Enclosure 9

Technical Report MPWR-TECR-005005 (Redacted) babcock & wilcox nuclear energy

Task Analysis
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B&W mPower™
a progressive energy solution

B&W mPower™ Reactor Program
Babcock & Wilcox Nuclear Energy, Inc.
109 Ramsey Place
Lynchburg, VA 24501

This is a pre-application document and includes preliminary B&W mPower Reactor design or design supporting information and is subject to further internal review, revision, or verification.

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SIGNATURES			
Prepared By:	Daniel Laughman	[signature]	5/30/12
	Name	Signature	Date
Reviewed By:	Dominick LoGalbo	[signature]	5/30/12
	Name	Signature	Date
Approved By:	Thomas Graham	[signature]	5/31/12
	Name	Signature	Date

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ABSTRACT

This technical report describes the portion of the human factors engineering (HFE) program that analyzes tasks that form the safety functions and have high economic or operating impacts. The task analysis process described in this document contains three major subdivisions (i.e., initial task analysis, staffing and qualifications, and design assessment). The initial task analysis is treated in a static (tabletop) methodology. Staffing and qualifications are analyzed under this process and therefore, no separate process is developed for staffing and qualification analyses. As the design progresses and mockups and simulators are developed, the design assessment is a more dynamic evaluation of these tasks. Although this report focuses on the Babcock and Wilcox mPower™ HFE activities, the process and tools can be used by various system engineers for applicable design work. The output of task analysis contains information which is then distributed to the human-system interface designers, procedure developers, and the training group.

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1. INTRODUCTION

1.1 Applicability

This document is applicable to all design activities for the Babcock & Wilcox (B&W) mPower™ reactor systems within the scope of the human factors engineering (HFE) program as defined in *Human Factors Engineering Program Management Plan*, MPWR-TECR-005002. This includes all B&W employees and contractors assigned to design activities of the B&W mPower reactor.

1.2 Scope and Objectives

The scope of this technical report is to establish the task analysis program. The task analysis output identifies all controls and indications necessary to complete each task or element of the task. The analysis identifies all interface requirements in the control room and local control stations in the plant. The task sequences, interlocks, and alarms are documented for procedure development. The design assessment portion of the task analysis tests the systems in combinations and as a whole in a dynamic environment. Design assessment includes the human element of the tasks and is completed as part-task or full-scope simulators of sufficient fidelity and completeness to evaluate the task become available. The design assessment portion of task analysis describes and evaluates the method of access and navigation for all controls and indications supporting task performance. Design assessment is conducted using trained operators and using applicable procedures. Knowledge items for each task are identified. Task analysis reviews the initial staffing and qualification assumptions driven by task and regulatory requirements. Task analysis documents any changes made to the initial staffing or qualification assumptions.

This report describes the process for the initial task analysis, staffing and qualifications determinations, and design assessments. The functional requirements analysis and function allocation (FRA/FA) processes coupled with the results of probabilistic risk assessment and human reliability analysis (PRA/HRA) provide input to the task analysis process. This task analysis technical report describes a graded approach for completion. The task categories that are addressed during the verification and validation (V&V) process form the basis for the screening criteria for those tasks that are fully analyzed. Tasks that are identified by operating experience reports or that reach regulatory significance are analyzed.

Task analysis breaks tasks into individual task elements using a static analysis technique. These tasks are then modeled into the engineering simulator for the design assessment portion of the task analysis. The modeling of tasks in simulators (part-task and full-scope) provides the dynamic assessment of the design. The initial task analysis output provides input to the human-system interface (HSI) developers, procedures group, and training development group. The sequence of the tasks aids in the development of the individual displays. A task analysis is not meant to describe the exact navigation through the displays; it is only meant to describe display content. Tasks that are identified by operating experience reports or that are of regulatory significance are analyzed. Tasks that fall outside this screening process are analyzed by system engineers as necessary, but not by the integration design process/ HFE team, with the exception of multidisciplinary team reviews performed during the design review acceptance process.

1.3 Responsibilities

Work performed within the scope of this technical report is under the direction of the Unit Manager of the Integrated Design Process and Human Factors Engineering Program. The individuals performing the work are selected from the HFE design team. These HFE team members include, at a minimum, operations and systems engineering personnel. Engineers outside of the HFE team may be consulted on an as-needed basis. Other engineering personnel are assigned to work within the bounds of the task analysis process and follow the direction of the HFE team members.

