



Rolls-Royce

Rolls-Royce

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April 12, 2014

U.S. Nuclear Regulatory Commission
Document Control Desk
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ATTENTION: To whom it may concern

SUBJECT: Rolls-Royce Response to Request for Review of Draft Safety Evaluation on the **SPINLINE 3** Digital Safety Instrumentation and Control Platform Topical Report (TAC NO. ME3600)

REFERENCES: (1) Project Number 0773: **SPINLINE 3** Digital Safety Instrumentation and Control Platform (TAC No. ME3600)
(2) Letter, Joseph J. Holonich (NRC) to Mark Burzynski (Rolls-Royce), "Draft Safety Evaluation on the **SPINLINE 3** Digital Safety Instrumentation and Control Platform Topical Report (TAC NO. ME3600)," dated March 10, 2014

NRC provided a draft safety evaluation report for the **SPINLINE 3** Topical Report for review and comment by Reference 2. Specifically, Rolls-Royce was asked to determine if the draft report contains proprietary information and identify such information line-by-line and define the basis pursuant to the criteria of 10 CFR 2.390. In addition, Rolls-Royce was asked to comment on any factual errors or clarity concerns contained in the draft report.

Rolls-Royce hereby submits the following documents in connection with the referenced NRC project:

Document Title	Versions: Proprietary (P), Non-proprietary (NP)	Notes
Attachment 1 Rolls-Royce Comment Matrix	NP	Provides comments regarding factual errors or clarity concerns and suggested changes to resolve comments.
Attachment 2 Mark-up of Draft Safety Evaluation Report	P	Provides editorial and grammatical comments, identification of proprietary information (shown as [[proprietary]]), suggested wording to resolve factual errors or clarity concerns.

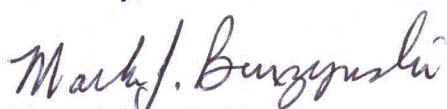
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Rolls-Royce considers the material contained in Attachment 2 to be proprietary and requests that the proprietary documents be withheld from public disclosure. In accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding", an affidavit is enclosed identifying the specific portions of the above documents that are proprietary and the basis for making that determination. A nonproprietary version of Attachment 2 is not provided based on the guidance in NRC Information Notice (IN) 2009-07. As noted in IN 2009-07, in instances in which a nonproprietary version would be of no value to the public because of the extent of the proprietary information, the agency does not expect a nonproprietary version to be submitted.

All documents are submitted in hard copy.

If you have any questions related to this submittal, please contact me at 423-598-3526 or by e-mail at mark.j.burzynski@ds-s.com.

Sincerely,



Mark J. Burzynski
US I&C Licensing Manager
Rolls-Royce



Rolls-Royce

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Affidavit

STATE OF TENNESSEE)

)

COUNTY OF HAMILTON)

1. In accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding", Rolls-Royce requests withholding from public disclosure of the documents listed in Table 1, which is attached to this affidavit.
2. I am familiar with the criteria applied by Rolls-Royce to determine whether certain Rolls-Royce information is proprietary. I am familiar with the policies established by Rolls-Royce to ensure the proper application of these criteria.
3. As required by 10 CFR 2.390, Rolls-Royce has included in Table 1 the following information:
 - Identity of the document or part sought to be withheld;
 - Declaration of the basis for proposing the information be withheld, encompassing considerations set forth in § 2.390(a);
 - Specific statement of the harm that would result if the information sought to be withheld is disclosed to the public; and
 - Locations in the documents of all information sought to be withheld.
4. As required in § 2.390(b)(4); Rolls-Royce wishes to note that the request for withholding from public disclosure applies to pages that contain commercially sensitive information that Rolls-Royce normally discloses only under a Non-Disclosure Agreement (NDA). This commercially sensitive information is not available in public sources and is the type of information customarily held in confidence by Rolls-Royce and our competitors.

5. Rolls-Royce is transmitting this information to NRC in confidence.
6. As noted in Table 1, release of this information in a public forum could cause harm to Rolls-Royce by revealing trade secrets and/or commercially sensitive design and operational details and technical processes related to designing, building, and/or operating a **SPINLINE 3** digital safety instrumentation and control system.
7. As Rolls-Royce US I&C Licensing Manager, I have been specifically delegated responsibility for reviewing the information sought to be withheld, and I am authorized to apply for its withholding on behalf of Rolls-Royce.
8. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

Mark J. Burzynski

Mark J. Burzynski

US I&C Licensing Manager

Rolls-Royce

Sworn to and subscribed before me

this 12th day of April, 2014

Whitney D. Hickman

Notary Public

My commission expires:

