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Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors

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KNOWLEDGE AND ABILITIES CATALOG FOR NUCLEAR POWER PLANT OPERATORS: BOILING WATER REACTORS

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ABSTRACT

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The Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling-Water Reactors (BWRs) (NUREG-1123, Revision 1) provides the basis for the development of content-valid licensing examinations for reactor operators (ROs) and senior reactor operators (SROs). The examinations developed using the BWR Catalog along with the Operator Licensing Examiner Standards (NUREG-1021) and the Examiner's Handbook for Developing Operator Licensing Written Examinations (NUREG/BR-0122), will cover the topics listed under Title 10, Code of Federal Regulations, Part 55 (10 CFR 55).

The BWR Catalog contains approximately 7,000 knowledge and ability (K/A) statements for ROs and SROs at BWRs. The catalog is organized into six major sections: Organization of the Catalog, Generic Knowledge and Ability Statements, Plant Systems grouped by Safety Functions, Emergency and Abnormal Plant Evolutions, Components, and Theory.

Revision 1 to the BWR Catalog represents a modification in form and content of the original catalog. The K/As were linked to their applicable 10 CFR 55 item numbers. SRO level K/As were identified by 10 CFR 55.43 item numbers. The plant-wide generic and system generic K/As were combined in one section with approximately one hundred new K/As. Component Cooing Water and Instrument Air Systems were added to the Systems Section. Finally, High Containment Hydrogen Concentration and Plant Fire On Site evolutions added to the Emergency and Abnormal Plant Evolutions section.

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SUMMARY OF SIGNIFICANT CHANGES

1 ORGANIZATION OF THE BWR CATALOG

1.1 The 10 CFR 55 items listed.

The content of the written and operating licensing examinations is dictated by Sections 55.41, 55.43, and 55.45 of Title 10 of the Code of Federal Regulations (10 CFR). The thirty four (34) items listed under the 10 CFR requirements were included in the catalog in order to consolidate this information in one reference book.

1.2 Knowledge and Abilities linked to 10 CFR 55

The linkage of K/As to the 10 CFR 55.41, 43 and 45 was done for two reasons. First, the linkage to the 10 CFR item numbers was designed to help ensure that the examinations include a representative sample from among the applicable items. Second, the linkage was designed to simplify the examiners task of defending the content of a particular examination, should defense become necessary.

1.3 Senior Reactor Operator (SRO) knowledge and abilities identified

NUREG-1021, "Operator Licensing Examiner Standards," Section ES-401, Item C.1.b. states that 25% of the site-specific written examination for SROs should evaluate K/As required for the higher license level. The old catalogs did not explicitly identify the K/As that represented the higher license level. Differences in RO and SRO importance ratings were sometimes used, but, the rating differences were not linked to the 10 CFR 55.43. In this catalog revision, SRO license level K/As were linked to the items associated with the 10 CFR 55.43. This is intended to remove subjectivity from selection of higher license level K/As.

1.4 Senior Reactor Operator Limited to Fuel Handling (LSRO) examination specifications added.

NUREG-1021, Rev. 7, Section 701 refers to the K/A catalog. In an effort to assure consistency between the Examiner Standards and the catalog, a brief discussion of the use of the catalog for LSRO examinations was included.

1.5 An updated catalog organization was implemented.

1. ORGANIZATION OF BWR CATALOG
    1. Added 10 CFR information

2 Generic Knowledge and Abilities
    1. Combined old plant-wide and system generic K/As in one section.
    2. Eliminated duplicate generic K/As.
    3. Organized the section into 4 topic areas.
    4. Added about 100 new generic K/As.

3 Plant Systems
    1. Moved System Generic K/As to new generic section
    2. Added Instrument Air System
    3. Added Component Cooling Water System

4 Emergency & Abnormal Plant Evolution Section
    1. Moved Generic K/As to Section 2
    2. Added High Containment Hydrogen Concentration
    3. Added Plant Fire On Site

5 Components
    No change

6 Theory Section
    No change

2 GENERIC KNOWLEDGE AND ABILITIES (132)

2.1 The System Generic K/As were combined with the Plant-Wide Generic K/As.

Many of the old system generic K/As had plant-wide applicability as well as system applicability. In addition, the old plant-wide generic section had relatively few K/As to draw upon to make up 13% or 17% of the examination. As a result, all generic K/As were combined into one section.

These are generally administrative knowledge and abilities with broad application across systems and operations. The four (4) topic areas listed below.

- 2.1 Conduct of Operations K/As
- 2.2 Equipment Control K/As
- 2.3 Radiation Control K/As
- 2.4 Emergency Procedures /Plan K/As

The generic K/As for "Conduct of Operations," may be used to evaluate the applicant's
knowledge of the daily operation of the facility. The types of information covered under this category may include for example, shift turnover or temporary modification procedures.

The generic K/As for "Equipment Control " address the administrative issues associated with the management and control of plant systems and equipment. Examples of the types of information evaluated under this topic include maintenance and temporary modifications of systems. Fuel handling and refueling K/As were also organized into this topic area because of the equipment control aspect of fuel handling.

The generic K/As for "Radiation Control," may be used to evaluate the applicant's knowledge and abilities with respect to radiation hazards and protection (personnel and public). Examples of the types of information that should be evaluated under this topic are knowledge of significant radiation hazards or radiation work permits.

The generic K/As for "Emergency Procedures / Plan" may be used to evaluate the applicant's general knowledge of emergency operations. The K/As are designed to evaluate knowledge of the emergency procedures their use. The emergency procedures consist of both symptom based and event based procedures. The emergency plan K/As may be used to evaluate the applicant's knowledge of the plan, including, as appropriate, the RO's or SRO's responsibility to decide whether it should be executed and the duties assigned under the plan.

2.2 Approximately one hundred (100) new generic K/As were added to the catalog.

The new K/As were identified through license examiner surveys and an independent review of the catalog, NUREG 1021, licensee event reports and inspection reports. All new K/As were directly linked to the applicable 10 CFR 55 requirements..

3 PLANT SYSTEMS (56) WITHIN 9 SAFETY FUNCTIONS

3.1 The old system generic K/As were combined with plant wide generic K/As in Section 2, Generic K/As.

3.2 Two systems were added because they were covered in the Abnormal Evolutions..

1. Instrument Air System
2. Component Cooling Water System

3.3 K/A stem statement K5, changed "operational applications" to "operational implications"

4 EMERGENCY & ABNORMAL PLANT EVOLUTIONS (40)

4.1 The old system generic K/As were combined with plant wide generic K/As in Section 2, Generic K/As. Duplicate generic K/As were combined into single K/As where applicable.

