

April 4, 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 FEBRUARY 8-12, 2016, 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 No. ML11201A323), Lockheed Martin 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 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 February 8 through February 12, 2016, the U.S. Nuclear Regulatory Commission (NRC) staff performed a regulatory audit of the Trinity Road, Texas, 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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**ADAMS Accession No.: ML16069A237**

**\* concurrence via e-mail**

OFFICE	DPR/PLPB/PM	DPR/PLPB/LA	DPR/EICB/BC	DPR/PLPB/BC	DPR/PLPB/PM
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DATE	3/28/2016	3/22/16	3/29/2016	4/1/2016	4/4/2016

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AUDIT REPORT FOR FEBRUARY 8-12, 2016, AUDIT OF  
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)

Instrumentation and Controls Branch

**Background:** By letter dated June 28, 2011 (Agencywide Documents Access and Management System Accession Number ML11201A323), Lockheed Martin 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 instrumentation and controls technical review branch has conducted an audit, as described in below.

**Material Used:**

- Electronic access (for viewing) to project documents
- NuPAC Programmable Logic Design Rev. C January 31, 2016
- NuPAC Generic Logic Module Test Plan Rev. A May 19, 2014
- Software Tool Evaluation Plan Rev. F January 22, 2015
- Reporting of Defects and Failures to Comply to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 21 for Commercial Nuclear Projects June 04, 2015
- MCD\_Configuration Management Rev. F December 28, 2015
- Component Test Design Rev. A November 04, 2015
- Component Test Plan Rev. A November 04, 2015
- Integration Test Plan Rev. C February 02, 2015
- Decision Management, No. 3-2-097, dated August 28, 2014
- Software Configuration Item Development, No. 3-2-103, dated August 28, 2014
- Configuration Management Process, No. 3-2-113, dated February 2, 2016
- Corrective Action Procedure dated June 01, 2015
- Commercial Grade Item/Service Dedication Plan Rev. C October 08, 2014
- SOW 610400-202 (Contains Standards and Regulatory requirements for a project) Rev. B September 16, 2015
- Control of Measuring and Test Equipment Rev. A November 25, 2014
- Control of nonconforming Items Rev. B November 16, 2015
- Software Tool Evaluation Report - Questa Rev. C February 01, 2016
- NuPAC Test Equipment Integration, Verification, and Validation Plan Rev. A February 25, 2014

**Team Assignments:** Norbert Carte: Team Lead  
Jose Jimenez: QA/Appendix B

Enclosure

**Logistics:** The audit started at 2:00 pm on Monday, February 8, 2016 (Kickoff & Introductions).

The audit was completed at 10:00 am on Friday, February 12, 2016.

**Material Covered (Quality Assurance Implementation/Verification):**

The U.S. Nuclear Regulatory Commission (NRC) audit team reviewed Lockheed Martin's policies and procedures to verify compliance with Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. In addition, the NRC audit team reviewed a sample of the quality assurance (QA) program implementation in the development of the NuPAC platform. In addition to reviewing the NuPAC quality assurance plan revision E, dated October 2nd, 2015 -NuPAC\_QAP610000-001 and its respective second tier procedures addressing 10 CFR Part 50 Appendix B 18 Criteria, the NRC staff verified implementation of the QA program by reviewing a sample of these documents: software design verification, software control changes, configuration management procedure, software safety plan, software development plan, corrective action procedure, stakeholder requirements definition, component test design, integration test plan, problem change request, and software tool evaluation plan. The sample of completed documentation included evaluation of management reviews, drawings, determination of technical evaluations, and selection of methods of acceptance of test results.

The NuPAC platform development was initiated under Lockheed Martin QA program. A review of the program showed it lacked the necessary elements to adequately address the requirements of 10 CFR Part 50 Appendix B. Lockheed Martin identified this weakness during a self-assessment prior to the NRC audit. As a result of the self-assessment Lockheed Martin identified a series of corrective actions. The biggest action was the development of a companywide 10 CFR Part 50 Appendix B QA program. The NuPAC development will be transitioned to this companywide QA program which will be used also for any future safety-related activity. The NRC staff selected samples of the initial and the revised QA program (i.e., design control, instructions, procedures and drawings, document control, test control, nonconformance, and corrective actions) to verify the quality of activities performed so far in support of the topical report. This sample included a review of Lockheed Martin's design procedures, audit and test requirements, personnel qualification, management oversight, and corrective actions for the NuPAC design, validation, and verification activities.

During the audit, the NRC staff specifically reviewed Lockheed Martin's GAP analysis (e.g., between the old and the revised QA program) from the self-assessment to verify the characterization of the weaknesses identified in their current QA program adequately reflected the reality of activities observed and to ensure the proposed corrective actions address these weakness. One of the key areas identified was the lack of procedures that specifically provide guidance for activities in the areas of design control and test controls. It also identified that procedures developed to implement the Appendix B criteria lacked enough details and rigor to provide reasonable assurance activities would be performed in a quality manner. The NRC staff interviewed personnel responsible for the NuPAC design and test activities to verify that the work was performed by qualified individuals and that there were adequate quality check points in place even though there was a lack of adequate procedures. The documentation reviewed and conversations with Lockheed Martin personnel provided a level of assurance that while previous work was not performed in full compliance of 10 CFR Part 50 appendix B requirements; however, based on the staff's review of the technical work process, and

interviews with the technical staff, the NRC staff determined there was an adequate level of quality in the work completed so far (in part due to the rigor of the V&V processes currently underway). The NRC staff determined that the corrective actions, if implemented as proposed, will ensure Lockheed Martin QA activities for the NuPAC platform will meet the regulatory requirements.

The NRC audit team concluded that while during the development of the NuPAC platform Lockheed Martin's implementation of quality assurance program was inadequate, enough corrective actions have been developed to ensure current and future activities will be performed in accordance with the regulatory requirements of Criterion II, "Quality assurance Program," of Appendix B to 10 CFR Part 50.