July 21st, 2015



Table 1 - Documents requested for withholding from public disclosure

Document Title	Document Number	Part of document sought to be withheld from public disclosure	Basis for proposing the information be withheld, encompassing considerations set forth in § 2.390(a)	Specific statement of the harm that would result if the information sought to be withheld is disclosed to the public	Location(s) in the document of all information sought to be withheld (Note 1)
Attachment 2 Markup of Draft Safety Evaluation Report with Proprietary Information	Not applicable	Entire document (see Note 1).	Trade secrets and / or commercial information as per § 2.390(a)(4)	Rolls-Royce would be harmed by disclosure of aspects of its proprietary safety-related digital network communication technology. This technology is a key feature of the SPINLINE 3 software, which is an important competitive advantage for Rolls-Royce.	Entire document

Notes:

- (1) As noted in IN 2009-07, in instances in which a nonproprietary version would be of no value to the public because of the extent of the proprietary information, the agency does not expect a nonproprietary version to be submitted.

Attachment 1

Rolls-Royce Comment Matrix

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report

Location	Comment	Basis	Resolution
All	Use Rolls-Royce rather than RRCN.	Preferred representation of the Rolls-Royce name.	
Section 1.0, 6th Paragraph	Revise sentence: The SE of the SPINLINE 3 platform is limited to the development and test plans, specifications and procedures to design, verification and validation, <u>the generic software (including libraries, the NERVIA+ communication software, and the Operational System Software)</u> , and performance of EQ of the circuit boards <u>and modules</u> described in the LTR.	Clarified to better reflect the scope of the review.	
Section 1.0, 8th Paragraph	Revise sentences: Section 3.0 of this SE provides the I&C technical evaluation of the topical report submittals <u>and</u> . This section includes a description of the SPINLINE 3 platform. Section provides the Staff conclusions. Section 4.05.0 provides limitations and conditions that apply to applicants or licensees that reference this SE for use of the SPINLINE 3 platform in a safety system of a nuclear power generating station. <u>Section 5.0 provides the NRC staff conclusion.</u> Section 6.0 provides a list of references.	To be consistent with changes to Sections 4.0 and 5.0 described below	
Section 3.2, 1st Paragraph	Revise sentence: The SPINLINE 3 platform supports field input and output types including discrete inputs, relay contacts, analog current, analog voltage, resistance temperature detectors, and <u>pulse signals</u> thermocouples	The use of thermocouples is not described in the LTR.	
Section 3.2, 6th Paragraph, 5th Bullet	Revise bullet: One power supply module per BAP is used and occupies <u>two</u> ones slots.	Consistent with Figure Q1-10 submitted to NRC in Rolls-Royce letter dated December 21, 2011.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.1.2, 2nd Paragraph	<p>Revise paragraph: The functions of the BAP bus are:</p> <ul style="list-style-type: none"> Centralization of data acquisition performed by input boards. Data transfer from main electronic boards to their associated interface boards. Transmit output signals from the CPU board to the output actuation boards. Supply power from the power supply board to the CPU board and to the I/O boards. Connect main electronic boards to their associated interface boards. Transmit status of the I/O boards to the CPU. 	To clarify data communication functions performed by the BAP Bus and the electrical connection functions performed by the BAP backplane.	
3.2.1.2, 3rd Paragraph	<p>Revise paragraph: Section 3.2.3.1 describes data transmission through the BAP bus. The BAP <u>backplane also performs the following functions:</u></p> <ul style="list-style-type: none"> <u>Connect main electronic boards to their associated interface boards.</u> <u>Data transfer from main electronic boards to their associated interface boards.</u> <p>The BAP <u>backplane</u> has the following type of connectors:</p>	To clarify data communication functions performed by the BAP Bus and the electrical connection functions performed by the BAP backplane.	
3.2.1.2, 4th Paragraph	<p>Revise sentence: The XF2 <u>connectors are</u> provided with <u>a-keyed mechanisms</u> to restrict the location of the <u>given boards to their assigned and restricted slots during the design phase.</u></p>	To clarify the context of the statement about the keyed mechanism.	
Section 3.2.1.3, 4th Paragraph	<p>Revise sentence: Note that SPINLINE 3 platform can be configured to use additional boards, such as <u>UC16COM</u> CPU boards (Reference 1.29).</p>	To be consistent with 1 207 146 G submitted to NRC in Rolls-Royce letter dated February 10, 2010.	
