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In Response, Reply to DRS-2013-0267

April 11, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Document Control Desk
Docket No: 99901417

Subject: Reply to a Notice of Nonconformance

Reference: (a) Letter, Richard A. Rasmussen (NRC) to Brian Gilmartin (DRS Consolidated Controls, Inc.),
NRC Inspection Report No. 99901417/2013-201 and Notice of Nonconformance

Gentlemen:

This letter and enclosure provides DRS Consolidated Controls, Inc.'s reply to the Notice of Nonconformance (NON) described in Reference a.

The attachment to this letter addresses the reason for the noncompliance; corrective steps that have been taken and the results achieved to date; corrective steps that will be taken to avoid future non-compliances; and the date when all corrective actions will be complete.

If you have any questions related to this letter, please contact me by telephone at 203-798-3072 or by email at bgilmartin@drs.com

Sincerely,

Brian Gilmartin,
Director of Quality and Continuous Improvement
DRS Consolidated Controls, Inc.

enclosure

cc: Richard A. Rasmussen, NRC
Jeffrey Armstrong, DRS-CCI

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Reply to Notice of Nonconformance No: 99901417/2013-201-01

Text from the Nuclear Regulatory Commission Inspection Report No. 99901417/2013-201 and Notice of Nonconformance will appear in *italics* within the body of this response.

Noncompliance Statement

“Based on the limited sample of software development activities observed and documents reviewed up to the end of the design-phase of DRS-CCI’s software development lifecycle, the NRC inspection team determined that DRS-CCI design activities affecting software quality, software development design change, and modification recording were accomplished in accordance with the regulatory requirements of Criterion III, “Design Control,” of Appendix B to 10 CFR Part 50.

However, while assessing the implementation of DRS-CCI’s software verification and validation (V&V) program, the NRC inspection team discovered that a software engineer (a software designer), who had been a part of the independent V&V review effort, reviewed his own work.

The NRC inspection team determined DRS-CCI failed to appropriately establish and implement measures that prevent software design individuals or groups from verifying or checking their own work within independent verification and validation (I-V&V) processes. This failure to meet the technical independence requirements of Criterion III of Appendix B to 10 CFR Part 50, is identified as Nonconformance 99901417/2013-201-01.”

Also...

“While assessing these final software design documents, the inspectors discovered that a software engineer (a software designer who was a member of the design group) was also the IV&V reviewer (a member of the testing group who verified his own design work) for the above documents. The inspectors learned that DRS-CCI considered assigning design personnel to an IV&V review role was acceptable under ER7357/70 provisions and this example was not an isolated occurrence. However, the inspectors did not review other examples during the inspection.

The NRC inspection team determined this did not meet Criterion III, “Design Control,” of Appendix B to Title 10 of the Code of Federal Regulation (10 CFR) Part 50, and IEEE-1012 independent V&V requirements. This issue is identified as Nonconformance 99901417/2013-201-01.”

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance

DRS-CCI established its documentation review policies and procedures based upon many industry standards as well as lessons learned over the past 60 years of providing nuclear safety related equipment for industrial and US Navy nuclear customers. Some of these specifications are quoted here in support of the policies in place at the time of the US NRC inspection.

Criterion III, “Design Control,” of Appendix B to Title 10 of the Code of Federal Regulation (10 CFR) Part 50 specifically states,

“The verifying or checking process shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization.”

Regulatory Guide 1.162, Verification, Validation, Reviews, And Audits for Digital Computer Software Used In Safety Systems of Nuclear Power Plants, Section 3 Independence Of Software Verification And Validation states,

“Criterion I, “Organization,” requires that persons and organizations performing quality assurance functions report to a management level such that sufficient authority and organizational freedom exist, including sufficient independence from cost and schedule limitations. Quality assurance functions include “verifying, such as by checking, auditing, and inspection, that activities affecting the safety-related functions have been correctly performed.” Criterion III, “Design Control,” imposes an independence requirement for the verification and checking of the adequacy of the design, requiring that those who perform the verification and checking be persons other than those who performed the design.”

IEEE 1012, Annex C (Informative) states,

“Technical independence requires the V&V effort to utilize personnel who are not involved in the development of the software.”