The minimum participants include personnel from plant operations, system safety engineering, reliability/ availability engineering, maintenance, and systems engineering. Other personnel may be involved on an as-needed basis to resolve any specific problems identified and develop specific solutions to those problems as necessary. The initial task analysis produces the basis for outlines for procedures and training content. Training and procedure specialists are involved with the emergency procedure guideline development to ensure that the requirements of the emergency procedure guidelines are fully considered within the task analysis process.

2. BACKGROUND

The purpose for performing a task analysis is to define all human actions, including personnel roles and responsibilities for those tasks that were screened into the analysis. The ability to define the tasks in terms of human actions allows for the development of the HSI, procedures, and training that is necessary for the performance of those tasks. The task analysis process provides either confirmation of or feedback to modify the initial staffing and qualification assumptions. Task analysis forms the inputs of many HFE activities and identifies the requirements for performing these tasks. These requirements are for displays, processing, controls, and job support aids needed to perform the tasks. As such, task analysis forms the basis for the task support verification criteria definition for V&V.

3. METHODOLOGY

3.1 Approach Overview

The task analysis screening process forms the foundation of the graded approach to task analysis. Tasks that are screened out in accordance with Section 3.2 are given a less rigorous task analysis by the HFE design team. Tasks that are screened in undergo the detailed analysis and assessment activities that constitute the HFE task analysis documented in this report. Input to task analysis comes from FRA/FA, PRA/HRA and operating experience processes. A diagram of this process is shown in Figure 1.

An iterative task analysis is performed for the development of normal, abnormal, emergency, and alarm response tasks. The successive task analysis iterations are performed as the design progresses and more detailed and complete information becomes available.

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Figure 1. Task Analysis Process Overview **[CCI per Affidavit 4(a)-(d)]**

The initial task analysis is performed with the detailed design information and each task is broken into discrete task steps (elements). The analysis is then expanded to include all task supporting information. Tasks are performed differently depending on the amount of automation associated with a particular function. The supporting information is also different based on whether the function is classified as a '*behavioral achieve*' or a '*behavioral maintain*' function. Functions that contribute to the '*behavioral maintain*' classification account for most of the monitoring tasks. Tasks that change the plant state fall into the 'behavioral achieve' classification. All task attributes are documented. Initial task analysis is further described in detail in Section 3.3.

The task overview forms part of the basis for procedure development. The task sequence forms a basic procedure outline that is used by procedure writers. The attributes and basis for the task are reviewed by training administrators for inclusion into the training program as appropriate. The basic task description includes all necessary indications and controls that are displayed on the HSI. Arrangement of these indications and controls are developed by the HSI design team and tested during the design assessment.

Once the plant procedures, necessary training, and HSI are developed, the design assessment phase of task analysis is performed. The systems engineering approach includes the individuals and teams involved in the system for analysis, and is the essence of the design assessment phase. The design assessment is conducted when part-task or full-scope simulators of sufficient fidelity and completeness to evaluate the task become available. Details of design assessment are described in Section 3.5.

The initial task analysis begins with development of tasks that were screened into the task analysis process. The tasks are analyzed for normal, abnormal, emergency, and alarm response performance.

3.1.1 Normal Operating Task Analysis

The normal operating task analysis considers all operational characteristics that are expected for the normal system modes of operation. This includes all normal system functions that are performed during the expected plant modes. These functions are placed in a system function matrix for determination of tasks for analysis. The system function matrix also allows for audit and reviews as necessary.

3.1.2 Abnormal Operating Task Analysis

The abnormal task analysis development process identifies the initial functions that are lost due to the initiating event and analyzes mitigating strategies for dealing with the function(s) that were lost or degraded. This abnormal condition is added to the system function matrix and analyzed to identify alarms, controls, and indications required for successful completion. The abnormal operating task analysis allows for the formation of abnormal operating procedures and the mitigation strategies associated with these events.

3.1.3 Emergency Operating Task Analysis

The mitigation strategies associated with these events are analyzed in the task analysis development process. Emergency operating conditions are added to the system function matrix for determination of assigned tasks. The resulting emergency task data is added to the system function matrix and analyzed to identify alarms, controls, and indications required for successful completion. Design assessment ensures that the emergency operating procedures and associated strategies are supported by the HSI and are efficiently executed.

3.1.4 Alarm Response Task Analysis

Alarm response guidance is found within the B&W mPower standard plants requirement document. The information for system documentation of expected alarms is compiled by the responsible engineers. This information is used during task analysis as the basis for the alarm types and strategies for dealing with the alarms. Design assessment modifies or optimizes the number and types of alarms within the control room.