Section 3.2.1.3, 1 1st Paragraph	<p>Revise sentence: This board is installed with a NERVIA+ daughter board and the I.NERVIA+ interface board, <u>if network communications have to be provided.</u></p>	To clarify that the daughter board is only installed if the plant-specific design requires network communication.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.1.3.1 6th Paragraph Bullets	<p>Revise bullet:</p> <ul style="list-style-type: none"> Data Random Access Memory (RAM) The system uses the Data RAM to maintain values of configurable parameters to be accessed <u>store and manage the variable calculated and used</u> by the application software. <p>Add bullet:</p> <ul style="list-style-type: none"> <u>EEPROM parameters</u> The system uses the EEPROM to maintain values of configurable parameters to be accessed by the application software. 	To be consistent with LTR Section 4.2.3.	
Section 3.2.1.3.3.1, 2nd Paragraph	<p>Revise sentence:</p> <p>This board is installed in the chassis and connects to the BAP bus via its I.32ETOR-TI interface board, which forwards discrete data to the UC25 N+ CPU board.</p>	To be consistent with the response to RAI-4 in Rolls-Royce letter dated December 21, 2011.	
Section 3.2.1.3.4.1, 3rd Paragraph	<p>Add sentence:</p> <p>This module consists of a 32ACT board and I.32ACT interface board, MV16 Voting Module, and 8SRELAY relay terminal blocks. <u>The use of the MV16 Voting Module is optional and its use dependent of the application.</u></p>	For clarification.	
Section 3.2.1.3.4.1, 4th Paragraph	<p>Revise sentences:</p> <p>The 32ACT board includes an FPGA to configure the various output <u>groups</u> and transmit command orders to each output <u>the various groups</u>. It also provides the interface between the BAP bus and the 324 <u>outputs</u> groups, manages the logic for the 32 output commands, <u>and ensures the</u> surveillance of the outputs, using a short impulse test and board self-tests.</p>	To be consistent with LTR Section 4.3.4.5.	
Section 3.2.1.3.4.1, 11th Paragraph	<p>Revise sentence:</p> <p>The licensee should confirm that the specified relay type is properly configured <u>selected</u> and tested for a plant specific application (see Section 4.2, Item 2).</p>	To clarify that the correct relay type must be selected. The relays are not configurable components.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.1.5, 2nd Paragraph	Revise paragraph: Therefore, the NRC staff did not evaluate the design, function, and operation of the operator displays listed above. The following sections only provide a brief description of the operator displays that can be used with the SPINLINE 3 platform. The licensee should evaluate what displays are used in a plant-specific application. <u>The NRC did evaluate the interface software (part of the OSS) that controls the interface with the LDU as part of its review.</u> Further, if an operator display is supplied for a plant-specific application, the licensee should evaluate its configuration and operation, as well as confirm that use of the operator display meets the <u>applicable electrical and physical independence and security requirements</u> guidance described in DI&C-ISG-04 for communication between safety related and non-safety related equipment (see Section 5.2, items 7 and 8).	Rolls-Royce believes NRC evaluated the communication independence aspects of the LDU interface, as described in LTR Sections 4.4 and 4.6.9, along with the responses to RAIs 3 and 8 (submitted in Rolls-Royce letter dated December 21, 2011), the responses to RAIs 37, 60, and 66 (submitted in Rolls-Royce letter dated August 3, 2012), and the responses to RAIs 68 and 73 (submitted in Rolls-Royce letter dated April 4, 2013).	
Section 3.2.1.5.1, 1st Paragraph	Revise sentence: Before <u>When</u> the LDU is connected, the operator <u>it</u> will disable the division or part of the division to which the processing unit belongs.	To be consistent with the administrative controls discussed in LTR Section 4.6.9.	
Section 3.2.1.5.1, 4th Paragraph	Revise sentence: <u>The LTR Section 4.6.9 and</u> References 1.22 and 1.23 provide additional information about the LDU.	To add reference to 3 008 503 D submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.2.1.5.2, 3rd Paragraph	Revise sentence: References 1.22 and 1.23 provide additional information about the <u>Operator Panel</u> LDU .	To correct copy error.	
Section 3.2.1.5.3, 1st Paragraph	Revise sentence: The ATU is a non-1E industrial computer used to perform periodic testing of the SPINLINE 3 platform described in Section 4.6. <u>9</u> 10 of the LTR and Section 3.7.3 of this SE.	To correct reference to 3 008 503 D submitted to NRC in Rolls-Royce letter dated December 18, 2012.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.1.5.3, 2nd Paragraph	Add sentence: Upon test completion, the ATU switches test inputs back to the normal inputs from the process. <u>The channel in test will be inhibited by the operator prior to the start of the periodic test.</u>	To be consistent with the response to RAI 8 submitted in Rolls-Royce letter dated December 21, 2011.	
Section 3.2.1.5.3, 3rd Paragraph	Revise sentence: The LTR Section 4.6.910 and References 1.22 and 1.23 provide additional information about the ATU.	To correct reference to 3 008 503 D submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.2.1.5.4, 3rd Paragraph	Revise sentence: The LTR, Section 4.6.4011, and References 1.22 and 1.23 provide additional information about the MMU.	To correct reference to 3 008 503 D submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.2.2, 2nd Paragraph	Revise sentence: The BAP <u>backplane</u> provides signal connectivity between boards, and the <u>interface boards</u> BAP provide signal connectivity to the application specific devices (e.g., sensors).	For clarification.	
