Rolls-Royce

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TABLE DES MATIERES

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1. Background

SPINLINE 3 is the third-generation digital safety instrumentation and control (I&C) platform originally developed by Rolls-Royce Civil Nuclear SAS (RRCN SAS) in accordance with European nuclear safety standards for such systems. The development of the ***SPINLINE 3*** generic digital safety I&C platform is described in the ***SPINLINE 3*** Licensing Topical Report (LTR, Reference 1), Sections 2.2, 6.1, 6.2 and 6.3.

In the ***SPINLINE 3*** LTR, Section 1.1, RRCN SAS describes the basic U.S. licensing strategy to demonstrate that the generic ***SPINLINE 3*** digital safety I&C platform and the associated quality and software life cycle processes comply with U.S. nuclear safety requirements. The basic elements of this strategy are:

- Dedicate the generic ***SPINLINE 3*** digital safety I&C platform using the process defined in EPRI TR-106439 (Reference 7) and approved by the NRC (Reference 12). The technical basis for dedication is documented in a Design Analysis Report (DAR, Reference 6).

- Qualify ***SPINLINE 3*** hardware to meet U.S. standards. The ***SPINLINE 3*** hardware will be qualified and maintained under the RRCN SAS 10 CFR 50 Appendix B (Reference 2) quality program. If new boards are developed or existing boards modified for obsolescence or other reasons, the new or modified hardware will be appropriately tested and/or analyzed to maintain equipment qualification to U.S. standards.

- Develop plant-specific application software in accordance with software life cycle plans that are compliant with NRC Branch Technical Position (BTP) 7-14 (Reference 3).

- The non-Class 1E set of software tools, which are used as design aids and not as a replacement for verification and validation (V&V), are not dedicated but continue to be subject to a configuration management program.

As described in LTR Chapter 6, the generic ***SPINLINE 3*** platform software and the plant-specific application software produced by the software tools are subject to comprehensive verification and validation (V&V) in accordance with V&V Plans identified in the LTR.

2. Objective

This Dedication Plan defines the process employed by RRCN SAS to dedicate the generic ***SPINLINE 3*** digital safety I&C platform and accept that hardware and software into the RRCN SAS 10CFR50 Appendix B (Reference 2) quality program. This dedication process is based on the guidance in EPRI TR-107330 (Reference 4) and EPRI TR-106439 (Reference 7).

3. Definition of the Generic *SPINLINE 3* Digital Safety I&C Platform

The generic ***SPINLINE 3*** platform software is comprised of the following:

- The standardized, Class 1E configurable Operational System Software (OSS),
- The Class 1E application-oriented library of re-usable software components,
- The Class 1E software embedded in the NERVIA+ communications board,
- The Class 1E software embedded in the ICTO pulse input board.

The generic ***SPINLINE 3*** platform hardware is comprised of the following:

- Chassis
- Power Supply Modules
- Digital Processing Modules
- Communication Modules
- Signal Input Modules

- Signal Output Modules
- Signal Conditioning Modules
- Terminal Blocks
- Cable and Wire Sets
- Fan Cooling Hardware
- Power Distribution Hardware

The generic ***SPINLINE 3*** platform software and hardware are further defined in the LTR (Reference 1).

4. Compliance with Dedication Guidance

The primary sources of guidance related to dedicating a digital safety I&C platform are EPRI TR-107330 (Reference 4), EPRI TR-106439 (Reference 7) and EPRI TR-10111710 (Reference 9). Implementing this guidance for dedication of the generic ***SPINLINE 3*** digital safety I&C platform is described below.

4.1. EPRI TR-107330 Guidance

The ***SPINLINE 3*** platform software will be treated as the "legacy software" described in Section 7.6 of EPRI TR-107330. Compensatory measures for legacy software are identified in EPRI TR-106439 (see 4.3, below).

4.2. EPRI TR-1011710 Guidance

The generic ***SPINLINE 3*** digital safety I&C platform and associated software life cycle processes were subject to a Critical Design Review (CDR) following the process defined in EPRI TR-1011710 (Reference 9). The results of the CDR are reported in the DAR (Reference 6). A primary conclusion reported in the DAR was that, "…… there is more than sufficient evidence of design integrity, system integrity, and high quality development processes" for the ***SPINLINE 3*** digital safety I&C platform. The CDR / DAR results support the RRCN SAS decision to dedicate the generic ***SPINLINE 3*** digital safety I&C platform

4.3. EPRI TR-106439 Guidance

The dedication process defined in EPRI TR-106439 was implemented for the generic ***SPINLINE 3*** digital safety I&C platform. Compliance with the EPRI TR-106439 process is demonstrated using the checklist in Appendix A, which provides a mapping that shows where the elements of the dedication process are addressed in ***SPINLINE 3*** licensing documentation.

