

December 17, 2013

COMPANY: GENERATION MPOWER, LLC.

DESIGN: MPOWER™ SMALL MODULAR REACTOR DESIGN

SUBJECT: SUMMARY OF NOVEMBER 14, 2013 PUBLIC MEETING REGARDING  
THE MPOWER DESIGN SPECIFIC REVIEW STANDARD INSTRUMENTATION  
AND CONTROLS TOPICS

On November 14, 2013, a public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and members of the public at NRC Headquarters, Three White Flint North, 11601 Landsdown Street, Rooms 01-C03/01-C05 North Bethesda, Maryland. The purpose of this meeting was to discuss the instrumentation and controls (I&C) topics in the mPower design specific review standard (DSRS).

The meeting began with a presentation on hazard analyses (HA). The NRC staff acknowledged that hazard analysis is not a requirement which is why it is included in the Design Specific Review Standard (DSRS) as an appendix. The HA appendix can be used as an organizing framework by mPower. The NRC staff outlined what are considered I&C hazards and the regulatory basis provided in IEEE Std. 603-1991. They identified the benefits of a good HA and how much detail should be included in the application. The staff pointed out that the HA is a "living" document since it takes place throughout the software development lifecycle. The staff clarified that HA interacts with other disciplines but this appendix to DSRS chapter 7 is specific to I&C. There was some discussion of what belongs in Tier 2 vs. ITAAC. The staff noted that this would be dependent on the complexity of the digital I&C system architecture, however, generally verification and validation would be completed as ITAAC. NRC staff feels they can make findings without a digital I&C platform selected as long as hazards, constraints, and architecture are well specified. The effects of non-safety systems on safety systems were also discussed as an important consideration when developing a HA. A question was asked if there were any plans to change the DSRS at this point. NRC staff is actively working on resolving comments and a final DSRS should be issued prior to submittal of the mPower application.

The next presentation was on the coordination of Chapter 7 and 17 reviews for quality of I&C systems. DSRS Section 7.2.1 attempts define the interface between Chapter 7 and Chapter 17 in order to avoid duplication of effort for both applicants and NRC staff, and to ensure that there are no gaps in the review. DSRS 7.2.1 is focused on software Quality Assurance (QA) with special attention paid to software-specific development processes. The staff performing the I&C review plans to leverage the review performed in Chapter 17 where appropriate. The staff noted that it is appropriate for mPower to point to information provided as part of Chapter 17 in order to satisfy Chapter 7 requirements. There was a brief discussion on regulatory findings for software quality assurance (QA). The NRC staff responded that if there are any deviations then an explanation as to why that choice was made is needed, whether it is QA, seismic, or other area of review. The topic of the next presentation was control of access. NRC staff discussed the regulatory framework that addresses a Secure Development and Operational Environment (SDOE) (10 CFR Part 50), and malicious activity including cyber security (10 CFR Part 73).

There is no cyber security regulation applicable to design certification applications; rather, the responsibility is placed on the CP/ OL or COL applicant. Cyber security is programmatic and performance based due to the changing nature of technology. The NRC staff discussed the review of the digital safety systems as described in the DC for inadvertent or non-malicious activity. The review focuses on the prevention of unauthorized access to the system and prevention of undesirable behavior of connected systems that would affect operations. Features that may have been installed for a cyber security purpose can be credited for controlling access or establishing system independence. However, the Design Certification review will only evaluate the design against Part 50 requirements and will not make any conclusions relative to the design features serving a cyber security purpose. There was a discussion about connecting safety related and non-safety related systems. In this case, the non-safety related system would need the same cyber security protection as the safety related system unless there was one way communication from the system. During the cyber security discussion, the staff mentioned that the make-up of the cyber security team should include people with diverse backgrounds (cyber, engineering, maintenance, physical security) so that the system is secure, operable, and does not add to the complexity of the design unnecessarily. There was a question regarding the frequency of updates to the cyber security plans. NRC staff responded they are considered programmatic and there should be periodic assessments and a constant vigilance to maintain safety and security.

The final presentation topic focused on the embedded digital device issue in plant safety and design certification. The staff outlined what would be considered an embedded digital device, clarified the NRCs technical position regarding embedded digital devices, and expectations for applicants. The NRC staff position is that if an embedded digital device performs or supports a safety function, then it should be treated consistent with the associated regulations and guidance for the system or component. The NRC staff also pointed out that regulations are not expected to apply to all embedded digital devices since the designed function of some embedded digital devices could be fairly innocuous. There was a discussion on firmware devices which are a subset of embedded digital devices that have executable code or software developed logic that is permanently or semi-permanently installed within the device. The NRC staff stressed that the NRC regulations and guidance does not exempt applicants and licensees from responsibility for awareness of potential safety vulnerabilities from embedded digital devices in procured equipment simply because they are firmware devices. Applicants are encouraged to solicit vendor disclosure of embedded digital devices in components specifications as part of the purchasing process.