Section 3.2.2, 2nd Paragraph	Revise sentence: One power supply module is used and occupies one <u>two</u> slots.	Consistent with Figure Q1-10 submitted to NRC in Rolls-Royce letter dated December 21, 2011.	
Section 3.2.2, 2nd Paragraph	Revise sentence: The remaining slots are available for I/O boards in any combination or number <u>of each type of boards</u> .	For clarification.	
Section 3.2.3.1.1, 1st Paragraph	Revise sentence: The UC25 N+ CPU board communicates with the NERVIA network using <u>the Nervia+ board and</u> the I.NERVIA+ interface board.	For clarification.	
Section 3.2.3.2, 2nd Paragraph	Revise sentences: The Station provides the network service to the Unit. Because the NERVIA+ daughter is mounted in the associated UC25 N+ CPU, <u>6 different</u> Stations can be dedicated to a Unit. <u>Since a Unit</u> A Station can support up to 6 NERVIA networks, <u>allowing</u> the Unit to can communicate <u>with several over 6 different</u> NERVIA networks.	To be consistent with LTR Section 4.3.4.8.	
Section 3.2.3.2, 5th Paragraph	Revise sentence: Rolls-Royce will use the CLARISSE <u>System and Software Development Environment (SSDE)</u> tool to define and configure the DPM parameters.	For clarification and consistency with other discussion.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.3.2, 7th Paragraph	Revise sentences: In addition, each CB includes a " validity <u>refresh</u> indicator" <u>and a CB checksum</u> that is <u>are</u> used by the Stations to confirm the status of the message travelling in the NERVIA network. This <u>ese</u> indicators is <u>are</u> used by receiving Stations to determine if <u>corruption or</u> acquisition errors occurred during transfer of the CB.	To be consistent with LTR Section 4.5.4.2.	
Section 3.2.3.2, 9th Paragraph	Revise sentences: Also, the token-and-message <u>CBs</u> include several Network parameters to manage communication. For example, the token <u>and related mechanism</u> will include <u>allow a synchronization while keeping the transmissions within a</u> signal-and -minimum and maximum propagation time, so Stations can be synchronized to receive messages or start transmission and a validation data to verify the integrity of the message for transmission errors.	To be consistent with LTR Section 4.5.4.2 and the response to RAI 77 submitted to NRC in Rolls-Royce letter dated April 4, 2013.	
Section 3.2.3.2, 11th Paragraph	Revise sentence: If the data received is correct (not transmission errors), additional checks are performed at application level based on the 32-bits <u>CB</u> checksum CB and the (e.g., refresh indicator).	To be consistent with LTR Section 4.5.4.2 and the response to RAI 77 submitted to NRC in Rolls-Royce letter dated April 4, 2013.	
Section 3.2.3.2, 12th Paragraph	Revise sentence: The second Station will transmit when the token matches its sequence number <u>or if the elapsed time within the global network sequencing has reached its limit in the defined station ranking (through its own indexed timeout)</u> .	To be consistent with LTR Section 4.5.4.2 and the response to RAI 77 submitted to NRC in Rolls-Royce letter dated April 4, 2013.	
Section 3.2.3.2, 13th Paragraph	Revise sentence: If a message is not received during this time, the Station will join-the-network <u>start to transmit</u> .	To be consistent with LTR Section 4.5.4.2 and the response to RAI 77 submitted to NRC in Rolls-Royce letter dated April 4, 2013.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.2.3.2, 19th Paragraph	Delete sentence: To communicate with receive-only stations, the SPINLINE 3 platform will require a PCI NERVIA+ board to be installed in the receive-only station.	Incorrect. Any NERVIA+ Station can be configured to be a receive-only station. Voters are often configured this way. The PCI NERVIA+ board is used for gateway communication, as described in LTR Section 4.5.7.	
Section 3.2.3.2, 22nd Paragraph	Revise sentence: When invalid data was transmitted, the <u>receiving</u> Unit used the last valid data received ...	Clarification.	
Section 3.4, 2nd Paragraph, 4th Bullet	Revise bullet: <ul style="list-style-type: none"> • <u>Class 1E software embedded in electronic boards with electronic components, such as the NERVIA+ board and, ICTO Pulse Input board, -6SANA board,</u> • <u>Class 1E firmware embedded in electronic boards with electronic components, such as the 32ACT board, 32ETOR board, and 16E.ANA ISO board.</u> 	To be consistent with LTR Section 4.3.2.3.	
Section 3.4.1, 2nd Paragraph	Revise sentence: In addition the SCADE is used to automatically generate the <u>application</u> executable code <u>included in the Unit code</u> to be loaded in executed by the CPU.	Clarification consistent with LTR Section 4.4.4.1.	
