



**Rolls-Royce**

# ***SPINLINE 3* generic licensing submittal overview**

7 January 2010  
Non-proprietary

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# Points of discussion

- Scope of generic licensing submittal
- Definition of the generic **SPINLINE 3** digital safety I&C platform
- **SPINLINE 3** licensing strategy
- **SPINLINE 3** delivery strategy for U.S. customers
- Licensing review schedule assumption
- Documentation being submitted for NRC
- LTR links to other submitted documents

# Scope of generic licensing submittal

- Rolls-Royce Civil Nuclear SAS is seeking U.S. Nuclear Regulatory Commission (NRC) generic approval for use of the **SPINLINE 3** digital safety instrumentation and control platform in nuclear safety I&C systems in any U.S. commercial nuclear power plant, research reactor, or nuclear fuel cycle facility.
- This generic licensing submittal addresses:
  - The RRCN quality management system
  - **SPINLINE 3** platform hardware design, dedication, qualification, and analysis
  - **SPINLINE 3** platform software design, software life cycle processes, and dedication
  - **SPINLINE 3** application software life cycle processes for developing future plant-specific applications

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# Definition of the generic *SPINLINE 3* digital safety I&C platform

- The generic platform software is comprised of:
  - The standardized, Class 1E configurable Operational System Software (OSS)
  - The Class 1E application-oriented library of re-usable software components
  - The Class 1E embedded software on certain ***SPINLINE 3*** boards:
    - NERVIA+ communications board,
    - ICTO pulse input board
- The generic platform hardware is comprised of:
  - Chassis
  - Signal conditioning modules
  - Signal input modules
  - Digital processing modules
  - Signal output modules
  - Communication modules
  - Terminal blocks
  - Power supply modules
  - Power distribution hardware
  - Fan cooling hardware
  - Cable and wire sets

# ***SPINLINE 3*** licensing strategy

- Dedicate the generic ***SPINLINE 3*** digital safety I&C platform, which was not originally developed under a 10 CFR 50 Appendix B QA program.
  - Use the dedication process defined in EPRI TR-106439 and approved by the NRC.
  - The suitability of ***SPINLINE 3*** for dedication is documented in a Design Analysis Report (DAR).
  - Platform is managed under a 10 CFR 50 Appendix B quality program after dedication.
- Qualify ***SPINLINE 3*** hardware to meet U.S. standards.
  - Qualification Test Specimen developed under a 10 CFR 50 Appendix B quality program.
- New plant-specific application software will be developed in accordance with software life cycle plans that are compliant with NRC Branch Technical Position (BTP) 7-14.
- 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.

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# ***SPINLINE 3* system delivery strategy for U.S. customers**

- Rolls-Royce Civil Nuclear SAS is the supplier and dedicator / qualifier of ***SPINLINE 3*** hardware and software and a supplier of integrated ***SPINLINE 3*** systems.
- Data Systems & Solutions LLC (DS&S), doing business as (dba) Rolls-Royce Civil Nuclear in the U.S., will be the customer-facing business entity for delivery of ***SPINLINE 3*** systems to U.S. customers.
  - Rolls-Royce Civil Nuclear SAS was qualified as a supplier under this DS&S QA program, which complies with 10 CFR 50 Appendix B.

# Licensing review schedule assumptions

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- Generic licensing process starts in Q1 2010, with a nominal 24 month NRC review cycle.
- NRC acceptance review completed in about two months.
- RRCN submits final new licensing documents to NRC no later than one year prior to the planned end of the review cycle (i.e., in Q1 2011).
- NRC completes their review and issues a generic Safety Evaluation Report (SER) in Q1 2012.