5. Dedication Plan

As described in the LTR (Reference 1), Section 6.1, the ***SPINLINE 3*** digital safety I&C platform originally was developed to meet European nuclear safety standards. The platform software originally was developed under the life cycle process defined and used for the previous generation digital safety I&C system for the French N4 1400 megawatt (MW) pressurized water reactor (PWR) nuclear power plants (NPPs). This life cycle process explicitly addresses the development of software for safety-related systems in NPPs. This process originally was established based on the guidance of the International Electrotechnical Commission (IEC) Standard 880-1986 (Reference 8), with enhancements to take into account the advances in software engineering as reflected in later revisions of that standard.

As described in the LTR, the ***SPINLINE 3*** platform hardware originally was developed under an ISO-9001 QA program.

Despite some shortcomings in documentation, as described in the DAR (Reference 6), the ***SPINLINE 3*** digital safety I&C platform has demonstrated its high quality and reliability through extensive use in operating NPPs. The ***SPINLINE 3*** installed base and reactor-years of operation are listed in LTR Section 2.3.

Following on the recommendations in DAR Section 6.3, this Dedication Plan defines the processes used by RRCN SAS to generate the appropriate dedication documents under the current 10 CFR 50 Appendix B quality assurance program, with appropriate preparer, reviewer, and approver signatures. These documents will affirm that the generic ***SPINLINE 3*** digital safety I&C platform has been accepted into the RRCN SAS 10 CFR 50 Appendix B program.

All future modifications to the ***SPINLINE 3*** platform will continue to be maintained under the existing life cycle processes and a dedication update will be performed on future modifications to the platform.

The RRCN SAS process for dedication is defined in quality procedure 8 307 288 (Reference 10), which requires the following:

- Writing a Dedication Plan that includes a detailed checklist with the acceptance activities to be performed to demonstrate compliance with EPRI TR-106439.
- Performing these activities and completing the checklist according to the approved Plan.
- Reporting the results in a Dedication Report.

This Plan implements quality procedure 8 307 288 specifically for dedicating the generic ***SPINLINE 3*** digital safety I&C platform. The checklist in Table A-1 identifies: (1) the actions already completed in various ***SPINLINE 3*** licensing documents, and (2) the additional actions that need to be taken by RRCN SAS QA to complete the dedication of the ***SPINLINE 3*** platform.

Completion of dedication and acceptance of the ***SPINLINE 3*** platform will be documented in a Dedication Report (Reference 11), which will contain the completed Table A-1 checklist and supporting information. This report will be the evidence that the quality procedure 8 307 288 has been completed and the generic ***SPINLINE 3*** digital safety I&C platform has been accepted into the RRCN SAS 10 CFR 50 Appendix B program.

6. Dedication Schedule

This Plan	3 010 794 A	8 January 2010
SPINLINE 3 Platform Dedication Report	3 010 795 A	31 July 2010

7. References

1. *"**SPINLINE 3** Licensing Topical Report (LTR)," Document No. 3 008 503B, Rolls-Royce Civil Nuclear SAS, July 2009
2. 10 CFR 50 Appendix B, "Quality Assurances Requirements for Nuclear Power Plants and Fuel Reprocessing Plants"
3. NUREG-0800, Chapter 7, NRC Branch Technical Position 7-14, Rev, 5, "Guidance on Software Reviews for Digital Computer Based Instrumentation and Control Systems," US Nuclear Regulatory Commission, March 2007
4. EPRI TR-107330, "Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants," Electric Power Research Institute, December 1996
5. USNRC Letter dated July 30, 1998 to Mr. J. Naser (EPRI), "Safety Evaluation by the Office of Nuclear Reactor Regulation Electric Power Research Institute (EPRI) Topical Report, TR-107330, Final Report, "Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants."
6. "***SPINLINE 3*** Design Analysis Report," Document No. MPR-3337, MPR Associates, Inc., June 2009
7. EPRI TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications, Electric Power Research Institute, October 1996
8. IEC 880-1986, "Software for Computers in the Safety Systems of Nuclear Power Stations," International Electrotechnical Commission
9. EPRI Technical Report 1011710, "Handbook for Evaluating Critical Digital Equipment and Systems," Electric Power Research Institute, November 2005
10. QA Procedure for Dedication, 8 307 288 A, RRCN SAS, December 2009
11. "***SPINLINE 3*** Platform Dedication Report," 3 010 795 A, RRCN SAS, 31 July 2010
12. USNRC Letter dated July 17, 1997 to Mr. Raymond C. Torok (EPRI), "Review of EPRI Topical Report TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications (TAC No. M94127)"

8. Appendix A. Compliance with the Dedication Process Defined in EPRI TR-106439

Correspondence between the dedication process employed for the generic ***SPINLINE 3*** digital safety I&C platform and the process defined in EPRI TR-106439 is documented in Table A-1, which will be used as a checklist for RRCN SAS dedication activities. Completion of this checklist confirms that the generic ***SPINLINE 3*** digital safety I&C platform has been accepted into the RRCN SAS 10 CFR 50 Appendix B program.

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