Section 3.4.1, 5th Paragraph	Revise sentence: Rolls-Royce document, "SPINLINE 3 Design Analysis Report" (Reference 1.57, explains that the SCADE tool was originally created by <u>VERILOGMICROTEC Research</u> and it is currently managed as a product of Esterel Technologies.	Clarification consistent with LTR Section 6.1.	
Section 3.4.1, 6th Paragraph	Revise sentence; The SCADE <u>development environment</u> includes a <u>Rolls-Royce developed proprietary</u> library of 1E application-oriented software functions (e.g., threshold function) for software development.	Clarification.	
Section 3.4.2.1, Figure 3-6	The order of Cycle Time Management and Test and Self-test Diagnostics should be reversed.	See LTR Figure 3-6 and response to RAI 68 submitted to NRC in Rolls-Royce letter dated April 4, 2013.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Sections 3.4.2.1.2 and 3.4.2.1.3	The order of the two paragraphs should be reversed.	To match revised Figure 3-6.	
Section 3.6, Table 3-3, 4th Line	Add 3 019 950 A as an additional Factory Acceptance Test reference	Submitted to NRC in Rolls-Royce letter dated May 31, 2012.	
Section 3.6, Table 3-3, 4th Line	Check ML12188A040 reference	Rolls-Royce records show ML101670111 for this document reference	
Section 3.6.1.1, 7th Paragraph	Delete sentence: Because Rolls-Royce only tested communication with only two units, licensees will need to verify that communication among multiple Units does not adversely affect the SPINLINE platform operation to perform its safety functions (see Section 4.2, Item 4).	The number of the communication networks is not established by the hardware qualification test. It is established by the design of the OSS and NERVIA+ network. Refer to LTR Rolls-Royce believes that the information provided in LTR Sections 4.4 and 4.5.	
Section 3.6.1.1, 8th Paragraph	Revise paragraph: The QTS included the operator panel to perform certain functions to be performed by operators in an application-specific installation, such as inhibition, periodic testing. However, in Reference1.22, Rolls-Royce explained that these functions were not tested during EQ testing, <u>as they are not safety functions. They were implemented in the QTS specimen so as to prove that these functions, which are commonly implemented on SPINLINE 3 systems, do not adversely affect the performance of the safety-related equipment during qualifications tests.</u> Further in Reference1.23, Rolls-Royce explained that the operator panel is a 1E component that is plant-specific that will be configured to match the cabinets components in the application. Therefore, the NRC staff did not evaluate the Operator panel in the SE. Licensees will need to verify that the configuration of the operator panel matches the requirements for the application specific <u>design, and that the operator panel will not experience failures due to abnormal</u>	To be consistent with the response to RAI 30 and the results of the qualification tests described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
	service conditions of temperature, humidity, electrical power, radiation, electromagnetic interference, radio frequency interference, power surge, or seismic vibration (see Section 4.2, Item 8).		
Section 3.6.2 Table	Revise Line 1: FAT Test Procedures 3 010 783 A (Campaign 2010) 3 019 950 A (Campaign 2012)	Second document submitted to NRC in Rolls-Royce letter dated May 31, 2012.	
Section 3.6.3, 2nd Paragraph, 3rd Bullet	Revise bullet: <ul style="list-style-type: none"> Prudence testing demonstrated the ability of the QTS to operate within specifications under dynamic conditions. The prudence test included a burst of events test <u>and an optic fiber connection</u>, a serial port receiver failure test, and a serial port noise test. 	To be consistent with 3 010 296 D (Section 3.B) submitted by Rolls-Royce letter dated September 21, 2012.	
Section 3.6.4 Table	Revise Line 4: 3 013 308 A (Campaign 2010) 3 018 588 A (Campaign 2011)	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.5, 9th Paragraph	Revise sentence: Two events were caused by improper <u>acceptance criteria</u> values of the 48VDC/24 VDC power converters.	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.5, 9th Paragraph	Delete sentence: The new power converter installed in the QTS was Part Number 3-008-467, serial number 002287.	Irrelevant information for the safety evaluation report.	
Section 3.6.6, 5th Paragraph	Revise paragraph: However, the vibration table in NTS could not meet the SSE and OBE levels. Thus, RRCN <u>Rolls-Royce</u> performed the five OBEs at 4.9 g and the SSE at 7 g. Specifically, <u>Rolls-Royce</u> RRCN performed the following tests <u>in the 2011 Campaign</u> : <ul style="list-style-type: none"> <u>Resonance search as described in Section 7.1.4 of IEEE Std. 344-1987.</u> <u>Five triaxial Operating Basis Earthquake (OBEs) tests with a minimum Zero Period Acceleration (ZPA) of 4.9 g.</u> 	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
	<ul style="list-style-type: none"> One triaxial SSE test with a minimum ZPA of 7 g. <u>Rolls-Royce performed the following additional tests in the 2012 Campaign to retest equipment that did not pass the 2011 seismic testing:</u>		