4.2. High Containment Hydrogen Concentration was added to reflect Revision 4 changes to BWROG Emergency Procedures Guidelines (EPGs).

4.3 Plant Fire On Site was added as an abnormal plant evolution to achieve consistency with the Fire Protection System section.

4.4 Emergency and Abnormal Evolution K/As were linked to 10 CFR item numbers at the stem statement level.

5 COMPONENTS

5.1 All component K/As were linked to 10 CFR item numbers.

6 THEORY

6.1 Reactor Theory and Thermodynamics theory K/As were linked to 10 CFR items numbers.

1 ORGANIZATION OF BWR CATALOG

1.1 Introduction

The Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors (BWR) NUREG-1123, Revision 1, provides the basis for development of content-valid written and operating licensing examinations for reactor operators (ROs) and senior reactor operators (SROs). The Catalog is designed to ensure equitable and consistent examinations.

1.2 Part 55 of Title 10 of the Code of Federal Regulations

The catalog is used in conjunction with NUREG-1021, Revision 7 "Operator Licensing Examination Standards." NUREG-1021 provides policy and guidance to the NRC examiners and establishes the procedures and practices for examining licensees and applicants for reactor RO and SRO licenses pursuant to Part 55 of Title 10 of the Code of Federal Regulations (10 CFR 55). knowledges and abilities (K/As) in this catalog are directly linked by item number to 10 CFR 55.

1.3 Written RO Examination

The items to be included in written RO examinations are specified in 10 CFR 55.41 (b). The written RO examination questions should be generated from a representative sample of K/As derived from among the 10 CFR 55.41 (b) items listed below:

(1) Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.

(2) General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow.

(3) Mechanical components and design features of reactor primary system.

(4) Secondary coolant and auxiliary systems that affect the facility.

(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

(6) Design, components, and function of reactivity control mechanisms and instrumentation.

(7) Design, components, and function of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

(8) Components, capacity, and functions of emergency systems.

(9) Shielding, isolation, and containment design features, including access limitations.

(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

(11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.

(12) Radiological safety principles and procedures.

(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.

(14) Principals of heat transfer, thermodynamics and fluid mechanics.

The written RO examination is administered in two sections, a generic fundamentals examination (GFE) section and a site-specific examination. The GFE covers those knowledges that do not vary significantly among reactors of the same type (NUREG-1021, ES-205). The GFE covers component, reactor theory, and thermodynamics knowledge. The component knowledge items are derived from 10 CFR 55.41 (b) items 3 and 7. Reactor theory knowledge items are derived from 10 CFR 55.41 (b) 1. Thermodynamic knowledge items are derived from 10 CFR 55.41 (b) 14.

The site-specific written RO examination covers K/As that vary among reactors of the same type. The guidance for preparation of written RO examination is presented in NUREG-1021, ES-401, and NUREG/BR-0122, "Examiner's Handbook for Developing Operator Licensing Written Examinations." The RO examination includes a balanced mix of generic K/As, plant systems K/As, and emergency/abnormal evolution K/As. The K/As associated with the RO site-specific written examinations are derived from 10 CFR 55.41 (b) items 2 through 13.

1.4 Written SRO Examination

The items to be covered for written SRO examinations are presented in 10 CFR 55.43 (b). The guidance for preparation of the written SRO examination is presented in NUREG-1021, ES-401 and NUREG/BR-0122. The examination for SRO should include approximately twenty five percent (25%) higher license level K/As from the seven (7) items listed under 10 CFR 55.43 (b). Approximately seventy five percent (75%) of the SRO K/As may be derived from the 10 CFR 55.41 (b) RO K/As. The seven (7) SRO items listed under 10 CFR 55.43 (b) include:

(1) Conditions and limitations in the facility license.

(2) Facility operating limitations in the technical specifications and their bases.

(3) Facility licensee procedures required to obtain authority for design and operating changes in the facility.

(4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.

(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

(6) Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming , and determination of various internal and external effects on core reactivity.

(7) Fuel handling facilities and procedures.

1.5 Operating RO and SRO Examination

The items to be covered for operating tests for ROs and SROs are presented in 10 CFR 55.45 (a). The guidance for preparation of the operating examinations is presented in NUREG-1021, ES-301. The operating examination should include a representative selection of K/As derived from thirteen (13) items under 10 CFR 55.45 (a). The examination should include a balanced coverage of administrative topics, control systems and facility walkthroughs, and integrated plant operations. The thirteen (13) items listed under 10 CFR 55.45 (a) are:

(1) Perform pre-startup procedures for the facility, including operating of those controls associated with plant equipment that could affect reactivity.

(2) Manipulate the console controls as required to operate the facility between shutdown and designated power levels.

(3) Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.

(4) Identify the instrumentation systems and the significance of facility instrument readings.

(5) Observe and safely control the operating behavior characteristics of the facility.

(6) Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.

(7) Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems, and identify the relations of proper operation of these systems to the operation of the facility.

(8) Safety operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment

(9) Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.

(10) Demonstrate a knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.

(11)Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide when the plan should be executed and the duties under the plan assigned.

(12) Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.

(13) Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensees procedures are adhered to and that the limitations in its license and amendments are not violated.

1.6 Senior Operators Limited to Fuel Handling Examination Specifications.

The specifications for examinations for Senior Operators Limited to Fuel Handling (LSRO) are provided in Examiner Standard, NUREG 1021, Section ES-701. The LSRO examination process includes both a written and an operating examination. The examinations include a balanced coverage reactor and fuel characteristics, fuel handling equipment and instrumentation, procedures and health physics K/As. This examination includes, but is not limited to, items associated with 10 CFR 55.43 (b) items 5 to 7, and 10 CFR 55.45(a) items 5 and 6.

1.7 Organization of the BWR Catalog

The Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling Water Reactors is organized into five Major sections. Knowledge and ability statements (K/As) are grouped according to the major section to which they pertain. this organization is shown schematically below.