Staffing and qualifications analysis is done as part of the overall task analysis. The staffing and qualifications initial assumptions are reviewed throughout the task analysis process to ensure that there are no changes necessary.

3.2 Screening Process

Task categories that are specifically addressed during the V&V process form the basis for the screening criteria for those tasks that are fully analyzed. Task analysis analyzes tasks screened using the following criteria:

- Tasks that support critical safety functions for modes 1 through 7 of the B&W mPower reactor (modes include: start-up, full-power, low-power, and shutdown)
- The tasks in relation to any abnormal or emergency operations (transients)
- Important and representative tasks pertaining to operations, maintenance, testing, inspections, and surveillances
- All human actions that are designated risk-important by HRA
- All critical safety functions that are automated. These are reviewed for human actions (such as monitoring and intervention/backup for that action)
- Tasks that could impact critical safety function assumptions
- All tasks that are derived from first-of-a-kind engineering activities for the B&W mPower reactor design

Any changes made to the original staffing or qualification assumptions are subsequently evaluated from a detailed task analysis view. This is intended to apply to those tasks that originally screened out of the process but subsequently revealed themselves as challenges to initial staffing or qualification assumptions.

3.3 Initial Task Analysis

The task analysis process identifies all tasks required to complete functions determined to be within the scope of HFE task analysis. These tasks are then broken down into task steps (elements). All future changes to the tasks are checked against the original description of those tasks (see Section 3.7 for modifications). This is a written description of the task and follows the function allocation for each task. The initial task analysis is performed as a tabletop exercise. When mockups and simulations become available as the design progresses, dynamic analysis is performed using the design assessment process.

3.3.1 Subtasks

The actions fulfilling a specific purpose within a task are listed as subtasks in the order that they occur and are performed in the task sequence. Hierarchical task analyses use this data input in Section 3.3.17.

3.3.2 Elements

The elements are descriptors that make up individual parts of a subtask. By themselves, they do not complete a simple task and are grouped together to form a subtask. The elements are action items for every subtask. For example, elements as action items are typically defined by an action verb such as "call" maintenance, "start" pump, "check" level, and so forth.

3.3.3 Time requirements

The start and stop times for the individual elements are considered individually as well as collectively for the subtask/task. Any time restrictions associated with a task performance are clearly listed.

3.3.4 Staffing and Qualification

Staffing and qualification requirements are considered for the task performance and are derived through task and regulatory requirements, U.S. Nuclear Regulatory Commission (NRC) guidelines, and any applicable operating experience. This includes the interaction of all personnel needed for the completion of the task. Field tasks include local monitoring necessary to support the completion of tasks primarily conducted by the control room personnel. Any information for specific qualification needs (e.g., chemistry, maintenance) is described and referenced in this section of the task analysis.

3.3.5 Plant Subsystems and Operating Modes

A list is made of systems and subsystems that require observation, control, and manipulation. This list includes major subsystems even if they are from different systems. An identifier for primary or supporting roles within the task is then assigned to each subsystem. This list also documents the mode during which the task is performed.

3.3.6 Support Systems

All support systems required for the task elements are documented and include the sequence necessary for task performance.

3.3.7 Precautions and Limitations

Performance of the task includes using structures, systems, and components that pose any physical hazard to the operator, co-workers, the public, or the environment. This also includes an external tool that is needed or the environment in which the task is performed. Chemical, biological, and radiological safety measures are described for the task performance.

3.3.8 Task Information

Information associated with a task is documented. This includes information required for task performance, as well as the minimum indications and controls needed and the cues for task initiation, control, and completion. Identifiers are used for minimum inventory determinations. Important information regarding any operation mode (normal through emergency) is provided to the operator. Alerts and alarm information are specified for all system mode functions.

3.3.9 Evaluation Process

The evaluation process relates to the controls and indications necessary for task completion. All steps that include calculations or formulation of composite information are specified as well as the type of decisions necessary for the task performance (i.e., relative, absolute, or probabilistic).

3.3.10 Operator Actions

Many tasks involve monitoring of a process or system. Physical operation of equipment is considered when determining the physical workload of the task and placement of individual controls and displays. Cognitive workload of the monitoring task or physical task is also assessed. Based on the proposed concept of operations, expected navigation challenges are considered from this viewpoint.