Section 3.6.6, 7th Paragraph	Revise sentence: <u>Rolls-Royce</u> RRCN did <u>could</u> not test <u>meet</u> this requirement because the <u>SPINLINE 3 system does not include cabinet power supply modules fed from external DC sources</u> QTS did not include cabinet DC power supply to the QTS cabinet power supply.	As described in 3 006 501 E submitted to NRC in Rolls-Royce letter dated May 31, 2012.	
Section 3.6.6, 8th Paragraph	Revise sentence: In its RAI response (Reference 1.22), Rolls-Royce explained that the circuits for the relays and related contacts were modified configured to monitor for chattering.	Clarification. The relay contacts were configured. The relay was not modified.	
Section 3.6.6, 10th Paragraph	Revise sentence: These results correspond to Configuration 1, except for the components tested during Campaign 2012, and Configuration 2. Most of the SPINLINE 3 <u>equipment in Configuration 1 passed the 2011 Seismic Test except for the problems noted above. The SPINLINE 3 equipment in Configuration 2 also passed the 2011 Seismic Test.</u>	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.6, 11th Paragraph	Add second sentence: <u>The two subassemblies of the SPINLINE 3 equipment in Configuration 1 were successfully retested in the 2012 test campaign.</u>	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.6 Table	Revise Line 5: 3 018 590 A <u>(Campaign 2011)</u> 3 020 948 A <u>(Campaign 2012)</u>	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.6.7, 7th Paragraph	Revise sentences: Specifically, <u>Rolls-Royce chose not to perform the 61000-4-10 (Radiated susceptibility, magnetic field) test was not performed due to laboratory test limitations. RG 1.180, Revision 1, allows that equipment not intended to be installed in areas with strong sources of magnetic fields (e.g., cathode ray tubes, motors, cable bundles carrying high currents) can be exempt from this test. Rolls-Royce chose not to perform the RS103, Radiated Susceptibility, test, and radiated susceptibility above 8 GHz was excluded, since that frequency range is reserved for satellite communication. The tested range is acceptable, since the "susceptibility testing in this range covers the unlicensed frequency bands where much of the communications activity is taking place (2.45 GHz and 5.7 GHz)" (from RG 1.180).</u>	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.7 Table	Revise Line 3: 3 018 591 A (<u>Campaign 2011</u>) 3 020 951 B (<u>Campaign 2012</u>)	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.7, 13th Paragraph	Revise sentence: These limitations are consistent with RG 1.180, as long as the equipment is not installed in areas with source of <u>strong</u> magnetic fields or <u>radiated emission sources</u> above 8 GHz.	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.8, 9th Paragraph	Check plant-specific action item reference.	Referenced item appears to be written for environmental qualification and not EFT.	
Section 3.6.9, 7th Paragraph	Revise sentence: These events were detected because <u>the program for comparing</u> data received in the DAS was compared with the NERVIA data <u>was not accurate enough in some cases.</u>	Consistent with 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.9, 9th Paragraph	Check plant-specific action item reference.	Referenced item appears to be written for environmental qualification and not surge withstand testing.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.6.10, 6th Paragraph	Revise sentence: During ESD testing, Rolls-Royce RRCN observed that the 3TP/2FL hub <u>exhibited intermittent performance during the ESD test</u> failed .	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.10, 8th Paragraph	Revise sentence: Before using the <u>Modicon 3TP/2FL hub</u> SPINLINE-3 platform equipment in SR systems in a nuclear power plant, licensees must determine that the plant-specific ESD requirements are enveloped by the capabilities of the SPINLINE 3 platform as approved in this SE.	For clarification consistent with 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.10, 8th Paragraph	Check plant-specific action item reference.	Referenced item appears to be written for environmental qualification and not ESD	
Section 3.6.12, 3rd Paragraph	Revise sentence: After analyzing these events, Rolls-Royce modified the QTS and DAS to resolve them.	Consistent with 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.12 Table	Revise Line 4: 3 018 596 A (<u>Campaign 2011</u>) 3 018 949 A (<u>Campaign 2012</u>)	As described in 3 014 545 C submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.6.14, 3rd Paragraph	Revise sentence: Each board's reliability analysis provides quantitative <u>failure rate</u> predictions expressed in <u>units of 10⁻⁶ per hour</u> ⁺ .	For clarification consistent with 3 008 503 D submitted to NRC in Rolls-Royce letter dated December 18, 2012.	
Section 3.7.1, 5th Paragraph	Revise sentence: So the cycle time for the Unit is different than the cycle time for the Station <u>but both cycle time are predefined and fixed so that the minimum and maximum value of data processing can be guaranteed</u> .	Consistent with LTR Section 4.2.6.	