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# Documentation being submitted

- NRC I&C Branch provided RRCN with a draft of Interim Staff Guide DI&C ISG-06, “Licensing Process” (circa March 2009).
  - This will be a Tier 3 review: Totally new system, extensive review effort expected, with thorough review of all technical areas.
  - Note that ISG-06 is intended for a plant-specific license amendment request (LAR) for an actual system.
  - Some interpretation is needed to identify the subset of documentation that applies to a generic licensing review of a digital safety I&C platform.
- Other important NRC references include:
  - Branch Technical Position 7-14 regarding software life cycle processes and associated documentation.
  - Regulatory Guides 1.152 and 5.71 regarding cyber security process and associated documentation.
- The substantial body of **SPINLINE 3** documentation already submitted by RRCN is intended to meet draft ISG-06 expectations for “documents expected upon application”.
- RRCN will meet ISG-06 expectations for “Documents Expected Within 12 Months of Requested Approval” and “Documents to be Available for Audit”.



# Overview of documents being submitted \*

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
Licensing Topical Report (LTR)	P	3 008 503B	Delivered Jul 09
	NP	3 008 503B-NP	Delivered Jul 09
<b>SPINLINE 3</b> Design Analysis Report	P	MPR-3337 Rev 1	Delivered Jul 09
	NP	MPR-3337 Rev 1-NP	TBD
Cyber Security Plan	P	8 307 255 A	Delivered Jul 09
Set of quality program documents	See details on separate Quality worksheet.		
Set of equipment qualification (EQ) program reports	See details on separate EQ worksheet.		
Set of hardware (HW) analysis reports (Board / equipment-level FMEAs + reliability analyses and Setpoint support)	See details on separate HW Analysis worksheet.		
Set of generic platform software life cycle documents	See details on separate Platform SW worksheet.		
Set of application software and system life cycle plan templates (These templates will be customized for each plant-specific application)	See details on separate App SW & System worksheet.		

\* Based on draft ISG-06 guidance for Tier 3 review.

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# Set of quality program documents \*

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
<b>Generic <i>SPINLINE 3</i> Licensing Documents Available Upon Application</b>			
Rolls-Royce Civil Nuclear SAS Quality Manual	P	8 303 186 P	Delivered Jul 09
	NP	8 303 186 P-NP	Delivered Jul 09
Instrumentation & Controls US Quality Manual	NP	500-9600000-10, ICQ-005-C	Delivered Jul 09
Quality Audit Report	P	28-I&C US-2008	8-Jan-2010
DS&S 10CFR50 Appendix B / 10CFR21 Checklist, July 21 - 25, 2008	P	DS&S 10CFR50 Appendix B / 10CFR21 Checklist, July 21 - 25, 2008	8-Jan-2010
Data Systems & Solutions RTS Business Unit - Entergy Supplier Audit Number SA08-007	P	SA08-007	8-Jan-2010
Dedication Plan for the Generic <i>SPINLINE 3</i> Digital Safety I&C Platform	P	3 010 794 A	8-Jan-2010
	NP	3 010 794 A-NP	8-Jan-2010
<b>Generic <i>SPINLINE 3</i> Licensing Documents Available Within 12 Months of Requested Approval</b>			
Quality Procedure for Dedication	P	8 307 288 A	8-Jan-2010
Checklist for Dedication in Accordance with the Process Defined in EPRI TR-106439	NP	8 307 304 A	8-Jan-2010
Dedication Report for the Generic <i>SPINLINE 3</i> Digital Safety I&C Platform	P	3 010 795	30-Sep-2010
	NP	3 010 795-NP	30-Sep-2010
Selected RRCN SAS 10CFR50 App B QA procedures for digital hardware and software	P	TBD	TBD
Selected DS&S LLC 10CFR50 App B QA procedures for digital hardware and software	P	TBD	TBD

\* Also see platform software and application software life cycle documents.

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# Set of equipment qualification program reports