3.3.11 Location of Operation

Local control stations are described for indication and controls requirements. Development of local control stations depends on the operations performed and on the qualifications of personnel performing the task. Task analysis identifies those activities that take place remotely to:

- Better define task flow
- Define communications to the field
- Help define task divisions of responsibility (main control room, local)
- Help to define staffing and qualifications (licensed, non-licensed)

3.3.12 Response for Operations

Automated feedback (i.e., alarms, warnings, trends, etc.) informing the operator of the adequacy or inadequacy of the action is documented along with any controls and indications for automatic action intervention and completion. Any physical action required of the operator (e.g., lift, pull, turn, push, crank) is documented along with any associated time limitations placed on these actions.

"What if" scenarios and cause-effect scenarios for decisions are completed for those task elements or steps that contain risk-important human actions or where there is a history of human error as determined by the operating experience review. A "what if" scenario challenges the operator to consider mitigation activities or alternative strategies if something does not perform as expected. For example, if the task element is: "start the pump," a "what if" scenario asks, "what if the pump doesn't start?" Such a path is followed until the issue is safely resolved or brought to a conclusion. "What if" scenarios are also applied to risk-important human actions. For example, "what if the operator does it wrong?" (the operator starts pump A instead of pump B).

A cause-effect relationship is built out of steps. Each step has one or more possible triggers for action (the *stimulus*) and at least one action to take (the *response*). Those three kinds of steps are:

- One stimulus leading to one response (the *basic chain*)
- More than one possible stimulus, each leading to a different response (the *discrimination)*
- More than one possible stimulus, each leading to the same response (the *generalization)*

These steps can be combined to identify key steps and decisions in a complex task.

3.3.13 Communications

All communications necessary for the performance of the task are listed along with the expected amount and mode of communication. Any alternative means of communication or data transfer are determined for those situations that fall under abnormal or emergency classifications. This section of the task analysis includes data transfers as well as verbal communications.

3.3.14 Risk-Important Human Actions

The initial HRA considers a range of human actions that affect the plant PRA. All risk-significant human actions associated with the individual tasks are documented. Operating experience is appropriately reviewed for determining potential risk-important actions.

3.3.15 Workload

An initial assessment of the workload associated with completion of tasks is determined using task evaluations performed by personnel with operations experience. This includes an initial estimate of cognitive workload, physical workload, and overall task demands. These workload values are assessed and adjusted during the design assessment portion of the task analysis. Concurrent task performance is considered due to the compounding of workloads through all modes of operation.

3.3.16 Task Comments, Notes, and Workplace Factors

During analysis of each task described in the task analysis, analysts document comments or information applicable to task completion that does not take the form of a formal alarm, control, or indication (which are documented elsewhere in the process). For example, environmental considerations or ingress/egress paths that are challenging are documented. External tools needed for task performance are documented.

3.3.17 Hierarchical Task Analysis

A hierarchical task analysis is performed for groups of tasks when viewed from an integrated level. The hierarchical task analysis defines the hierarchy of goals, subgoals, operations, and plans, and produces a comprehensive task description that is used as input for other analysis (i.e., cognitive task analysis, human error identification, situation awareness assessment, etc.). The analyst gains a complete and comprehensive understanding of each of the task elements, their sequence, and functions.

3.3.18 Task Timelines

Any time limitations associated with task performance identified during analysis of tasks are documented. When tasks are performed concurrently and a change in workload is determined, a timeline is created to study concurrent tasks and workload effects. The creation of timelines is restricted to those groups of tasks that create changes in workload. Overlapping tasks are studied with a timeline analysis that uses the hierarchical task analysis to the extent possible.

3.3.19 Use of Task Analysis Output

The output of the initial task analysis is used by the procedure development team. The task sequence, supporting information, precautions and limitations, and notes support the initial procedure development. The information produced as a result of task analysis is used for Knowledge and Abilities catalog construction and training development. The HSI development process considers alarm, control, and indication requirements as well as other supporting contextual information identified during task analysis.