1 ORGANIZATION OF THE BWR CATALOG

2 GENERIC KNOWLEDGE AND ABILITIES (132)
- Conduct of Operations K/As
- Equipment Control K/As
- Radiation Control K/As
- Emergency Procedures / Plan K/As

3 PLANT SYSTEMS (56) WITHIN 9 SAFETY FUNCTIONS
- Knowledge Categories (K1 - K6)
- Ability Categories (A1 - A4)

4 EMERGENCY & ABNORMAL PLANT EVOLUTIONS (40)

Knowledge Categories (E/A K1 - E/A K3)

Ability Categories (E/A A1 - E/A - A2)

5 COMPONENTS

Component Knowledge Categories (8)

6 THEORY

Reactor Theory Knowledge Categories (8)

Thermodynamics Knowledge Categories (10)

1.8 Generic Knowledge and Abilities

These are generally administrative knowledge and abilities with broad application across systems and operations. They are listed in Section 2 of the BWR catalog.

2.1 Conduct of Operations K/As

2.2 Equipment Control K/As

2.3 Radiation Control K/As

2.4 Emergency Procedures /Plan K/As

The generic K/As for "Conduct of Operations," may be used to evaluate the applicant's knowledge of the daily operation of the facility. The types of information covered under this category may include for example, shift turnover or temporary modification procedures.

The generic K/As for "Equipment Control " address the administrative requirements associated with the management and control of plant systems and equipment. Examples of the types of information evaluated under this topic include maintenance and temporary modifications of systems.

The generic K/As for "Radiation Control," may be used to evaluate the applicant's knowledge and abilities with respect to radiation hazards and protection (personnel and public). Examples of the types of information that should be evaluated under this topic are knowledge of significant radiation hazards or radiation work permits.

The generic K/As for "Emergency Procedures / Plan" may be used to evaluate the applicant's general knowledge of emergency operations. The K/As are designed to evaluate knowledge of the emergency procedures network and its use. The emergency procedures network consists of both symptom based and event based procedures. The emergency plan K/As may be used to evaluate the applicant's knowledge of the plan, including, as appropriate, the RO's or SRO's responsibility to decide whether it should be executed and the duties assigned under the plan.

1.9 Plant Systems Within Nine (9) Safety Functions

Major safety functions must be maintained to ensure safe nuclear power plant operation. The nine safety functions required for a BWR plant are:

1. Reactivity Control
2. Reactor Water Inventory Control
3. Reactor Pressure Control
4. Heat Removal From the Core
5. Containment Integrity
6. Electrical
7. Instrumentation
8. Plant Service Systems
9. Radioactivity Release.

Fifty six (56) plant systems have been included in the BWR Catalog based on their relationship and importance to safety functions. Table 1 contains a list of these plant systems, alphabetically arranged within safety function. It should be noted that some plant systems contribute to more than one safety function.

Each plant system has a six (6) digit code number. The words "Plant Specific" following the system title, indicates that the knowledge or ability does not apply to all plants.

See Section 3 of the BWR catalog for the delineation's of K/As for the plant systems.

Table 1
Plant Systems by Safety Functions

Safety Function 1: Reactivity Control

201001	Control Rod Drive Hydraulic System
201003	Control Rod and Drive Mechanism
201002	Reactor Manual Control System
202002	Recirculation flow Control System
202001	Recirculation System
201005	Rod Control and Information System
211000	Standby Liquid Control System

Safety Function 2: Reactor Water Inventory Control

206000	High Pressure Coolant Injection System
209002	High Pressure Core Spray System
209001	Low Pressure Core Spray System
256000	Reactor Condensate System
217000	Reactor Core Isolation Cooling System
259001	Reactor Feedwater System

204000	Reactor Water Cleanup System
259002	Reactor Water Level Control System
203000	Residual Heat Removal /Low Pressure Coolant Injection: Injection Mode (Plant Specific)

Safety Function 3: Reactor Pressure Control

218000	Automatic Depressurization System
239001	Main and Reheat Steam System
241000	Reactor/Turbine Pressure Regulating System
239002	Safety Relief Valves

Safety Function 4: Heat Removal From Reactor Core

206000	High Pressure Coolant Injection System
209002	High Pressure Core Spray System
207000	Isolation (Emergency) Condenser
209001	Low Pressure Core Spray System
239001	Main and Reheat Steam System
245000	Main Turbine Generator and Auxiliary Systems
217000	Reactor Core Isolation Cooling System
202001	Recirculation System
203000	Residual Heat Removal /Low Pressure Coolant Injection: Injection Mode
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode)

Safety Function 5: Containment Integrity

223001	Primary Containment System and Auxiliaries
223002	Primary Containment Isolation System /Nuclear Steam Supply Shut-Off
290002	Reactor Vessel Internals
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode
226001	RHR/LPCI: Containment Spray System Mode
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode
290001	Secondary Containment

Safety Function 6: Electrical

262001	A.C. Electrical Distribution
263000	D.C. Electrical Distribution
264000	Emergency Generators (Diesel/Jet)
262002	Uninterruptable Power Supply (A.C. /D.C.)

Safety Function 7: Instrumentation

215005	Average Power Range Monitor/Local Power Range Monitor
215003	Intermediate Range Monitor System
216000	Nuclear Boiler Instrumentation

272000	Radiation Monitoring System
212000	Reactor Protection System
215002	Rod Block Monitor System
201005	Rod Control and Information System
214000	Rod Position Information System
201004	Rod Sequence Control System (Plant Specific)
201006	Rod Worth Minimizer System (Plant Specific)
215004	Source Range Monitor System
215001	Traversing In-Core Probe

Safety Function 8: Plant Service Systems

286000	Fire Protection System
234000	Fuel Handling
300000	Instrument Air System
400000	Component Cooling Water System

Safety Function 9: Radioactivity Release

239003	Main Steam Isolation Valve Leakage Control System
271000	Offgas System
288000	Plant Ventilation Systems
272000	Radiation Monitoring System
268000	Radwaste
290002	Reactor Vessel Internals
233000	Fuel Pool Cooling and Clean-up
261000	Standby Gas Treatment System
290003	Control Room Heating, Ventilation and Air Conditioning

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1.9.1 Knowledge and Ability Stem Statements for Plant Systems

The information delineated within each plant system is organized into six (6)different types of knowledge and four (4) different types of ability. If there are no knowledge or ability statements following a stem statement there is no applicable K/A.

The applicable 10 CFR 55.41, 43, and 45 item numbers are included with each stem statement. In most cases the K/As associated with the stem statements can be used for both the written and operating examinations.

