October 5, 2010

MEMORANDUM TO: Hossein Hamzehee, Chief
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Division of New Reactor Licensing
Office of New Reactors

FROM: Michael Takacs, Project Manager ***/RA/***
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SUBJECT: AUDIT REPORT FOR THE PHYSICAL SECURITY ELEMENT OF THE U.S. ADVANCED PRESSURIZED-WATER REACTOR DESIGN CERTIFICATION APPLICATION AND THE COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4, COMBINED LICENSE APPLICATION

The U.S. Nuclear Regulatory Commission (NRC) staff conducted two concurrent audits (hereafter referred to as an audit) of the physical security element for both the Mitsubishi Heavy Industries, Ltd. (MHI) United States - Advanced Pressurized Water Reactor (US-APWR) design certification application and the Luminant Generation Company, LLC. (Luminant) Comanche Peak Nuclear Power Plant, Units 3 and 4, (CPNPP, Units 3 and 4) Combined License Application (COLA) at Glen Rose, Texas, on May 10 - 13, 2010. The purpose of the audit was to examine the associated documentation pertaining to the design bases for physical protection incorporated into the US-APWR standard design, including MHI technical reports (UAP-SGI-08001, Revision 2, "US-APWR Design Certification Physical Security Element Review" and UAP-SGI-08002, Revision 1, "US-APWR High Assurance Assessment Evaluation Report," revised and submitted on December 19, 2009, and January 22, 2010, respectively) and for the design and licensing basis described in Part 2 and Part 8 of the CPNPP, Units 3 and 4, COLA.

The results of the audit are documented in the enclosed report. The information related to the subject matter contains safeguards, security-related, and/or proprietary information of which the details are protected in accordance with 10 CFR 73.21 and 10 CFR 2.390. The NRC audit team found both MHI staff and Luminant staff very cooperative and forthcoming in their support of the audit and provided information and insights of the design and licensing basis for certification and licensing.

Docket Nos. 52-021, 52-034, 52-035

Enclosure:
Audit Report

cc: See next page

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AUDIT REPORT

The U.S. Nuclear Regulatory Commission (NRC) staff audit of the Physical Security component for both the United States - Advanced Pressurized Water Reactor (US-APWR) Design Certification (DC) application and the Comanche Peak Nuclear Power Plant, (CPNPP) Units 3 and 4, Combined License Application (COLA).

INTRODUCTION

The NRC staff conducted an audit of the Physical Security component, for the most part Safeguards Information (SGI), of Chapter 13.6 for the US-APWR DC application, and Part 2 (FSAR Chapter 13.6 Physical Security) and Part 8 (Physical Security Plan) for the CPNPP COLA. The audit was conducted at the Engineering Building at the CPNPP, Units 1 and 2, in Glen Rose, Texas during the period of May 10 - 13, 2010. The NRC staff conducted the audit in accordance with the NRC Office of New Reactors (NRO) Office Instruction: NRO-REG-108 Regulatory Audits. The plans for the audit are documented in ADAMS Accession Numbers ML101130433 and ML101130494 dated May 3, 2010.

PARTICIPANTS

The following NRC staff members from NRO, the Office of Nuclear Security and Incident Response (NSIR), and NRC Contractors participated:

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DOCUMENTS REVIEWED

- UAP-SGI-08001, "US-APWR Technical Report - Design Certification Physical Security Element Review," R2
- UAP-SGI-08002, "US-APWR Technical Report - High Assurance Evaluation Assessment," R1
- US-APWR Design Control Document, FSAR, Chapter 19, Probabilistic Risk Assessment and Severe Accident Evaluation
- MUAP-07030, US-APWR Technical Report - Probabilistic Risk Assessment," R0
- Fire Areas and Fire Zones List, N0-CG00102, Rev. 1, Mitsubishi Heavy Industries, Ltd.

- DCD Hazard Analysis, P&IDs on which location information of components is added, 4CS-UAP-20070207, Rev. 1 Mitsubishi Heavy Industries, Ltd.
- MUAP-DC001, "Design Control Document for the US-APWR," Revision 2, October 2009.
- Tanaka, F., et al. US-APWR Probabilistic Risk Assessment, MUAP-07030, Mitsubishi Heavy Industries, December 2007.
- UAP-SGI-10001, "Blast Analysis for the Standard Plant"
- UAP-SGI-10002, "Large Blast Analysis for the Comanche Peak Units 3 and 4," R1
- UAP-SGI-10003, "Small Blast Analysis for the Comanche Peak Units 3 and 4," R0
- UAP-SGI-10004, "Comparison of the PS/B Wall to Sandia Report SAND77-0777
- MNES - GN-ED-100002, Security Conceptual Design - Bullet and Blast Resistant Enclosure
- MNES - GN-ED-100003, Security Conceptual Design - Central Alarm Station and Secondary Alarm Station
- MNES - GN-ED-100004, Security Conceptual Design - Intrusion Detection System
- MNES - GN-ED-100005, Security Conceptual Design - Protected Area Camera and Video Systems
- MNES - GN-ED-100006, Security Conceptual Design - Protected Area Fence and Nuisance Fence
- MNES - GN-ED-100007, Security Conceptual Design - Security Access Control System
- MNES - GN-ED-100008, Security Conceptual Design - Security Communications Systems
- MNES - GN-ED-100009, Security Conceptual Design - Security Computer System
- MNES - GN-ED-100010, Security Conceptual Design - Implementation of the Electrical Equipment in the Physical Protection System
- MNES - GN-ED-100011, Security Conceptual Design - Security Lighting
- MNES - GN-ED-100012, Security Conceptual Design - Security Power
- MNES - GN-ED-100013, Security Conceptual Design - Vehicle Barrier System

