Exhibit STP-0016

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	Docket Nos. 52-012 COL
	)	52-013 COL
NUCLEAR INNOVATION NORTH AMERICA LLC	)	
	)	
(South Texas Project Units 3 and 4)	)	December 3, 2015

NINA'S RESPONSES TO
<u>POST-HEARING QUESTIONS</u>

In response to the Commission's Order dated November 30, 2015, Nuclear Innovative North America LLC (NINA) provides the following responses to the Commission's post-hearing questions.

<u>Question 1</u>:

In FSAR Tier 2, Section 5.3.1.6.5, NINA includes the following STD DEP Vendor departure for alternative dosimetry testing that is based on the equivalent departure identified in the ABWR DCD, as administratively amended by the applicant: "*A separate neutron dosimeter* is provided *so that fluence measurements may be made at the vessel ID during the first fuel cycle to verify the predicted fluence at an early date in plant operation. This measurement is made over this short period to avoid saturation of the dosimeters now available. Once the fluence-to-thermal power output is verified, no further dosimetry is considered necessary because of the linear relationship between fluence and power output. It will be possible, however, to install a new dosimeter, if required, during succeeding fuel cycles.*"

Does the referenced departure mean that either: (a) NINA will not be performing any further dosimetry testing of external dosimeter locations once the initial round of external dosimetry testing is completed, or (b) that NINA will not be performing any further dosimetry testing of both external and internal dosimeter specimens once the initial round of external dosimetry testing is completed?

<u>NINA's Response</u>:

The referenced departure (STD DEP Vendor) to Section 5.3.1.6.5 of the DCD administratively removed the reference to GE from the section. No other changes were made to this section.

Neutron dosimetry is placed in each surveillance capsule as required by ASTM E 185-82, Section 7.3.2. Additionally, a separate neutron dosimeter is installed adjacent to the holder for capsules 1 and 2 so that fluence measurements may be made at the vessel ID during the first fuel cycle to verify the predicted fluence at an early date in plant operation. There is no neutron dosimetry installed external to the reactor pressure vessel.

DCD Section 5.3.1.6.5 stipulates that neutron dosimetry be provided to measure fluence at the vessel ID during the first fuel cycle. Once fluence-to-thermal power output has been verified (after first fuel cycle), no additional dosimetry will be necessary because of the linear relationship between fluence and power output.

NINA does not plan to perform additional dosimetry testing after fluence-to-thermal power output has been verified.

<u>Question 2</u>:

FSAR Sections 5.3.1.6.1 and 5.3.4.2 discuss the reactor vessel material surveillance program capsule withdrawal schedule. At the hearing, NINA stated that its plan is to withdraw four capsules during the initial 40-year licensing period, and its withdrawal schedule is intended to be consistent with ASTM E185. Tr. at 178-79.

The following table shows the expected times of withdrawal for capsules under the ASTM E 185 schedule for a four-capsule program and the FSAR schedule.

	ASTM E 185 Table 1	**FSAR Sec. 5.3.1.6.1**
1st Capsule	No later than 3 effective full power years (EFPY)	After 6 EFPY
2nd Capsule	No later than 6 EFPY	After 20 EFPY

3rd Capsule	No later than 15 EFPY	With an exposure not to exceed peak end-of-life fluence
4th Capsule	When capsule achieves a neutron fluence not less than once or greater than twice the peak end-of-life fluence	Determined based on results of first two capsules

The FSAR schedule does not appear to match the withdrawal schedule in Table 1 of ASTM E 185-82. Please explain which schedule applies to STP and why.

<u>NINA's Response</u>:

The FSAR withdrawal schedule, which incorporates the schedule described in DCD section 5.3.1.6.1, applies to STP 3&4. This schedule is consistent with the withdrawal schedule shown in the first column in Table 1 of ASTM E185-82, except that 4 capsules are used, instead of the minimum required 3 capsules. [Note that on page 5.3-6, DCD section 5.3.1.6.1 states that the adjusted reference nil ductility temperature at end-of-life (EOL) is less than 38^{o}C. Hence, the first column in Table 1 of ASTM E185-82 is applicable.] The reason 4 capsules are used instead of 3 is that the design life for the ABWR vessel is 60 years. Accordingly, the number of materials surveillance capsules was increased to 4 to account for the 20-year increase in the expected life of the vessel. This subject is discussed in more detail in the final safety evaluation report for the ABWR, NUREG-1503, page 5-16 as summarized below.