3.4 Staffing and Qualifications

Staffing and qualifications are addressed throughout the entire HFE analysis process. This is done in lieu of a separate analysis directed only at staffing and qualifications. The systems approach to staffing and qualifications is accomplished by placing the plant personnel within the system and evaluating the man-in the-loop as a whole entity. The initial staffing and qualifications are based on the concept of operations and then fully analyzed through the HFE processes. Staffing and Qualifications takes into account the guidance found in NUREG-0800 section 13.1 and 10 CFR 50.54. This will determine the number and background of personnel needed for the full range of plant conditions and tasks including operational tasks (normal, abnormal, and emergency), plant maintenance, and plant surveillance and testing. Task analysis defines:

- Knowledge, skills, and abilities needed for task performance
- Personnel workload analysis
- Personnel communication and coordination activities
- Availability of personnel considering other activities outside the control room (e.g., fire brigade, etc.)
- Actions identified in 10 CFR 50.47 and NUREG-0654 for emergency plan actions
- Risk-important human action performance

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] **[CCI per Affidavit 4(a)-(d)]**

Table 1. Examples of HFE Measurement Tools

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[CCI per Affidavit 4(a)-(d)]

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[CCI per Affidavit 4(a)-(d)]

Figure 2. Workload and Design Assessment Process Flow

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3.5.8 Part-task Simulation

The part-task simulator consists of one or more workstations to depict a single system or group of systems. The layout of the control room concept gives the reactor operator station multiple monitors that fulfill different purposes (trends, alarms, procedures, etc). The evaluations performed on this simulator are determined by the extent of the models that are programmed within the simulator. The part-task simulator is used for the development of HSI concepts, the operation of the plant during all modes of operation, and screen development. Control concepts and procedure usage are included as they become available.

Part-task simulation is used for system modeling, concept modeling proofs, alarm usage, and system interface issues. The models include core thermal hydraulics even if this is model-based and not the actual test platform data. This model also models the expected hard HSIs (e.g., switches, knobs) to the extent practicable. Part-task simulations of risk-important local control stations are constructed on an as-needed basis.

3.5.9 Full-Scope Simulation

Full-scope simulation encompasses the entire plant modeled for the B&W mPower reactor. The full-scope simulator meets the requirements of 10 CFR 50.34(f)(2)(i) to provide a simulator that models the control room with high fidelity, including the capability to simulate plant events. The full-scope training simulation is built within a room sized to replicate the dimensions of the actual control room. This simulation allows for the use of all expected hard and soft controls that are connected to the simulation. The safety and nonsafety panels are part of the simulation. The ability to place the simulation within the expected confines of the actual control room gives this simulation the ability to evaluate the plant systems and the HSI along with the human operator as one integrated system. This ability to design the HSI layout considering the operator with the controls that they will operate provides for a greater degree of cohesiveness in the design. This allows for a complete platform from which to test the integrated plant systems.

By performing evaluations starting in the design assessment phase of the design process, a greater emphasis is placed on creating an environment for the operator that allows for greater situational awareness and safer control of the plant. This simulation is expected to be certified to an ANSI/ANS Standard 3.5. Full-scope simulation is used during the design phase to the greatest extent possible for the resolution of engineering design problems. The physical exactness of the layout of both the hard controls as well as the soft controls (e.g., alarms, controls, displays) keeps the simulation as close to reality as possible. The exact environmental conditions of the control room are simulated as close as possible to expected values. Since the plant is not built, all best-guess estimates of temperature, airflows, background noise levels, and humidity is represented to the extent possible.

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[CCI per Affidavit 4(a)-(d)]

3.7 Modifications

All modifications to the original plant design are analyzed in relation to the degree of change of that task from the original task analysis. The task is matched to the function and the function allocation is confirmed. All risk-important human actions that are affected by the change are reviewed. Changes and modifications are carefully analyzed for any new human actions that are created. The design assessment proceeds with the modification as an input to the design. Training, procedures, HSIs, staffing, or qualifications associated with any tasks affected by the modification are reviewed. The assessment process is repeated until any identified issues are resolved. Additional considerations include the impact of the modification on all operations, maintenance, testing, and surveillances.

4. SUMMARY RESULTS AND DOCUMENTATION

Initial task analysis results are provided to the HSI designers, procedure development group, and training and qualifications group. The resulting design is analyzed as described in this document. The design assessment yields an evaluated system design. The task analysis provides a thorough understanding of the tasks necessary for plant operations and maintenance. The task analysis provides a basis for:

- Listing of all tasks including monitoring and task modes of operation

- Number of personnel and their qualifications necessary for the tasks
- Communication, coordination, and interaction between personnel
- Operator workload
- Information necessary for task controls and displays
- Support requirements for the task
- Precautions/limitations for the task
- Tools and equipment
- Precursors or initiating events
- References pertinent to the task including procedures for task performance
- Human interfaces
- Risk-important human actions and their incorporation in or mitigation by design

5. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

5.1 Definitions

Term	**Definition**
Behavioral Achieve Function	Task that shows a change of state for completion of the function. (e.g., change valve line-up to place pump in service).
Behavioral Maintain Function	Task that does not show a change of state for the completion of the function (e.g., maintain temperature at 80°F).
Critical Safety Function	Those functions that provide: • Reactivity control • Reactor core cooling and heat removal from the primary system (RCS inventory and secondary heat sink) • Reactor coolant system integrity • Radioactivity control • Containment conditions
Human Action	A manual action completed by a person in order to accomplish a task.
Human Error Probability	A measure of the likelihood that various failure modes for plant personnel to obtain the correct, required, or specified action or response in a given situation. The human error probability is the probability of the human failure event.