Audit Activities

MHI and Luminant presented overviews of the process applied in identifying vital equipment, the development of target sets, the results of evaluations, and information related to the design and licensing bases for the physical protection of the proposed CPNPP, Units 3 and 4. MHI and Luminant discussed plans to supplement information currently on the docket for vital equipment described in the DC application and clarify the interface between the DC and the COLA. The staff reviewed the following: (1) information related to the technical bases, assumptions, and results of technical evaluations and calculations supporting the identification of vital equipment based on the standard design, (2) the designations of vital area boundaries, (3) the listing and assumptions for identified safety functions and systems that must be protected to prevent core damage and the loss of spent fuel pool cooling, (4) the assumptions and technical bases for time to core damage, and (5) the design and licensing assumptions and technical bases for physical protection systems designed to protect nuclear island structures containing target set safety functions and systems.

NRC Staff Observations

Overall, the audit provided information to support the understanding of how MHI currently evaluated and determined vital equipment, designated vital areas boundaries, and developed (including assumptions made) for the resulting target sets for the US-APWR standard design. The audit also provided insights of Luminant's supporting evaluations and documentation of

design bases for physical protection systems incorporated into the standard design and credited security functions described in the COLA, including evaluations of minimum safe stand-off distance to protect the standard plant against postulated explosive threats.

Exit Briefing

The following is a summary of observations and potential issues the staff communicated to MHI and Luminant during the audit and reiterated at the exit briefing. The identified potential concerns or issues will be appropriately communicated in the form of NRC supplemental requests for additional information (RAIs) to ensure the appropriate design and licensing bases information is on the docket to support the technical bases for appropriate regulatory findings for the US-APWR design certification and CPNPP, Units 3 and 4 COLA.

1. Vital Equipment - Staff noted that MHI plans to revise assumptions needed for identifying as vital equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release, as defined in 10 CFR 73.2. The staff also noted that reactivity control safety functions have not been considered. MHI plans to revise technical reports to eliminate reference to NUREG 1178 as a basis for determining vital equipment and target sets. MHI plans to provide supplemental information on the docket regarding a complete and accurate list of vital equipment.

2. Target Sets - The staff noted that the MHI process for identifying target sets (e.g., safety functions and systems that must be maintained and available to prevent core damage and loss of spent fuel pool cooling) was systematic, sufficiently thorough, and transparent. The process resulted in detailed functions and system descriptions of target sets based on the US-APWR standard plant. However, MHI eliminated as target sets the safety functions and systems, if unavailable, that requires greater than 8 hours before the occurrence of core damage or the loss of spent fuel pool cooling, without descriptions of reasonable and sound technical justifications. The staff noted this as an issue. The applicants (MHI/Luminant) plan to provide supplemental information that justifies applying the 8-hr criteria based on management and administrative controls that would allow operators to take mitigating actions to prevent the occurrence of core damage or loss of spent fuel pool. The staff was not provided with information on mitigating actions, including required equipment that will be needed to successfully perform mitigating actions or how management and administrative controls would assure the reliability and availability for both safety and security required operations and security response to mitigate the initiated sequences of events for core damage or the loss of spent fuel pool cooling. The staff also noted a number of areas for identifying target set processes and results that requires clarification and/or additional information for completeness (e.g., operator actions, evaluation of main steam system functions, considerations of cables and instrumentation and controls, considerations of common equipment and selected initiating event that potentially cause multiple loss of safety-functions or target set elements, completeness of target set). The staff plans to issue supplemental RAIs for MHI/Luminant to provide appropriate technical bases justifying the application of eight hour criterion to the docket, including the considerations of specific COL information items.

3. Blast Analyses - The NRC staff noted that MHI blast analysis for the standard plant supports the minimum safe stand-off distances indicated in MHI TR UAP-SGI-08002. However, the blast analyses performed had not analyzed non-structural elements (e.g., doors, windows, equipment hatches, missile doors, or other penetrations) and potential effects for the postulated and analyzed vehicle bomb threats. The NRC staff also noted that the waterborne bomb threat has not been analyzed or documented to support conclusion in Part 8 of the COLA and the MHI evaluation documented in UAP-SGI-10004 did not evaluate all available methods that could significantly alter the results and conclusions for delays provided by walls and assumptions applied for structural members of the nuclear island. The staff plans to issue supplemental RAIs for MHI and/or Luminant to appropriately re-evaluate, determine impacts, and re-assess current technical assumptions, results, and conclusions for the design and licensing bases to address defense-in-depth of the proposed physical protection system for assurance of adequate protection against the DBT and to capture appropriate summaries, results, and supporting references on the docket.