Table 2
Knowledge and Ability Stem Statements for Plant Systems

K1. Knowledge of the physical connections and/or cause-effect relationships between (SYSTEM) and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)

K2. Knowledge of electrical power supplies to the following: (CFR 41.7)

K3. Knowledge of the effect that a loss or malfunction of the (SYSTEM) will have on the following: (CFR 41.7 / 45.4)

K4. Knowledge of (SYSTEM) design feature(s) and or interlock(s) which provide for the following: (CFR 41.7)

K5. Knowledge of the operational implications of the following concepts as they apply to the (SYSTEM): (CFR 41.5 / 45.3)

K6 Knowledge of the effect that a loss or malfunction of the following will have on the (SYSTEM): (CFR 41.7 / 45.7)

A1. Ability to predict and/or monitor changes in parameters associated with operating the (SYSTEM) controls including: (CFR 41.5 / 45.5)

A2. Ability to (a) predict the impacts of the following on the (SYSTEM) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: (CFR 41.5 / 45.6)

A3. Ability to monitor automatic operations of the (SYSTEM) including: (CFR 41.7 / 45.7)

A4. Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)

1.10 Emergency & Abnormal Plant EVOLUTIONS (40)

Section 4 of the BWR catalog contains forty (40) emergency and abnormal plant evolutions. An emergency plant evolution is any condition, event or symptom which leads to entry into the plant-specific emergency operating procedures (EOPs). The emergency plant evolution strategies described in Revision 4 to the Boiling Water Reactor Owners Group Emergency Procedures Guidelines, cover five broad areas:

1. Reactor Pressure Vessel Control

2. Reactor Pressure Vessel Control With SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown.
3. Primary Containment Control
4. Secondary Containment Control
5. Radioactivity Release Control.

If the operator controls the five broad areas of emergency plant evolutions listed above, the plant safety functions will be safely maintained. The sixteen (16) emergency plant evolutions covered by this catalog are listed numerically below;

295024	High Drywell Pressure
295025	High Reactor Pressure
295026	Suppression Pool High Water Temperature
295027	High Containment Temperature (Mark III Containment Only)
295028	High Drywell Temperature
295029	High Suppression Pool Water Level
295030	Low Suppression Pool Water Level
295031	Reactor Low Water Level
295032	High Secondary Containment Area Temperature
295033	High Secondary Containment Area Radiation Levels
295034	Secondary Containment Ventilation High Radiation
295035	Secondary Containment High Differential Pressure
295036	Secondary Containment High Sump / Area Water Level
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or unknown
295038	High Off-Site Release Rate
500000	High Containment Hydrogen Concentration.

An abnormal plant evolution is any degraded condition, event or symptom not directly leading to an EOP entry condition, but, non the less, adversely affecting a safety function. The twenty four(24) abnormal plant evolutions covered by this catalog are listed below:

295001	Partial or Complete Loss of Forced Core Flow Circulation
295002	Loss of Main Condenser Vacuum
295003	Partial or Complete Loss of A.C. Power
295004	Partial or Complete Loss of D.C. Power
295005	Main Turbine Trip
295006	SCRAM
295007	High Reactor Pressure
295008	High Reactor Water Level
295009	Low Reactor Water Level
295010	High Drywell Pressure
295011	High Containment Temperature (Mark III Containment Only)
295012	High Drywell Temperature
295013	High Suppression Pool Water Temperature
295014	Inadvertent Reactivity Addition
295015	Incomplete SCRAM

295016	Control Room Abandonment
295017	High Off-Site Release Rate
295018	Partial or Complete Loss of Component Cooling Water
295019	Partial or Complete Loss of Instrument Air
295020	Inadvertent Containment Isolation
295021	Loss of Shutdown Cooling
295022	Loss of Control Rod Drive Pumps
295023	Refueling Accidents
600000	Plant Fire On Site

1.10.1 Knowledge and Ability Stem Statements for Emergency and Abnormal Plant Evolutions

The information delineated within each emergency or abnormal evolution is organized into three (3)different types of knowledge and two (2) different types of ability. If there are no knowledge or ability statements following a stem statement there is no applicable K/A.

The applicable 10 CFR 55.41, 43, and 45 item numbers are included with each stem statement. In most cases the K/As associated with the stem statements can be used for both the written and operating examinations. See Table 4:

Table 4
Knowledge and Ability Stem Statements for Emergency and Abnormal Plant Evolutions

E/A K1. Knowledge of the operational applications of the following concepts as they apply to the (EMERGENCY OR ABNORMAL PLANT EVOLUTION): (CFR 41.8 to 41.10)

E/A K2. Knowledge of the interrelations between (EMERGENCY OR ABNORMAL PLANT EVOLUTION) and the following: (CFR 41.7, 45.8)

E/A K3. Knowledge of the reasons for the following responses as they apply to (EMERGENCY OR ABNORMAL PLANT EVOLUTION): (CFR 41.5, 45.6)

E/A A1. Ability to operate and / or monitor the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION): (CFR 41.7, 45.6)

E/A A2. Ability to determine and interpret the following as they apply to (EMERGENCY AND ABNORMAL PLANT EVOLUTION): (CFR 41.10, 43.5, 45.13)

1.11 Components

Basic components such as valves and pumps are found in many systems. The following eight (8) categories of components, for which additional knowledge statements are necessary are listed below and delineated in Section 5 of the BWR catalog.

The component knowledge statements are more detailed than those provided in the system listing, yet at the same time they are generic to the component types. Each component has a unique six (6) digit code number and 10 CFR 55.41 (b) item number.

291001	Valves (CFR 41.3)
291002	Sensors and Detectors (CFR 41.7)
291003	Controllers and positioners (CFR 41.7)
291004	Pumps(CFR 41.3)
291005	Motors and Generators (CFR 41.7)
295006	Heat Exchangers and Condensers (CFR 41.4)
295007	Demineralizers and Ion Exchangers (CFR 41.3)
295008	Breakers, Relays and Disconnects (CFR 41.7)

1.12 Theory

General fundamental knowledge which underlies safe performance on the job is delineated in Section 6 of the BWR Catalog. These theory topics represent general fundamental concepts related to plant operation. Each theory topic has a unique six (6) digit code number. The applicable 10 CFR 41 (b) item number is provided for Reactor Theory and Thermodynamics Theory.