> On the basis of a 40-year design life, ASTM E-185-82 recommends that three materials surveillance capsules be installed in the reactor vessel beltline. However, in the DFSER, the staff noted that for the ABWR, the design life is expected to be increased to 60 years. Accordingly, GE needed to reassess the number of materials surveillance capsules to be provided to account for the additional 20-year increase in the expected life of the vessel.
>
> Specifically, GE committed to provide four surveillance capsules instead of the three previously proposed capsules.

As stated in DCD section 5.3.1.6.1, the withdrawal schedule for STP 3&4 is extrapolated from ASTM E-185 and is as follows:

First Capsule: After 6 EFPY,
Second Capsule: After 20 EFPY,
Third Capsule: With an exposure not to exceed the peak EOL fluence, and
Fourth Capsule: Schedule determined on results of first two capsules.

The DCD withdrawal schedule is based on a 60-year reactor vessel life. Capsules 1 and 2 will be withdrawn within the 40-year licensing period. Capsule 3, the EOL capsule, will not be withdrawn until late in the 60-year life of the vessel. Capsule 4 may or may not be withdrawn within the 40-year license period depending on the results of the first two capsules.

NINA would like to clarify its response to the hearing question which asked whether three or four capsules would be withdrawn during the initial 40-year licensing period (Tr. 178-179). Each reactor vessel will have four capsules. However, as discussed above, not all of those capsules will necessarily be withdrawn during the initial 40-year period.

The material in FSAR 5.3.4, COL License Information, provides the site-specific information on the materials and surveillance program for STP 3&4.

Question 3:

In Pre-hearing Question 38, the Commission asked whether there is an ITAAC to verify that the as-built Engineered Safety Features Logic and Control System (ELCS) meets the 70 percent central processing unit (CPU) load restriction. NINA's response indicates that there is no specific ITAAC to verify that the 70% CPU load restriction is met for the as-built ELCS. Although NINA points to several ITAACs within the application that verify the overall system requirements are met for the ELCS, no specific maximum CPU loading testing or analysis requirements are identified in these ITAACs. The AP1000 design certification, which also uses the Common Q platform, includes a specific ITAAC to verify that the maximum CPU loading requirements are met in the as-built safety system (ITAAC Item 11.d in AP1000 FSAR, Tier 1, Table 2.5.2-8).

If COLs are issued, would it be appropriate to include the following acceptance criterion for ITAAC 3.4.8b(7) to verify that the as-built ELCS meets the 70 percent CPU load restriction?

"Response time test performed under maximum CPU loading to demonstrate that the safety system can fulfill its response time criteria."

<u>NINA's Response</u>:

No. ITAAC 3.4.8.b requires software safety analyses to be conducted for safety-related software applications. Specifically ITAAC 3.4.8.b(1) states:

> (1) Identify software requirements having safety-related implications.

NRC-approved WCAP-16097-P-A, "Common Qualified Platform Topical Report", specifies that the 70 percent CPU load restriction is a design input requirement. As such, it will be identified during implementation of ITAAC 3.4.8.b(1) as a software requirement having safety-related implications.

Furthermore ITAAC 3.4.8.b(7) requires the Software Management Plan to include provisions to:

> (7) Perform equipment integration and validation testing that demonstrate that safety-related functions identified in the design input requirements are operational.

As such, the Software Management Plan will require that the 70% CPU load restriction be tested and demonstrated in ITAAC 3.4.8.b. ITAAC 3.4.8 is contained in the DCD for the ABWR, and NINA has not taken any departures from that ITAAC. Additionally, ITAAC 2.7.5.2 requires tests of the Essential Communication Functions to verify that they use deterministic communication protocols. For Common Q to maintain determinism in communications protocols, the processor load must remain <70% per WCAP-16097-P-A.

WCAP-16097-P-A contains many requirements, including the 70 percent CPU load restriction. All of these requirements must be satisfied. It is unnecessary and would be inappropriate to single out any one requirement from WCAP-16097-P-A, such as CPU loading, and place it in a specific ITAAC.

CERTIFICATE OF WITNESS

I certify that NINA's responses to the Commission's post-hearing questions were prepared by me or under my direction; that the responses are true and correct to the best of my information, knowledge and belief; and that I adopt these responses as part of my sworn testimony in this proceeding.

Executed in Accord with 10 CFR § 2.304(d)

/s/ Scott M. Head
Scott M. Head

DECLARATION OF WITNESS

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 3, 2015.

Executed in Accord with 10 CFR § 2.304(d)

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Respectfully submitted,

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Counsel for Nuclear Innovation North America LLC

Dated in Washington, D.C.
this 3rd day of December 2015

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CERTIFICATE OF SERVICE

I hereby certify that on this date a copy of the "NINA's Responses to Post-Hearing Questions" was submitted through the NRC's E-filing system.

Signed (electronically) by Steven P. Frantz
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