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
<b>Generic <i>SPINLINE</i> 3 Licensing Documents Available Upon Application</b>			
Equipment Qualification (EQ) Plan	P	3 006 501C	Delivered Jul 09
	NP	3 006 501C-NP	
System Specification of the Qualification Test Specimen and Data Acquisition System	P	3 006 404C	Delivered Jul 09
<b>Generic <i>SPINLINE</i> 3 Licensing Documents Available Within 12 Months of Requested Approval</b>			
QTS Master Configuration List	P	3 010 612 A	31-Mar-2010
Factory Acceptance Test Procedure	P	3 010 783 A	31-Mar-2010
Radiation Exposure Test Procedure	P	3 010 286 A	31-Mar-2010
Environmental Test Procedure	P	3 010 287 A	31-Mar-2010
Seismic Test Procedure	P	3 010 288 A	31-Mar-2010
EMI / RFI Test Procedure	P	3 010 289 A	31-Mar-2010
Electrical Fast Transient Test Procedure	P	3 010 290 A	31-Mar-2010
Surge Withstand Test Procedure	P	3 010 291 A	31-Mar-2010
Electrostatic Discharge Test Procedure	P	3 010 292 A	31-Mar-2010
Class 1E to Non-Class 1E Isolation Test Procedure	P	3 010 293 A	31-Mar-2010
System Setup and Checkout Test Procedure	P	3 010 294 A	31-Mar-2010
Operability Test Procedure	P	3 010 295 A	31-Mar-2010
Prudency Test Procedure	P	3 010 296 A	31-Mar-2010
Summary EQ Test Report	P	TBD	30-Sep-2010
	NP	TBD	

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# Set of hardware analysis reports

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
<b>Generic SPINLINE 3 Licensing Documents Available Upon Application</b>			
Setpoint Analysis Support	P	3 009 397 A	Delivered Jul 09
Reliability Analysis and Predictive Safety Analysis - RTD conditioning board: 8PT100 and I.8PT100 Interface board	P	5 100 436 882 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Analog input board: 16E.ANA ISO and I.16EANA interface board	P	5 100 436 348 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Digital isolated input board: 32ETOR TI SR and I.32ETOR TI interface board	P	5 100 435 707 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Calibrated pulse acquisition board: ICTO and I.ICTO interface board	P	1 479 513 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Actuator drive board: 32ACT and I.32ACT interface board	P	5 100 437 019 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Analog output board: 6SANA ISO and I.6SANA interface board	P	3 008 651 B	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - CPU board: UC25N+	P	6 648 805 D	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - NERVIA+ daughter board and I.NERVIA+ interface board	P	1 208 933 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - ALIM 48V/5V-24V power supply board and I.ALIM 48 interface board	P	3 000 180 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Actuation voting module: MV16	P	5 100 436 936 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - Output relays terminal block: 8SRELAY1 & 8SRELAY2	P	5 100 436 935 C	Delivered Dec 09
Reliability Analysis and Predictive Safety Analysis - 32ETOR input terminal block	P	3 008 991 B	Delivered Dec 09
<b>Generic SPINLINE 3 Licensing Documents Available Within 12 Months of Requested Approval</b>			
None			

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# Set of platform software life cycle documents

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
<b>Generic SPINLINE 3 Licensing Documents Available Upon Application</b>			
Software Quality Plan (SQP) - MC3	P	8 303 429 E	Delivered Dec 09
Software Modification Quality Plan	P	1 208 686 B	Delivered Dec 09
Software Quality Plan - SCADE Operator Library	P	1 208 356 C	Delivered Dec 09
<b>SPINLINE 3</b> Safety of Processing Unit Software	P	1 207 228 H	Delivered Dec 09
			Delivered Dec 09
Software Configuration Management Plan for <b>SPINLINE 3</b> Software Sub-assemblies Managed by CM Tool	P	1 208 878 D	Delivered Dec 09
Software Development Plan	P	1 207 102 A	Delivered Dec 09
Requirements for Software Development Tools	P	1 206 747 E	Delivered Dec 09
(OSS) Software Requirement Specification	P	1 207 108 J	31-Jan-2010
(OSS) Software Preliminary Design Document	P	1 207 141 H	31-Jan-2010
Software Interface Specification	P	1 207 110 J	31-Jan-2010
(OSS) Software Integration Test Plan and Report	P	1 207 204 E	31-Jan-2010
(OSS) Software Validation Test Plan	P	1 207 146 G	31-Jan-2010
<b>Generic SPINLINE 3 Licensing Documents Available Within 12 Months of Requested Approval</b>			
Selected RRCN SAS 10CFR50 App B QA procedures	P	TBD	TBD
Selected RRCN SAS 10CFR50 App B QA procedures	P	TBD	TBD
(OSS) Software Validation Test Report	P	1 207 232 F	31-Jan-2010