Reactor Theory (CFR 41.1)

292001	Neutrons
292002	Neutron Life Cycle
292003	Reactor Kinetics and Neutron Sources
292004	Reactivity Coefficients
292005	Control rods
292006	Fission Product Poisons
292007	Fuel Depletion and Burnable Poisons
292008	Reactor Operational Physics

Thermodynamics Theory (CFR 41.14)

293001	Thermodynamic Units and Properties
293002	Basic Energy Concepts
293003	Steam
293004	Thermodynamic Process
293005	Thermodynamic Cycles
293006	Fluid Statics
293007	Heat Transfer and Heat Exchangers

293008	Thermal Hydraulics
293009	Core Thermal Limits
293010	Brittle Fracture and Vessel Thermal Stress

1.13 IMPORTANCE RATINGS

Importance, in this context, included direct and indirect impact of the K/A on safe plant operation in a manner ensuring personnel and public health and safety. Importance Ratings of the K/As are given for Reactor Operators and Senior Reactor Operators next to each knowledge and ability in the catalog. These ratings reflect average ratings of individual NRC and utility panel members. The rating scale is presented in Table 6.

Table 6
RO and SRO Importance Ratings

Rating	Importance for safe operation
5	Essential
4	Very important
3	Fairly important
2	Of limited importance
1	Insignificant Importance
*	Indicates variability in the responses

Therefore, the rating of 2.0 or below represents a statement of limited or insignificant importance for the safe operation of a plant. Such statements are generally considered as inappropriate content for NRC licensing examinations. (See below for qualifications of importance ratings related to variability of the ratings and plant specific data.)

1.13.1 Asterisk and Question Ratings

Some importance ratings are followed by an asterisk (*) or question mark (?). These marks indicate variability in the rating responses. An asterisk indicates that the rating spread was very broad. An asterisk can also signify that more than 15 percent of the raters indicated that the knowledge or ability is not required for the RO/SRO position at their plant, either because it refers to an inapplicable design feature or because it is the responsibility of someone else (e.g. SRO vs. RO). A question mark indicates that more than 15 percent of the raters felt that they were not familiar with the knowledge or ability as related to the particular system or design feature. These marks indicate a need for examiners to review plant-specific materials to determine whether or not that knowledge or ability is indeed appropriate for inclusion in any given examination.

1.13.2 Difference Ratings

A dagger (†) to the left of an individual knowledge or ability statement indicates that more than 20 percent of the raters indicated that the level of knowledge or ability required by an SRO is different than the level of knowledge or ability required by an RO. IN the PWR catalog, daggers may only appear next to plant-wide generic K/A statements, system -wide generic K/A statements, and statements in Appendices A and B as this information was not collected for the statements in the other sections of the catalog.

1.14 ACRONYMS AND TERMS

ADS	automatic depressurization system
APE	abnormal plant evolution
AFW	auxiliary feedwater system
APRM	average power range monitor
ARI	alternate rod insertion system
ARM	area radiation monitoring system
ATWS	anticipated transient without scram
CFR	code of federal regulations
CRD	control rod drive
D/G	diesel generator
ECCS	emergency core cooling system
EPE	emergency plant evolution
HPCS	high pressure core spray
HVAC	heating, ventilation and air conditioning
IAS	instrument air system
IRM	intermediate range monitor
K/A	knowledge and ability
LCO	limiting condition for operation
LPCI	low pressure coolant injection
LPCS	low pressure core spray
LSRO	senior reactor operator limited to fuel handling
MFW	main feedwater
M/G	motor generator
MSIV	main steam isolation valve
RCIC	reactor coolant isolation system
RCS	reactor coolant system
RHR	residual heat removal
RO	reactor operator
RPS	reactor protection system
RPV	reactor pressure vessel
SRO	senior reactor operator
SRV	safety relief valve

2.0 GENERIC KNOWLEDGES AND ABILITIES

2.1 Conduct of Operations

2.1.1 Knowledge of conduct of operations requirements.
(CFR 41.10, 45.13)
IMPORTANCE RO 3.7 SRO 3.8

2.1.2 Knowledge of operator responsibilities during all modes of plant operation.
(CFR 41.10, 45.13)
IMPORTANCE RO 3.0 SRO 4.0

2.1.3 Knowledge of shift turnover practices.
(CFR 41.10, 45.13)
IMPORTANCE RO 3.0 SRO 3.4

2.1.4 Knowledge of shift staffing requirements.
(CFR 41.10, 43.2)
IMPORTANCE RO 2.3 SRO 3.4

2.1.5 Ability to locate and use procedures and directives related to shift staffing and activities.
(CFR 41.10, 43.5, 45.12)
IMPORTANCE RO 2.3 SRO 3.4

2.1.6 Ability to supervise and assume a management role during plant transients and upset conditions.
(CFR 43.5, 45.12, 45.13)
IMPORTANCE RO 2.1 SRO 4.3

2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.
(CFR 43.5, 45.12, 45.13)
IMPORTANCE RO 3.7 SRO 4.4

2.1.8 Ability to coordinate personnel activities outside the control room.
(CFR 45.5, 45.12, 45.13)
IMPORTANCE RO 3.8 SRO 3.6

2.1 Conduct of Operations (continued)

2.1.9 Ability to direct personnel activities inside the control room.
(CFR 45.5, 45.12, 45.13)
IMPORTANCE RO 2.5 SRO 4.0

2.1.10 Knowledge of conditions and limitations in the facility license.
(CFR 43.1, 45.13)
IMPORTANCE RO 2.7 SRO 3.9

2.1.11 Knowledge of less than one hour technical specification action statements for systems.
(CFR 43.2, 45.13)
IMPORTANCE RO 3.0 SRO 3.8

2.1.12 Ability to apply technical specifications for a system.
(CFR 43.2, 43.5, 45.3)
IMPORTANCE RO 2.9 SRO 4.0

2.1.13 Knowledge of facility requirements for controlling vital / controlled access.
(CFR 41.10, 43.5, 45.9, 45.10)
IMPORTANCE RO 2.0 SRO 2.9

2.1.14 Knowledge of system status criteria which require the notification of plant personnel.
(CFR 43.5, 45.12)
IMPORTANCE RO 2.5 SRO 3.3

2.1.15 Ability to manage short-term information such as night and standing orders.
(CFR 45.12)
IMPORTANCE RO 2.3 SRO 3.0

2.1.16 Ability to operate plant phone, paging system, and two-way radio.
(CFR 41.10, 45.12)
IMPORTANCE RO 2.9 SRO 2.8

2.1.17 Ability to make accurate, clear and concise verbal reports.
(CFR 45.12, 45.13)
IMPORTANCE RO 3.5 SRO 3.6

2.1.18 Ability to make accurate, clear and concise logs, records, status boards, and reports.
(CFR 45.12, 45.13)
IMPORTANCE RO 2.9 SRO 3.0