Section 3.7.1, 6th Paragraph	Revise sentence: On the contrary, In order to obtain satisfactory the cycle time, if the cycle time is not sufficient to perform all functions, the OSS will perform certain <u>time consuming self-tests</u> such as memory self-test (e.g., Data RAM address test, Code RAM checksum, etc.) that require longer time over several cycles.	Consistent with LTR Section 4.6.9.2.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.7.1, 9th Paragraph	Revise sentence: Section 3.4.2.1.2 3.4.2.1.3 of this SE ...	To be consistent with changes to Sections 3.4.2.1.2 and 3.4.2.1.3 described above	
Section 3.7.3, 8th Paragraph	Revise sentence: Section 4.6.5 of the LTR, Sections 3.4.2.1.3 3.4.2.1.2 and ...	To be consistent with changes to Sections 3.4.2.1.2 and 3.4.2.1.3 described above	
Section 3.7.3, 10th Paragraph	Revise sentence: Specifically, this module will perform: <ul style="list-style-type: none"> CPU board test and self-test. This function will activate the watchdog and run the self-tests included in Category 1 (see Section 3.4.2.1.33.4.2.1.2). 	To be consistent with changes to Sections 3.4.2.1.2 and 3.4.2.1.3 described above	
Section 3.9.1.2, 2nd Paragraph	Revise sentence: Section 4.5.7 of the LTR states that the NERVIA network can be configured as one-way communication (<u>typically from safety related components</u> only to non-safety related components).	To be consistent with LTR Figure 4.2-1.	
Section 3.9.1.2, 4th Paragraph, 4th Bullet	Revise bullet: <ul style="list-style-type: none"> Perform 32 bit CRC on received messages and <u>CB checksum on</u> data within received messages 	To be consistent with LTR Section 4.5.4.2.	
Section 3.9.1.6, 4th Paragraph	Revise sentence: The NRC staff review determined that communications protocols associated with the NERVIA include the use of a time token -based <u>token</u> protocol, but this no handshaking is done by the communications section of the Station's MPC860 processor.	To be consistent with LTR Section 4.5.2 and Table 3.7-1 Item 6.	
Section 3.9.1.8, 5th Paragraph	Revise sentence: As described in Staff Position 1, Point 2, Section 4.5.7 of the LTR states the NERVIA network can be configured as one-way communication (<u>typically from safety related components</u> only to non-safety related components).	To be consistent with LTR Figure 4.2-1.	
Section 3.9.1.10, 2nd Paragraph	Revise sentence: Certain designated modifiable parameters may be changed via the LDU (non-safety) <u>while the channel is inoperable</u> a processor is out of service .	To be consistent with LTR Section 4.6.9.1.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.9.1.10, 3rd and 4th Paragraphs	<p>Revise paragraphs: Section 4.4.3.5.5 of the LTR states that the LDU is "not permanently installed." <u>This physical disconnection of the LDU when not in use satisfies Staff Position 1, Point 10).</u> As mentioned in Section 3.2.1.5 of this SE, RRCN did not request approval of the Local Display Unit. Furthermore, the LTR does not explain how configuration of a one-way communication is implemented (see Staff Position 1, Point 2). An applicant or licensee referencing this SE should confirm that data exchanged between safety and non-safety division adversely affect the safety function.</p> <p>Given that the LTR does not define a specific configuration of a system based on the SPINLINE 3 platform and that the one-way data barrier is also not defined, conformance to Staff Position 1, Point 10 is an application specific action item. An applicant or licensee referencing this SE should confirm that any non-safety related component on a SPINLINE 3 NERVIA network is configured as a "non-transmitting" station. The applicant should also confirm that the one-way data barrier selected would preclude any transmissions from the non-safety related component from reaching NERVIA+ boards serving SR processors on the SPINLINE 3 platform-based system.</p>	Rolls-Royce believes that the information provided in LTR Sections 4.4.3.5.5 and 4.6.9 and Table 3.7-1 Item 10 demonstrated that DI&C-ISG-04 Position 1 Point 10 is fully satisfied by the LDU interface design.	
Section 3.9.1.11, 2nd Paragraph	<p>Revise paragraph: <u>Rolls-Royce identified that interdivisional communication would be used at the voting layer of system architecture in LTR Section 4.2.4.1. Rolls-Royce also described in LTR Sections 4.4 and 4.5 how the OSS and NERVIA+ network work to safely transmit data between processors. The OSS does not transmit or receive software instructions; instead, the OSS is designed to only transmit data in the CBs. The design of the OSS and NERVIA+ network satisfies Staff Position 1, Point 11. At this time, The</u></p>	Rolls-Royce believes that the information provided in LTR Sections 4.2.4.1, 4.4, and 4.5 and Table 3.7-1 Item 11 demonstrated that DI&C-ISG-04 Position 1 Point 11 is fully satisfied by the OSS and NERVIA+ network design. These design features were addressed in RAIs 68 and 74-79 submitted in Rolls-Royce letter dated April 4, 2013. These design features do not	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