The meeting agenda and meeting attendees are included in Enclosures 1 and 2. NRC staff slide presentations are available through the Agencywide Documents Access and Management System (ADAMS). The ADAMS accession numbers for the public slide presentations are ML13317A006 for DSRS Chapter 7, Appendix A: I&C Perspectives on Hazard Analyses (HA), ML13317A003 for Coordination of Chapter 7 and 17 Reviews for Quality of I&C Systems, ML13317A005 for NRC Perspectives on Control of Access: Secure Development and Operational Environment (SDOE) & Cyber Security, and ML13317A004 for Embedded Digital Device Issue in Plant Safety and Design Certification. ADAMS is the system that provides text and image files of NRC's public documents. Documents are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. If you do not have access to ADAMS or have problems accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) staff at 1-800-397-4209, 301-415-4737, or [pdr@nrc.gov](mailto:pdr@nrc.gov).

Please direct any inquiries to me at 301-415-5864, email: [Courtney.StPeters@nrc.gov](mailto:Courtney.StPeters@nrc.gov), or Joelle Starefos at 301-415-6091, email: [Joelle.Starefos@nrc.gov](mailto:Joelle.Starefos@nrc.gov).

Sincerely,  
**/RA/**

Courtney St. Peters, Project Manager  
Small Modular Licensing Branch 1  
Division of Advanced Reactors and  
Rulemaking  
Office of New Reactors

Project No.: 0776

Enclosure:

1. Agenda
2. List of Attendees

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Please direct any inquiries to me at 301-415-5864, email: [Courtney.StPeters@nrc.gov](mailto:Courtney.StPeters@nrc.gov), or Joelle Starefos at 301-415-6091, email: [Joelle.Starefos@nrc.gov](mailto:Joelle.Starefos@nrc.gov).

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**ADAMS ACCESSION No.: ML13339A524**

**NRC-001**

<b>OFFICE</b>	PM:NRO/DARR/SMRLB1	PM:NRO/DARR/SMRLB1
<b>NAME</b>	CStPeters	JStarefos
<b>DATE</b>	12/06/2013	12/17/2013

**OFFICIAL RECORD COPY**

## **AGENDA**

### **AGENDA FOR PUBLIC MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND MEMBERS OF THE PUBLIC**

**THURSDAY, NOVEMBER 14, 2013; 9:30 a.m. - 4:30 p.m.  
TWO WHITE FLINT NORTH, ROOM T08-A01**

<b>TIME</b>	<b>TOPIC</b>	<b>LEAD</b>
9:30 am – 9:40 am	Introductions	NRC
9:40 am – 11:00 am	Hazard Analysis Presentation	NRC
11:00 am – 11:10 am	Break	All
11:10 am – 11:55 am	Hazard Analysis Q&A	NRC
11:55 am – 12:00 pm	Public Opportunity to Discuss with NRC	NRC/Public
12:00 pm – 1:00 pm	Lunch	All
1:00 pm – 2:00 pm	Software Quality Assurance	NRC
2:00 pm – 2:15pm	Break	All
2:15 pm – 4:10 pm	Emerging Issues	NRC
4:10 pm – 4:15 pm	Public Opportunity to Discuss with NRC	NRC/Public
4:15 pm – 4:30 pm	Closing Remarks	NRC

## ATTENDANCE LIST

**PUBLIC MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC)  
STAFF AND MEMBERS OF THE PUBLIC  
November 14, 2013**

NAME	ORGANIZATION
Courtney St. Peters	NRC
Tim Mossman	NRC
Tony Lentz	Bechtel mPower
Deanna Zhang	NRC
Chester Poslusny	B&W mPower
Paul Kumar	B&W mPower
Patrick Troy	Lockheed Martin
Steve Pope	B&W mPower
Darrell Gardner	Generation mPower
Hanh Phan	NRC
Joshua Moore	Safeware Engineering
Luis Betancourt	NRC
Brian Arnholt	Generation mPower
John Rycyna	NRC
Jean-Claude Dehmel	NRC
Dan Santos	NRC
Eugene Eagle Jr.	NRC
Sushil Birla	NRC
Khoi Nguyen	NRC
Brian Thomas	NRC
Ron LaVera	NRC
Jack Y. Zhao	NRC
Dinesh Taneja	NRC
Yaguang Yang	NRC
Christina Antonescu	NRC
Terry Jackson	NRC

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<b>NAME</b>	<b>ORGANIZATION</b>
Rodger Magness	Generation mPower
Yanely Malave	NRC
William Roggenbrodt	NRC
Joelle Starefos	NRC
Jan Mazza	NRC
Demetrius Murray	NRC
Arlon Costa	NRC
Mark Burzynski	Rolls-Royce
Jason Pottorf	NuScale
Will Rodgers	Lockheed Martin