

February 1, 2016

Mr. Patrick Troy, Program Licensing Manager  
Nuclear Systems & Solutions  
Lockheed Martin Missiles and Fire Control  
459 Kennedy Drive  
Archibald, PA 18403

SUBJECT: AUDIT REPORT FOR OCTOBER 26-30, 2015, AUDIT OF LOCKHEED MARTIN NUCLEAR SYSTEM AND SOLUTIONS, REQUEST FOR REVIEW OF THE NUPAC\_ED610000-47-P, "GENERIC QUALIFICATION OF THE NUPAC PLATFORM FOR SAFETY-RELATED APPLICATIONS," TOPICAL REPORT (TAC NO. ME7900)

Dear Mr. Troy:

By letter dated June 28, 2011 (Agencywide Documents Access and Management System Accession Number ML11201A323), Lockheed Martin (LM) Nuclear Systems and Solutions submitted a topical report (TR) NuPAC\_ED610000-47-P, Revision -, which proposes to use a generic digital safety instrumentation and control platform (i.e., the Nuclear Protection and Control (NuPAC) platform) to implement Class 1E safety-related applications in United States nuclear power plants. The TR is for a generic platform, not a plant-specific implementation.

From October 26, 2015, through October 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff performed a regulatory audit of the Dunmore, Pennsylvania, facilities of LM. The audit was conducted to support the NRC staff evaluation of the NuPAC TR.

The purpose of this letter is to provide LM with the results of the regulatory audit. Documented in the report are the observations the NRC staff identified during the audit.

If you any questions or require any additional information, please feel free to contact me at 301-415-7297 or [Joseph.Holonich@nrc.gov](mailto:Joseph.Holonich@nrc.gov).

Sincerely,

*/RA/*

Joseph J. Holonich, Sr. Project Manager  
Licensing Processes Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Project No. 780

Enclosure:  
As stated

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DATE	1/4/2016	12/21/2015	1/5/2016	1/13/2016	2/1/2016

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AUDIT REPORT  
LOCKHEED MARTIN NUCLEAR SYSTEM AND SOLUTIONS,  
NUPAC ED610000-47-P, "GENERIC QUALIFICATION OF THE NUPAC PLATFORM FOR  
SAFETY-RELATED APPLICATIONS," TOPICAL REPORT  
(TAC NO. ME7900)

**Background:** By letter dated June 28, 2011 (Agencywide Documents Access and Management System Accession Number ML11201A323), Lockheed Martin (LM) Nuclear Systems and Solutions submitted a topical report (TR) NuPAC\_ED610000-47-P, Revision -, which proposes to use a generic digital safety instrumentation and control platform (i.e., the Nuclear Protection and Control (NuPAC) platform) to implement Class 1E safety-related applications in United States nuclear power plants. The TR is for a generic platform, not a plant-specific implementation.

The U.S. Nuclear Regulatory Commission (NRC) staff has conducted an audit. The results of the audit are documented in this report.

**Material Used:**

- Electronic Access (for viewing) to project documents
- Software Safety Plan (and 3 Vulnerability Assessments)
- Baseline Definition Document for version 1.3.1
- NuPAC Failure Modes and Affects Analysis (FMEA)
- Cyber Security related documents and associated corrective actions

**Team Assignments:** Norbert Carte, Team Lead  
Royce Beacom, Peer Reviewer  
Rui Li, Cyber Security

**Logistics:** The audit started at 11:00 a.m. on Monday, October 26, 2015 (Kickoff and Introductions).  
The audit was completed at 11:00 a.m. on Friday, October 30, 2015.

**Material Covered:**

**Requirements Traceability:** The majority of the audit was spent tracing technical and process related criteria from their source to their implementation. The technical tracing focused on design side development and verification, not verification and validation (V&V); a V&V Audit is scheduled for early 2016. The process criteria include the development and implementation processes.

During the course of this tracing, several discrepancies were identified, and LM promptly entered the discrepancies into their corrective action program. The resolution of these will be evaluated as part (i.e., corrective actions) of the Appendix B audit scheduled for February 2016. LM uses several software tools for configuration management and documentation of requirements tracing. The LM staff was able to trace the requirements (except as noted) using these tools.

Enclosure

**Quality Assurance (QA) Summary Assessment:** The audit reviewed and discussed several randomly selected items from the QA Summary Assessment Report. This report identified issues raised during any part of the programmable logic process with the resolution as reported by the QA group based on the previous baseline version. An example issue raised involved the Contract Management Plan and the statement of work for software suppliers. V&V does a similar type of assessment related to a technical review of the process that may be looked at for the next version of the baseline during the V&V audit.

**Failure Modes and Affects Analysis (FMEA):** The FMEA associated with an application framework (e.g., the NuPAC TR) addresses each field-replaceable module. This FMEA should document how much of these module's behavior is impacted by individual component failures, and how these component failures can be identified and/or mitigated. This information would then be used during application specific system design in order to design a redundant system to be able to meet the single failure criteria. A sample of items in the NuPAC FMEA was discussed in detail, and it was concluded that LM should thoroughly review the FMEA to ensure accuracy and usability during the application development phase.

**Secure Development and Operational Environment (SDOE):** During the onsite audit, the staff examined the Software Safety Plan and three related vulnerability assessments. Not all items from the most recent vulnerability assessment were implemented; therefore, the SDOE assessment was postponed until the next audit. LM's general approach to ensuring no unwanted or undocumented code in the Core Programmable Logic (PL) consists of two parts: (1) a system of controls to ensure no unwanted or unauthorized code is introduced, and (2) a comprehensive review of the final software to assure a one-for-one correspondence with project documentation.

**Cyber Security:** During the onsite audit, the staff also conducted a cyber security review. Lockheed Martin is not required to comply with Title 10 of the *Code of Federal Regulations* (10 CFR) 73.54 though any product an NRC licensee purchases from LM may require compliance with 10 CFR 73.54.

The NRC staff's cyber security review focused on the Trinity Facility located in Fort Worth, Texas. The NRC staff reviewed LM's cyber security implementation guidance documents and site network architecture layouts in addition to interviewed Information Technology (IT) staff and performed walk down of key IT and security systems.

The NRC staff observed that LM has a robust corporate cyber security program in place and has a cyber safety conscience culture. Its cyber security guidance documents and diagrams were well laid out. The NRC staff also noted that Lockheed Martin has a corrective action program which self-identified deficient issues for resolution. While on site, the NRC staff reviewed several examples of these self-identified incidents and the Trinity Facility staff demonstrated that they were promptly (after the identification) corrected.