4. Interface between DC and RCOLA - Luminant clarified the applicability of information currently contained in MHI TR UAP-SGI-08002, Appendix A, Example Protective Strategy for US-APWR Reference Plant, to the COLA and plans to incorporate by reference Appendix A to address the design and licensing bases for the physical protection of CPNPP, Units 3 and 4. Luminant plans to supplement information in the COLA that would clearly indicate that Appendix A of the UAP-SGI-08002 is relied on as part of the design and licensing bases for meeting requirements of 10 CFR 73. On the basis that the information will be incorporated by reference, the staff plans to review and provide appropriate RAIs as needed on the design and licensing bases described and applicable to the COLA.

5. Design Bases for Physical Protection Systems - The NRC staff noted that supporting documents on design of physical protection systems (i.e., intrusion detection, Protected Area (PA) camera and video, PA fence and nuisance fence, security access control, security communications, security computer, security lighting, security power, vehicle barrier system) contained details of design bases and references to industry standards or guidance (e.g., IEEE, NFPA, GSA, etc) for the physical protection systems described in the DC and COLA. The review design details and standards, along with opportunity during the site tour to observe similar design and construction of physical barriers (e.g., vehicle barrier system, vehicle access sally port, blast/ballistic resistant enclosures, etc.), provided the staff with insights to proposed physical protection system designs. However, sufficient and appropriate details of design, configuration, and interfacing systems for the design of physical protection systems (e.g., access controls, interior and exterior intrusion detection and assessment system design and interface, configuration of protected area delay and detection and VBS, etc.), have not been captured on the docket to demonstrate the reliability and availability of systems to meet intended security functions or performances. The level of detail for the design (including locations, configurations, and interfaces) of physical protection systems should conform to guidance in Regulatory Guide 1.206. The applicants plan to provide supplemental information on the appropriate dockets to address the level of detail in MHI TR UAP-SGI-08002 or Part 8 site specific information. The staff plans to prepare supplemental RAIs as appropriate to request additional information on the subjects indicated.

6. Defense-in-Depth of Security Response - The staff noted that the planned internal response (e.g., initial response and plans for re-deployment) and design of engineered delays and barriers within the nuclear island were reasonably well planned and described based on locations of target sets for core damage of the US-APWR standard design and the postulated pathways and scenarios analyzed. However, the staff noted the following: (a) the defense-in-depth of response (internal and/or external) has not considered or addressed uncertainties outside of the postulated pathways and scenarios analyzed. Defense-in-depth protection must consider pathways and scenarios that include explosive breaching of structural walls or other penetrations and ascending/descending available internal or external horizontal or vertical pathways (e.g., walls, ventilation ducts, utility/maintenance tunnels, and elevator shafts) that are other than normal ground level access pathways (i.e., doorways and stairs) to provide assurance that internal and external responses planned will provide defense-in-depth protection that reasonably bounds all credible scenarios within the DBT adversarial characteristics and capabilities; (b) the defense-in-depth or layered protection for the reliability and availability of opportunities for security responders to interdict adversaries to deny access at the nuclear island and structures has not been fully analyzed and/or documented for all credible pathways and scenarios; (c) the descriptions of engineered systems required and credited for detection, assessments, and proposed defensive positions (or BRE/BBRE) to enable and provide opportunities for protected security responders with overlapping fields of fire for reliability and availability of interdictions at the boundaries of the nuclear island and structures are not documented for a layered protection; and (d) the plans for deploying armed security officers, along with required engineered physical protection systems, to interdict adversaries has not been described and/or documented in supporting documents or adequately described to assure reliability and availability in the information currently on the docket.

Maximum Distance Credited for Overlapping Fields of Fire: The staff noted that the application of NEI 05-05 guidance for force-on-force exercise as licensing assumptions for the capabilities of security responders to acquire and neutralize a moving target under naturally occurring or adversary initiated environmental conditions, for the maximum distance credited for overlapping fields of fire, will require a high standard for initial training and qualification and continued training to maintaining proficiency to meet assumptions. The assumptions stated above, the proposed physical configuration of BBRE/BREs currently described in Appendix A, the assumptions of required time for initiating security response (i.e.,IDS alarm, assessment of threat, and communications to sector or zone of intrusion), the task time required to acquire target, and the available windows of opportunities to engage targets has not been fully considered or described for the assurance of reliability and availability for interdiction of adversaries. The staff plans to prepare supplemental RAIs as appropriate to request additional information on the subjects indicated.

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