentation and control design of the 4S is underway. Activities for the development, construction, and use of a control room simulator have not commenced. The schedule for these activities has not been established.

NRC request 2.9: 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, and if so, please describe future staffing plans.

Toshiba response 2.9: The number of staff equivalents currently working on the design and testing of the reactor is around fifty. When a purchase commitment is forthcoming, staffing will be increased.

NRC request 2.10: What are the applicant's current and future plans for the use of contractors to support plant design and testing (e.g., how many part-time and how many full-time contractors does or will the applicant employ)?

Toshiba response 2.10: Toshiba is currently making only minor use of contractor firms and personnel on the 4S project. Toshiba will maintain the current resources levels such as the number of staff and

support contractors for the time being. When a purchase commitment is forthcoming, staffing will be increased.

3. White papers and technical/topical reports

NRC request 3.1: 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.

Toshiba response 3.1: Toshiba plans to submit additional 4S Technical Reports to the NRC as indicated in the following Table 1. Toshiba would like to discuss these matters with the NRC in greater detail prior to submittal of the DAA as part of the ongoing pre-application review of the 4S design.

NRC request 3.2: For ESP applicants, will the applicant seek approval of either "proposed major features of the emergency plans" per 10 CFR 52.17(b)(2)(i), or "proposed complete and integrated emergency plans" per 10 CFR 52.17(b)(2)(ii)?

Toshiba response 3.2: Toshiba is not currently projecting any information regarding an ESP to complement our DAA.

4. Manufacturing Licenses

NRC request 4.1: Describe possible interest in the use of the provisions in Subpart F, "Manufacturing Licenses," of 10 CFR Part 52 instead of, or in combination with, other licensing approaches (e.g., DC or DA).

Toshiba response 4.1: Toshiba does not anticipate utilizing a Manufacturing License approach at this time.

NRC request 4.2: 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; and which are being constructed on site?

Toshiba response 4.2: The 4S reactor plant will be factory-assembled in transportable modules and shipped to the plant site. These modules will consist of appropriate combinations of the Reactor Building seismically supported internal structure and plant systems and components. For example, one large module will consist of part of the seismically supported internal Reactor Building structure, along with the Steam Generator and portions of the intermediate sodium loop, along with other systems and components. The outer shell of the Reactor Building will be fabricated on site using conventional techniques.

NRC request 4.3: Describe the desired scope of a possible manufacturing license and what design or licensing process would address the remainder of the proposed nuclear power plant. For example, would the manufacturing license address an essentially complete plant or would it be limited to the primary coolant system basically consisting of the integral reactor vessel and internals?

Toshiba response 4.3: Toshiba does not anticipate utilizing a Manufacturing License approach at this time.

If you have any questions regarding this matter, please contact Mr. Tony Grenci of Westinghouse at (623) 271-9992, or grencit@westinghouse.com.

Very truly yours,

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Table 1 Schedule for 4S Technical Reports Submittal

Reports	FY 2010	FY 2011		FY 2012	
	Latter Half	Former Half	Latter Half	Former Half	Latter Half
1. Criteria and Regulatory					
Response to 73 FR60612 and SECY-10-0034	●				
Emergency Planning		○			
2. Design & Safety Evaluation					
Aircraft Hazard			○		
I&C			○		
Safety Design				○	
Prevention of Severe Accidents				○	
3. Verification and Validation					
Core Design Analysis		○			
Plant Dynamics Analysis Code				○	
4. Further Investigation					
PIRT I. (Design Basis Accident)	●				
PIRT II. (Beyond Design Base Accident)			○		

●: Submitted

○: Plan