Term	Definition
Human-System Interface	That part of the system through which personnel interact to perform their functions and tasks. This interaction includes the alarms, displays, controls, and job performance aids (e.g., procedures, instructions, etc.).
Performance Shaping Factors	Factors that influence human reliability through their effects on performance. Performance shaping factors include factors such as environmental conditions, human-system interface design, procedures, training, and supervision.
Risk-Important Human Actions	Actions that are performed by plant personnel to provide reasonable assurance of plant safety. Actions may be made up of one or more tasks. There are both absolute and relative criteria for defining risk-important actions. From an absolute standpoint, a risk-important action is any action whose successful performance is needed to provide reasonable assurance that probabilistic design objectives are met. From a relative standpoint, the risk-important actions may be defined as those with the greatest risk contribution in comparison to all risk contributors.
Static Analysis	This is a tabletop exercise done with only paper or on a static mockup of task to be analyzed.

5.2 Abbreviations and Acronyms

B&W	Babcock and Wilcox
FA	function allocation
FRA	functional requirements analysis
HFE	human factors engineering
HRA	human reliability analysis
HSI	human-system interface
OER	operating experience review
PRA	probabilistic risk assessment
V&V	verification and validation

6. REFERENCES

6.1 Code of Federal Regulations

6.1.1 10 CFR 50, Domestic Licensing of Production and Utilization Facilities

6.1.2 10 CFR 50.34(f)(1)(i) (See Attachment 1), Design Objectives for Equipment to Control Releases of Radioactive Material In Effluents – Nuclear Power Reactors, United States Nuclear Regulatory Commission

6.1.3 10 CFR 50.47, Emergency Plans, United States Nuclear Regulatory Commission

6.1.4 10 CFR 50.54(m), Conditions of Licenses, United States Nuclear Regulatory Commission

6.2 <u>U.S. Nuclear Regulatory Guidance</u>

6.2.1 NUREG-0654, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants (FEMA-REP-1), United States Nuclear Regulatory Commission

6.2.2 NUREG-0711, Human Factors Engineering Program Review Model, United States Nuclear Regulatory Commission, Rev. 2

6.2.3 NUREG-0737, Clarification of TMI Action Plan Requirements, United States Nuclear Regulatory Commission, 1980

6.2.4 NUREG-0737, Clarification of TMI Action Plan Requirements, Supplement #1, United States Nuclear Regulatory Commission, 1983

6.2.5 NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition, United States Nuclear Regulatory Commission

6.2.6 NUREG/CR-6633, Advanced Information Systems Design: Technical Basis and human Factors Review Guidance, United States Nuclear Regulatory Commission

6.2.7 NUREG/IA-0137, A study of control Room Staffing Levels for Advanced Control Rooms, United States Nuclear Regulatory Commission

6.2.8 DI&C-ISG-05, Highly-Integrated Control Rooms – Human Factors Issues

6.2.9 SECY-11-0098, Operator Staffing for Small or Multi-module Nuclear Power Plant Facilities

6.3 <u>Other References</u>

6.3.1 ANSI/ANS-3.5-2009, Nuclear Power Plant Simulators for Use in Operator Training and Examination

6.3.2 Kirwan, B., & Ainsworth, L., A Guide to Task Analysis, Bristol, PA, Taylor & Francis Inc., 1993

6.3.3 MPWR-TECR-005002, Human Factors Engineering Program Management Plan

6.3.4 NEI, Position Paper, Control Room Staffing for Small Reactors, NEI Small Modular Reactor Licensing Task Force, September 12, 2011

6.3.5 NEI 10-05, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities, Rev. 0, 2011

6.3.6 Smith, J., Small Modular Reactor Issue Identification and Ranking Program: Control Room Staffing Final Report. SMR IIRP – CRS WG, Office of New Reactors, Advanced Reactor Program, 2011

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Attachment 1 – General Control Room Activities and Tasks

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] **[CCI per Affidavit 4(a)-(d)]**