	NRC staff would not expect any message data relayed through the NERVIA DPM to the processor to affect the execution of application software. RRCN provided a description on how the SPINLINE 3 platform complies with this point in Table 3.7-1 of the LTR. However, since there is no specific system architectures defined in the LTR, it is unknown whether any interdivisional communication will be designed into a future application and/or what messages may be crafted. An applicant or licensee referencing this SE should confirm that either no interdivisional communications are used in safety system using the RRCN SPINLINE 3 platform or, if interdivisional communications are proposed, that the communications conform to the provisions of this point.	change as part of a project-specific implementation.	
Section 3.11.2.3.2, 4th Paragraph	Revise sentences: RRCN uses the CLARISSE SSDE <u>and SCADE</u> for the development of SPINLINE 3 platform-based I&C systems. This tool is used to define the system architecture, hardware architecture, design the application software, and generate the executable code for a plant-specific application. As mentioned previously, CLARISSE <u>and SCADE</u> is-are only used and dedicated to the development of SPINLINE 3 platform-based I&C systems for nuclear applications.	To be consistent with LTR Section 4.4.4.2.	
Section 3.11.2.4.1, 3rd Paragraph	Revise sentence: ... the NRC staff concludes that the Rolls-Royce qualification program met the requirement for computer testing of the SPINLINE 3 platform subject to satisfactory resolution of the generic open items in Section 5.0 of this SE.	No generic open items were listed in Section 5.0.	
Section 3.11.2.10, 4th Paragraph	Revise sentence: No mechanism is provided by RRCN for altering the system software of a module in the field other than replacement of the <u>flash memories on the</u> CPU board.	To be consistent with LTR Table 3.7-1 Item 10.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 3.12, 9th Paragraph	Revise sentence: For an application specific review, the licensee should confirm that the correct I/O modules are installed and that the deactivated code for boards not installed does not adversely affect the safety functions to be implemented in the SPINLINE 3 system (see Section 4.2, Item 2).	The hardware configuration tables (which specify the I/O modules and results in the deactivated code) are checked as part of the independent verification and validation process by Rolls-Royce.	
Sections 4.0 and 5.0	The order of the two sections should be reversed.	Relocated to have better flow and match sample outline in LIC-500.	
Section 4.2	Delete sentence: In particular, the applicant must confirm that the hardware tables for I/O boards not used in the system are deactivated.	The hardware configuration tables (which specify the I/O modules and results in the deactivated code) are checked as part of the independent verification and validation process by Rolls-Royce.	
Section 4.2	Revise Item 5: Specifically the type and number of stations transmitting on the network, station parameters and tables, amount of data transmitted by each station, time frame (time window) for each Station to transmit data, configuration of the DPM, Station sequence number, and the overall network cycle time for the system.	These factors are all related to the project-specific code development. They are aspects that are checked as part of the independent verification and validation process by Rolls-Royce.	
Section 4.2	Delete Item 10	Item 10 is not referenced in the SER text. It is really a duplicate of Item 26.	
Section 4.2	Revised Item 11: An applicant referencing this SE should also coordinate with Rolls-Royce to establish appropriate parameters for the packing management process. These parameters are described in Reference 1.29.	This action makes no sense to Rolls-Royce and is unrelated to the information in the referenced document.	
Section 4.2	Delete Item 13	Item 13 is not referenced in the SER text. It is really a subset of old Item 12.	

Rolls-Royce Comments Draft Safety Evaluation Report for the SPINLINE 3 Topical Report (cont.)

Location	Comment	Basis	Resolution
Section 5.0	Revise sentence: The NRC staff determined that the SPINLINE 3 platform standardized <u>circuit boards and associated generic software (including libraries, the NERVIA+ communication software, and the Operational System Software)</u> described in the LTR, its design features, and the processes used to produce them support satisfying the applicable regulatory requirements for plant-specific and application-specific use within SR I&C systems when each plant-specific and application-specific use satisfies the limitations and conditions delineated in Section <u>4.05.0</u> of this SE, and the system is properly installed and used.	Clarified to better reflect the scope of the review. To be consistent with changes to Sections 4.0 and 5.0 described above.	
Section 6.0	Delete reference 1.28	Duplicate to reference 1.2.	
Section 6.0	Regarding: Rolls-Royce Document 3 013 962 A, Secure Development and Operational Environment (ADAMS Accession No. ML111820022).	This is the ML number for the public version. Is that what was intended?	
Section 6.0	Regarding: Rolls-Royce Document 3 014 543 A, Secure Development and Operational Environment – Vulnerability Assessment (ADAMS Accession No. ML111820022).	This ML number is wrong.	