IEEE 1028, IEEE Standard for Software Review, does not prohibit the author/designer from participation in any type of software review. The only restrictions on the author of a work product are stated in Section 6.2, Responsibilities:

“The following roles shall be established for the inspection:

- a) Inspection leader
- b) Recorder
- c) Reader
- d) Author
- e) Inspector

All participants in the review are inspectors. The author shall not act as inspection leader and should not act as reader or recorder. Other roles may be shared among the team members. Individual participants may act in more than one role.”

ER7357/70, Commercial Generic Software and Hardware Test Plan takes these referenced documents as well as others and incorporates them into the plan that governs how DRS-CCI internalizes these requirements. Section 1.5, Test Philosophy and Approach states:

“The design validation and production test verification described below is performed by personnel other than the hardware designer(s) or software author(s) of the work products under test in order to provide test independence. The respective test procedures will identify all test software and hardware. These must be under configuration control to the extent necessary to repeat the test at a later date with the identical results.”

DRS-CCI interpreted the statements above to indicate that the designer of the software was not allowed to participate in the formal testing of their own work products. The designers’ participation in the peer review of test procedures and test reports was viewed as a way to ensure that the test engineering personnel fully understood the operation of the software. Additionally, the process in place does not require the test engineer to implement all peer review comments. Each comment is evaluated on its own merit and it is the test engineers’ final say as to whether or not a comment is implemented.

Under no circumstances was the original designer/author involved in the performance of any verification testing of their own work product. DRS-CCI requires that any individual performing testing or recording of test data must be certified to perform such a function and they **cannot** be one of the designers/authors. In the case listed as the reason for this noncompliance, the software designer participated in the review of the Software Verification and Validation Phase Summary Reports. The reports were created by Test Engineers based upon the contract technical requirements and were

then reviewed by a group of knowledgeable engineers. The document author is responsible for evaluating any peer review comments and incorporating as appropriate.

The software engineer did not participate in the execution of any of the formal testing of the work products.

DRS-CCI has reviewed this non-compliance for potential reportability in accordance with 10 CFR Part 21 and has concluded this non-compliance has no impact to delivered equipment and is not reportable for the reasons given above.

Corrective steps that have been taken and the results achieved to date

DRS-CCI has taken several steps to address the noncompliance as a containment action prior to the implementation of more permanent solutions.

- 1) Meetings were held with the Engineering Functional Managers to discuss the noncompliance and the immediate steps to be put in place to ensure compliance. These steps are:
 - a. Make all the personnel currently working on commercial nuclear applications aware that they are not permitted to participate in formal reviews of V&V related documentation if they are the designer of the work product being evaluated.
 - i. Note that the designers can respond to questions from reviewers or other test personnel in the creation of the work products.
 - b. System Engineering is on every peer review. System Engineering will check to ensure that the designer is not assigned to the peer review of any V&V related documentation.
- 2) System Engineering reviewed all of the peer review comments to FME MOX V&V related work products to see if the comments provided by the software designer influenced the final work product in a negative way
 - a. This review found that none of the incorporated comments from the software designer were inappropriate.
 - b. Therefore no re-review of V&V documentation is required.

Corrective steps that will be taken to avoid future non-compliances

DRS-CCI will take several steps to enhance the existing processes to be more in line with the expectation of the US NRC:

- 1) The workflow within the DRS-CCI automated configuration management system (Peer Review Workflow Tool in Omnify) will be modified to change the required peer review participants for V&V related documentation (Test Procedures, Test Reports, V&V Summary Reports, etc.). The workflow will require the Engineering Functional Managers, rather than the designers, to be included in the peer review. The Engineering Functional Manager will have the option of reviewing the documents themselves or assigning the review to another engineer not involved in the development of the product.

The Peer Review stage name within Omnify will be modified to indicate that the Configuration Item (CI) designer cannot participate in the review. In this way, if there is an inadvertent assignment, the CI designer will alert their Functional Manager of the mis-assignment.

In addition the following documents will be updated to address the new work flow and the

restriction on the designer during the peer review process as appropriate.

- 2) ER7357/70, Commercial Generic Software and Hardware Test Plan, SEP-10-02-DBY, Procedure for Document/Part Identification & Release-Danbury,
- 3) SEP-05-02, Peer Review Process,
- 4) SEP-10-02-W01-DBY, Work Instruction for Engineering Change Orders (ECOs)-Danbury,

Date when all corrective actions will be completed

DRS-CCI commits to having corrective action 1 completed by May 31, 2013 and corrective actions 2, 3 and 4 completed by August 31, 2013.