2.1 Conduct of Operations (continued)

2.1.19 Ability to use plant computer to obtain and evaluate parametric information on system or component status.
(CFR 45.12)
IMPORTANCE RO 3.0 SRO 3.0

2.1.20 Ability to execute procedure steps.
(CFR 41.10, 43.5, 45.12)
IMPORTANCE RO 4.3 SRO 4.2

2.1.21 Ability to obtain and verify controlled procedure copy.
(CFR 45.10, 45.13)
IMPORTANCE RO 3.1 SRO 3.2

2.1.22 Ability to determine Mode of Operation.
(CFR 43.5, 45.13)
IMPORTANCE RO 2.8 SRO 3.3

2.1.23 Ability to perform specific system and integrated plant procedures during different modes of plant operation.
(CFR 45.2, 45.6)
IMPORTANCE RO 3.9 SRO 4.0

2.1.24 Ability to obtain and interpret station electrical and mechanical drawings.
(CFR 45.12, 45.13)
IMPORTANCE RO 2.8 SRO 3.1

2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.
(CFR 41.10, 43.5, 45.12)
IMPORTANCE RO 2.8 SRO 3.1

2.1.26 Knowledge of non-nuclear safety procedures (e.g. rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).
(CFR 41.10, 45.12)
IMPORTANCE RO 2.2 SRO 2.6

2.1 Conduct of Operations (continued)

2.1.27 Knowledge of system purpose and or function.
(CFR 41.7)
IMPORTANCE RO 2.8 SRO 2.9

2.1.28 Knowledge of the purpose and function of major system components and controls.
(CFR 41.7)
IMPORTANCE RO 3.2 SRO 3.3

2.1.29 Knowledge of how to conduct and verify valve lineups.
(CFR 41.10, 45.1, 45.12)
IMPORTANCE RO 3.4 SRO 3.3

2.1.30 Ability to locate and operate components, including local controls.
(CFR 41.7, 45.7)
IMPORTANCE RO 3.9 SRO 3.4

2.1.31 Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup.
(CFR 45.12)
IMPORTANCE RO 4.2 SRO 3.9

2.1.32 Ability to explain and apply system limits and precautions.
(CFR 41.10, 43.2, 45.12)
IMPORTANCE RO 3.4 SRO 3.8

2.1.33 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.
(CFR 43.2, 43.3, 45.3)
IMPORTANCE RO 3.4 SRO 4.0

2.1.34 Ability to maintain primary and secondary plant chemistry within allowable limits.
(CFR 41.10, 43.5, 45.12)
IMPORTANCE RO 2.3 SRO 2.9

2.2 Equipment Control

2.2.1 **Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.**
(CFR 45.1)
IMPORTANCE RO 3.7 SRO 3.6

2.2.2 **Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.**
(CFR 45.2)
IMPORTANCE RO 4.0 SRO 3.5

2.2.3 (multi-unit) **Knowledge of the design, procedural, and operational differences between units.**
(CFR 41, 43, 45)
IMPORTANCE RO 3.1 SRO 3.3

2.2.4 (multi-unit) **Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility.**
(CFR 45.1-45.13)
IMPORTANCE RO 2.8 SRO 3.0*

2.2.5 **Knowledge of the process for making changes in the facility as described in the safety analysis report.**
(CFR 43.3, 45.13)
IMPORTANCE RO 1.6 SRO 2.7

2.2.6 **Knowledge of the process for making changes in procedures as described in the safety analysis report.**
(CFR 43.3, 45.13)
IMPORTANCE RO 2.3 SRO 3.3

2.2.7 **Knowledge of the process for conducting tests or experiments not described in the safety analysis report.**
(CFR 43.3, 45.13)
IMPORTANCE RO 2.0 SRO 3.2

2.2.8 **Knowledge of the process for determining if the proposed change, test, or experiment involves an unreviewed safety question.**
(CFR 43.3, 45.13)
IMPORTANCE RO 1.8 SRO 3.3

2.2 Equipment Control (Continued)

2.2.9 **Knowledge of the process for determining if the proposed change, test or experiment increases the probability of occurrence or consequences of an accident during the change, test or experiment.**
(CFR 43.3, 45.13)
IMPORTANCE RO 2.0 SRO 3.3

2.2.10 **Knowledge of the process for determining if the margin of safety, as defined in the basis of any technical specification is reduced by a proposed change, test or experiment.**
(CFR 43.3, 45.13)
IMPORTANCE RO 1.9 SRO 3.3

2.2.11 **Knowledge of the process for controlling temporary changes.**
(CFR 41.10, 43.3, 45.13)
IMPORTANCE RO 2.5 SRO 3.4 *

2.2.12 **Knowledge of surveillance procedures.**
(CFR 41.10, 45.13)
IMPORTANCE RO 3.0 SRO 3.4

2.2.13 **Knowledge of tagging and clearance procedures.**
(CFR 41.10, 45.13)
IMPORTANCE RO 3.6 SRO 3.8

2.2.14 **Knowledge of the process for making configuration changes.**
(CFR 43.3, 45.13)
IMPORTANCE RO 2.1 SRO 3.0

2.2.15 **Ability to identify and utilize as-built design and configuration change documentation to ascertain expected current plant configuration and operate the plant.**
(CFR 43.3, 45.13)
IMPORTANCE RO 2.2 SRO 2.9

2.2.16 **Knowledge of the process for making of field changes.**
(CFR 41.10, 45.13)
IMPORTANCE RO 1.9 SRO 2.6*

2.2 **Equipment Control (Continued)**

2.2.17 **Knowledge of the process for managing maintenance activities during power operations.**
(CFR 43.5, 45.13)
IMPORTANCE RO 2.3 SRO 3.5

2.2.18 **Knowledge of the process for managing maintenance activities during shutdown operations.**
(CFR 43.5, 45.13)
IMPORTANCE RO 2.3 SRO 3.6

2.2.19 **Knowledge of maintenance work order requirements.**
(CFR 43.5, 45.13)
IMPORTANCE RO 2.1 SRO 3.1

2.2.20 **Knowledge of the process for managing troubleshooting activities.**
(CFR 43.5, 45.13)
IMPORTANCE RO 2.2 SRO 3.3

2.2.21 **Knowledge of pre and post maintenance operability requirements.**
(CFR 43.2)
IMPORTANCE RO 2.3 SRO 3.5

2.2.22 **Knowledge of limiting conditions for operations and safety limits.**
(CFR 43.2, 45.2)
IMPORTANCE RO 3.4 SRO 4.1