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# Set of application software and system life cycle plan templates \*

RRCN Document Title	Versions: Proprietary (P); Non-proprietary (NP)	RRCN Document Number	Planned date to send to NRC
<b>Generic <i>SPINLINE 3</i> Licensing Documents Available Upon Application</b>			
<b><i>SPINLINE 3</i></b> Software Quality Assurance Plan - SQAP	P	8 307 208 B	Delivered Jul 09
<b><i>SPINLINE 3</i></b> Software Configuration Management Plan - SCMP	P	8 307 209 B	Delivered Jul 09
<b><i>SPINLINE 3</i></b> Software Verification and Validation Plan - SVVP	P	8 307 210 B	Delivered Jul 09
<b><i>SPINLINE 3</i></b> Software Development Plan - SDP	P	8 307 211 B	Delivered Jul 09
System Integration and Factory Test Plan	P	8 307 245 A	Delivered Jul 09
	NP	8 307 245 A-NP	
System Installation and Site Test Plan	NP	8 307 243 A	Delivered Jul 09
System Operations and Maintenance Plan	P	8 307 244 A	Delivered Jul 09
	NP	8 307 244 A-NP	
System Training Plan	NP	8 307 242 A	Delivered Jul 09
<b>Generic <i>SPINLINE 3</i> Licensing Documents Available Within 12 Months of Requested Approval</b>			
None			

\* These templates will be customized for each plant-specific application

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# LTR links to other submitted documents (1/2)

Licensing Topical Report		Other Linked Documents
1	Introduction	
1.1	Purpose	
1.2	Organization of this Licensing Topical Report	
1.3	Supporting SPINLINE 3 Licensing Documents	
1.4	Quality Program	Rolls-Royce Civil Nuclear SAS Quality Manual, Document No. 8 303 186 P Instrumentation & Controls US Quality Manual, Revision C, Document 500-9600000-10, ICQ-005-C Grenoble QA Audit Report Huntsville QA Audit Report
2	SPINLINE 3 Development and Operational History	
3	Regulations, Codes and Standards	
3.1	Compliance Summary	
3.2 - 3.13	More detailed compliance	
4	Description of the SPINLINE 3 Digital Safety I&C Platform	
4.1	Overview	
4.2	Main Features of SPINLINE 3	
4.3	Hardware	LTR Appendix A, Hardware Data Sheets
4.4	SPINLINE 3 Software	
4.5	Communications	
4.6	Testability	
4.7	Cyber security characteristics of SPINLINE 3 systems	Cyber Security Plan template, Document No. 8 307 255 A

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# LTR links to other submitted documents (2/2)

Licensing Topical Report		Other Linked Documents
5	Equipment Qualification and Analysis	
5.1	Equipment Qualification	Equipment Qualification Plan, Document No. 3 006 501C System Specification of the Qualification Test Specimen and Data Acquisition System, Document No. 3 006 404C Qualification test specimen (QTS) and test system arrangement and wiring drawings Master Configuration List (MCL) Set of qualification test procedures Set of qualification test reports
5.2	Equipment Analysis	Set of board / equipment-level FMEAs and reliability analyses Setpoint Analysis Support, Document No. 3 009 397A
6	Software Development Process for SPINLINE 3 Platform Software and Application Software	
6.1	SPINLINE 3 Platform Software Development History	
6.2	SPINLINE 3 Operational System Software (OSS) Development Process	SPINLINE 3 Design Analysis Report, Document No. MPR-3337 Rev. 1
6.3	SPINLINE 3 Platform Software Design and Development Analyses – IEC 880 and BTP 7-14	Set of historical platform software life cycle documents
6.4	SPINLINE 3 Application Software Development Process	Set of application software and system life cycle plan templates (these will be customized for each plant-specific application)
6.5	Cyber Security Plan	Cyber Security Plan template, Document No. 8 307 255 A
App A	Hardware Data Sheets	

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