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2013 December 5

Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, ON., K1P5S9

Attention: Aurele Gervais, Media and Community Relations

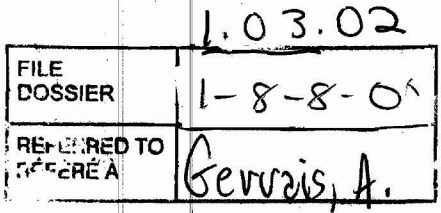
Subject: CNSC draft REGDOC-2.3.1 "Commissioning of Reactor Facilities"

With reference to your announcement dated November 6, 2013, my comments on the subject document are attached with this letter for your information and action as required.

Yours truly,

Dr. Sardar Alikhan

Attachment



ATTACHMENT TO LETTER DATED DECEMBER 5, 2013
by Dr. Sardar Alikhan, Alikhan Consulting Inc.

SECTION	COMMENT	RECOMMENDED ACTION
1.2 Scope	In the first paragraph, commissioning of refurbished reactor facilities is mentioned in passing. Given the current and future emphasis on refurbishing existing reactor facilities, the scope of this document should address both new and refurbished units with necessary guidance included in Section 2, "Commissioning Program".	See comment below.
2. Commissioning Program	The full scope of the commissioning program should include the physical plant, the procedures, people, and the applicable management system. Specific guidance on the scope of the commissioning program should include new and refurbished plants along with caveats for practicality considerations.	See Section 5.2 of Ref. 1 (copy attached) for specific guidance. Also add another bullet to the list: • Ensures that applicable management system is duly assessed, approved and issued to perform commissioning and operating funcions.
5. Test Phases and Regulatory Hold Points	Written request to the CNSC for approval to proceed beyond a regulatory hold point should also include a formal statement about the integrated management system.	Add a bullet: • The integrated management system (processes, procedures and practices) has been duly assessed, approved and issued to cover subsequent phase(s) of commissioning and operation.
Appendix D: Recommended Tests for Phase D	Why dynamic tests such as full load rejection and reactor trip tests not specifically mentioned? This is considered necessary to validate analytical tools and to confirm design-expected response of the plant, procedures and staff.	See Section 5.2, paragraph 2 of Ref 1 (Appendix A here) for further guidance.

Ref. 1, "Commissioning Guide for New and Refurbished CANDU Nuclear Power Plants" CNSC Document Doc#3446802, Dr. Sardar Alikhan, June 22, 2010.

Appendix A
Extract from Reference 1, "Commissioning Guide for New and Refurbished CANDU Nuclear Power Plants" CNSC Document Doc#3446802, by Dr. Sardar Alikhan, June 22, 2010.

"5.2 Scope of the Commissioning Program

The commissioning program should be sufficiently comprehensive to establish that the plant can operate safely in all operating states for which it has been designed. It should include all applicable checks and tests that can be performed to the maximum extent practicable on each SSC and the integrated plant to demonstrate that it meets, or can meet, the design requirements. In addition, the commissioning program should include the validation of the operating procedures to cover all operating states, completion of the required staff training, and satisfactory assessment of the management system in order to confirm that all the elements of the commissioning program stated in Section 5.1 have been duly completed.

As stated in RD-337 [6], all plant systems should be designed such that, to the greatest extent practicable, tests of the equipment can be performed to confirm that the design requirements have been achieved. This includes such dynamic tests as loss of power, load rejection, reactor trip, turbine trip, loss of computer control. However, some tests are clearly not practicable because of their unacceptable impact on the plant, such as ECC injection into hot HTS following a LOCA, dousing operation following a LOCA or steam main break. In such cases, the design should make alternate provisions to perform partial in-situ tests and/or equipment qualification tests to demonstrate that the SSC can meet the design intent [12], as discussed in Section 5.2.3 below.

For identical units in a multi-unit nuclear power plant and or series of identical plants, it may be acceptable to treat some tests conducted on the lead unit as type tests and therefore not necessarily repeated on the lag unit. The plant management should ensure that such an approach is duly justified with no adverse impact on plant safety and that it is taken only with the prior CNSC approval [5, 12].

5.2.1 New-build Plant

The scope of commissioning for a new-build plant should cover all the SSCs and the integrated plant as stated above, including any interfaces with existing operating facilities on the site.

5.2.2 Refurbished Plant

The commissioning program for a refurbished plant should address the impact of the design modifications (both hardware and software), as well as the work done on the SSCs that were dismantled or laid-up during the extended outage. Once these SSCs are

satisfactorily checked and tested for readiness to load fuel, the commissioning program from fuel load to full power should be similar if not identical to a new-build plant. This assertion is based on the premise that the baseline steady state and dynamic performance of the refurbished plant would be significantly affected due the extensive nature of design modifications performed on such major SSCs as: reactor core, steam generators, control computers and associated software, electrical supply and distribution systems, shutdown systems, turbine generator.

To assist in developing the applicable commissioning program, the licensee should categorize the SSCs as defined below to reflect their status and the scope of work performed:

1) *Category A: Systems that remained in normal operation with continued health monitoring and routine maintenance program activities. Temporary changes may have been implemented on some of these systems in order to enable them to provide necessary service throughout the outage. No formal commissioning should be required to return these systems to normal service. However any temporary changes should be carefully removed and normal operation restored in accordance with the operating procedures.*
2) *Category B: Systems that are shut down and placed in a laid-up state. This includes systems that may have been disconnected or dismantled in order to provide proper access to perform work during the refurbishment outage. Depending on the nature of work involved, some commissioning work should be required to confirm that the system has been reinstalled correctly and performs in accordance with the design specifications.*
3) *Category C: New systems installed or existing systems in which portions of systems or components have been modified. Commissioning will be required to confirm that the modified system and the integrated plant perform in accordance with the design specifications.*

5.2.3 Practicability Considerations

Reference [5] provides that test should not be conducted and operating modes or plant configurations should not be established if they have not been analyzed, if they fall outside the range of assumptions made in the safety analysis, or if they might damage the plant or jeopardize safety. Reference [12] also provides guidance where full in-situ system or integrated plant test is not practicable. In such cases the designer should provide alternate means to demonstrate that the design intent can be met. A few examples are citied below to illustrate the point:

1) *Automatic actuation of the emergency core cooling system following a high energy break inside containment (LOCA or a steam main break) which injects cold light water into a hot heavy water filled heat transport system. Alternate partial testing could include:*

a) *Test firing of ECC at design pressure with HTS valves closed to confirm robustness of piping system against any dynamic loads such as water hammer;*
b) *Overlapping logic testing without firing ECC into HTS to test for operability;*
c) *Environmental qualification of essential equipment important to safety to confirm survivability;*
d) *Simulation codes to predict system performance validated by representative experimental results to confirm capability.*

2) *Automatic actuation of the dousing system in a CANDU 6 plant which creates a deluge of water to limit the pressure rise following a high energy break inside containment and in so doing floods the reactor building. Alternate partial testing would include:*
   a) *Simulation codes validated by experimental results using representative dousing header configuration to confirm capability;*
   b) *Environmental qualification of essential equipment important to safety to confirm survivability;*
   c) *Overlapping logic tests without firing dousing system.*
3) *Placing shutdown cooling system in service at nominal HTS zero power hot condition, or crash cooling of the steam generators (and the HTS), on loss of feed water that can impose emergency stress levels on process equipment. As long as the transient does not subject the equipment to a "faulted" condition (ASME level D stress), it should be possible to perform such an important "first of a kind" safety significant in-situ test under controlled conditions, subject to prior CNSC approval. The test results should be used to validate the thermal hydraulics simulation codes and treated as a type test for units of identical design. "*