2.2.23 **Ability to track limiting conditions for operations.**
(CFR 43.2, 45.13)
IMPORTANCE RO 2.6 SRO 3.8

2.2.24 **Ability to analyze the affect of maintenance activities on LCO status.**
(CFR 43.2, 45.13)
IMPORTANCE RO 2.6 SRO 3.8

2.2.25 **Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.**
(CFR 43.2)
IMPORTANCE RO 2.5 SRO 3.7

2.2 Equipment Control (Continued)

2.2.26 Knowledge of refueling administrative requirements.
(CFR 43.5, 45.13)
IMPORTANCE RO 2.5 SRO 3.7

2.2.27 Knowledge of the refueling process.
(CFR 43.6, 45.13)
IMPORTANCE RO 2.6 SRO 3.5

2.2.30 Knowledge of new and spent fuel movement procedures.
(CFR 43.7, 45.13)
IMPORTANCE RO 2.6 SRO 3.5

2.2.31 Knowledge of SRO fuel handling responsibilities.
(CFR 43.6, 45.12)
IMPORTANCE RO 1.6 SRO 3.8

2.2.32 Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.
(CFR 45.12)
IMPORTANCE RO 3.5 SRO 3.3

2.2.33 Knowledge of procedures and limitations involved in initial core loading.
(CFR 43.6)
IMPORTANCE RO 2.2 SRO 2.9*

2.2.34 Knowledge of the effects of alterations on core configuration.
(CFR 43.6)
IMPORTANCE RO 2.3 SRO 3.3

2.2.35 Knowledge of control rod programming.
(CFR 43.6)
IMPORTANCE RO 2.5 SRO 2.9

2.2.36 Knowledge of the process for determining the internal and external effects on core reactivity.
(CFR 43.6)
IMPORTANCE RO 2.8 SRO 3.2*

2.3 Radiation Control

2.3.1 **Knowledge of 10 CFR 20 and related facility radiation control requirements.**
(CFR 41.12, 43.4. 45.9, 45.10)
IMPORTANCE RO 2.6 SRO 3.0

2.3.2 **Knowledge of facility ALARA program.**
(CFR 41.12, 43.4, 45.9, 45.10)
IMPORTANCE RO 2.5 SRO 2.9

2.3.3 **Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems).**
(CFR 43.4, 45.10)
IMPORTANCE RO 1.8 SRO 2.9

2.3.4 **Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.**
(CFR 43.4, 45.10)
IMPORTANCE RO 2.5 SRO 3.1

2.3.5 **Knowledge of use and function of personnel monitoring equipment.**
(CFR 41.11, 45.9)
IMPORTANCE RO 2.3 SRO 2.5

2.3.6 **Knowledge of the requirements for reviewing and approving release permits.**
(CFR 43.4, 45.10)
IMPORTANCE RO 2.1 SRO 3.1

2.3.7 **Knowledge of the process for preparing a radiation work permit.**
(CFR 41.10, 45.12)
IMPORTANCE RO 2.0 SRO 3.3

2.3.8 **Knowledge of the process for performing a planned gaseous radioactive release.**
(CFR 43.4, 45.10)
IMPORTANCE RO 2.3 SRO 3.2

2.3 Radiation Control (Continued)

2.3.9 Knowledge of the process for performing a containment purge.
(CFR 43.4, 45.10)
IMPORTANCE RO 2.5 SRO 3.4

2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.
(CFR 43.4, 45.10)
IMPORTANCE RO 2.9 SRO 3.3

2.3.11 Ability to control radiation releases.
(CFR 45.9, 45.10)
IMPORTANCE RO 2.7 SRO 3.2

2.4 Emergency Procedures /Plan

2.4.1 Knowledge of EOP entry conditions and immediate action steps.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 4.3 SRO 4.6

2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.
(CFR 41.7, 45.7, 45.8)
Note: The issue of setpoints and automatic safety features is not specifically covered in the systems sections).
IMPORTANCE RO 3.9 SRO 4.1

2.4.3 Ability to identify post-accident instrumentation.
(CFR 41.6, 45.4)
IMPORTANCE RO 3.5 SRO 3.8

2.4.4 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.
(CFR 41.10, 43.2, 45.6)
IMPORTANCE RO 4.0 SRO 4.3

2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 2.9 SRO 3.6

2.4 Emergency Procedures /Plan (Continued)

2.4.6 Knowledge symptom based EOP mitigation strategies.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.1 SRO 4.0

2.4.7 Knowledge of event based EOP mitigation strategies.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.1 SRO 3.8

2.4.8 Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.0 SRO 3.7

2.4.9 Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.3 SRO 3.9

2.4.10 Knowledge of annunciator response procedures.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.0 SRO 3.1

2.4.11 Knowledge of abnormal condition procedures.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.4 SRO 3.6

2.4.12 Knowledge of general operating crew responsibilities during emergency operations.
(CFR 41.10, 45.12)
IMPORTANCE RO 3.4 SRO 3.9

2.4.13 Knowledge of crew roles and responsibilities during EOP flowchart use.
(CFR 41.10, 45.12)
IMPORTANCE RO 3.3 SRO 3.9

2.4.14 Knowledge of general guidelines for EOP flowchart use.
(CFR 41.10, 45.13)
IMPORTANCE RO 3.0 SRO 3.9

2.4 Emergency Procedures /Plan (Continued)

2.4.15 **Knowledge of communications procedures associated with EOP implementation.**
(CFR 41.10, 45.13)
IMPORTANCE RO 3.0 SRO 3.5

2.4.16 **Knowledge of EOP implementation hierarchy and coordination with other support procedures.**
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.0 SRO 4.0

2.4.17 **Knowledge of EOP terms and definitions.**
(CFR 41.10, 45.13)
IMPORTANCE RO 3.1 SRO 3.8

2.4.18 **Knowledge of the specific bases for EOPs.**
(CFR 41.10, 45.13)
IMPORTANCE RO 2.7 SRO 3.6

2.4.19 **Knowledge of EOP layout, symbols, and icons.**
(CFR 41.10, 45.13)
IMPORTANCE RO 2.7 SRO 3.7

2.4.20 **Knowledge of operational implications of EOP warnings, cautions, and notes.**
(CFR 41.10, 45.13)
IMPORTANCE RO 3.3 SRO 4.0

2.4.21 **Knowledge of the parameters and logic used to assess the status of safety functions including:**
1. Reactivity control
2. Core cooling and heat removal
3. Reactor coolant system integrity
4. Containment conditions
5. Radioactivity release control.

(CFR 43.5, 45.12)
IMPORTANCE RO 3.7 SRO 4.3

2.4.22 **Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.**
(CFR 43.5, 45.12)
IMPORTANCE RO 3.0 SRO 4.0

2.4 Emergency Procedures /Plan (Continued)

2.4.23 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.
(CFR 41.10, 45.13)
IMPORTANCE RO 2.8 SRO 3.8

2.4.24 Knowledge of loss of cooling water procedures.
(CFR 41.10, 45.13)
IMPORTANCE RO 3.3 SRO 3.7

2.4.25 Knowledge of fire protection procedures.
(CFR 41.10, 45.13)
IMPORTANCE RO 2.9 SRO 3.4

2.4.26 Knowledge of facility protection requirements including fire brigade and portable fire fighting equipment usage.
(CFR 43.5, 45.12)
IMPORTANCE RO 2.9 SRO 3.3

2.4.27 Knowledge of fire in the plant procedure.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.0 SRO 3.5

2.4.28 Knowledge of procedures relating to emergency response to sabotage.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 2.3 SRO 3.3

2.4.29 Knowledge of the emergency plan.
(CFR 43.5, 45.11)
IMPORTANCE RO 2.6 SRO 4.0

2.4.30 Knowledge of which events related to system operations/status should be reported to outside agencies.
(CFR 43.5, 45.11)
IMPORTANCE RO 2.2 SRO 3.6

2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions.
(CFR 41.10, 45.3)
IMPORTANCE RO 3.3 SRO 3.4

2.4 Emergency Procedures /Plan (Continued)

2.4.32 Knowledge of operator response to loss of all annunciators.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 3.3 SRO 3.5

2.4.33 Knowledge of the process used track inoperable alarms.
(CFR 41.10, 43.5, 45.13)
IMPORTANCE RO 2.4 SRO 2.8

2.4.34 Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.
(CFR 43.5, 45.13)
IMPORTANCE RO 3.8 SRO 3.6

2.4.35 Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.
(CFR 43.5, 45.13)
IMPORTANCE RO 3.3 SRO 3.5

2.4.36 Knowledge of chemistry / health physics tasks during emergency operations.
(CFR 43.5)
IMPORTANCE RO 2.0 SRO 2.8

2.4.37 Knowledge of the lines of authority during an emergency.
(CFR 45.13)
IMPORTANCE RO 2.0 SRO 3.5

2.4.38 Ability to take actions called for in the facility emergency plan, including (if required)supporting or acting as emergency coordinator.
(CFR 43.5, 45.11)
IMPORTANCE RO 2.2 SRO 4.0

2.4.39 Knowledge of the RO's responsibilities in emergency plan implementation.
(CFR 45.11)
IMPORTANCE RO 3.3 SRO 3.1

2.4.40 Knowledge of the SRO's responsibilities in emergency plan implementation.
(CFR 45.11)
IMPORTANCE RO 2.3 SRO 4.0

2.4.41 Knowledge of the emergency action level thresholds and classifications.
(CFR 43.5, 45.11)
IMPORTANCE RO 2.3 SRO 4.1

2.4 Emergency Procedures /Plan (Continued)

2.4.42 Knowledge of emergency response facilities.
(CFR 45.11)
IMPORTANCE RO 2.3 SRO 3.7

2.4.43 Knowledge of emergency communications systems and techniques.
(CFR 45.13)
IMPORTANCE RO 2.8 SRO 3.5

2.4.44 Knowledge of emergency plan protective action recommendations.
(CFR 43.5, 45.11)
IMPORTANCE RO 2.1 SRO 4.0

2.4.45 Ability to prioritize and interpret the significance of each annunciator or alarm.
(CFR 43.5, 45.3, 45.12)
IMPORTANCE RO 3.3 SRO 3.6

2.4.46 Ability to verify that the alarms are consistent with the plant conditions.
(CFR 43.5, 45.3, 45.12)
IMPORTANCE RO 3.5 SRO 3.6

2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.
(CFR: 41.10,43.5, 45.12)
IMPORTANCE RO 3.4 SRO 3.7

2.4.48 Ability to interpret control room indications to verify the status and operation of system, and understand how operator action s and directives affect plant and system conditions.
(CFR 43.5, 45.12)
IMPORTANCE RO 3.5 SRO 3.8

2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.
(CFR 41.10, 43.2, 45.6)
IMPORTANCE RO 4.0 SRO 4.0

2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.
(CFR 45.3)
IMPORTANCE RO 3.3 SRO 3.3

3.1 Reactivity Control

201001	Control Rod Drive Hydraulic System
201003	Control Rod and Drive Mechanism
201002	Reactor Manual Control System
202002	Recirculation flow Control System
202001	Recirculation System
201005	Rod Control and Information System
211000	Standby Liquid Control System

SYSTEM: 201001 Control Rod Drive Hydraulic System

TASK: Perform lineups on the CRD hydraulic system
Place the control rod drive system in service
Monitor the control rod Drive System
Remove Control Rod Drive System From Service
Vent the control rod drive system (write in)
Conduct CRD hydraulics valve testing during cold shutdown

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between CONTROL ROD DRIVE HYDRAULIC SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate system	3.1	3.1
K1.02	Condensate storage tanks	3.0	3.0
K1.03	Recirculation pumps (seal purge): Plant-Specific . . .	3.1	3.1
K1.04	Head spray: BWR-3	2.7	2.7
K1.05	Feedwater (or reactor water cleanup)-CRD return to vessel: Plant-Specific	2.7	2.7
K1.06	Component cooling water systems: Plant-Specific . . .	2.8	2.8
K1.07	Reactor protection system	3.4	3.4
K1.08	Reactor manual control system	3.4	3.4
K1.09	Plant air systems	3.1	3.2
K1.10	Control rod drive mechanisms	2.8	2.8
K1.11	Reactor water cleanup pumps: Plant-Specific	2.8	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pumps	2.9	3.1
K2.02	Scram valve solenoids	3.6*	3.7
K2.03	Backup SCRAM valve solenoids	3.5*	3.6*
K2.04	Scram discharge volume vent and drain valve solenoids.	3.2	3.3
K2.05	Alternate rod insertion valve solenoids: Plant-Specific	4.5*	4.5*
K2.06	Motor operated valves	2.1*	2.3*
K2.07	Breaker control	2.0*	2.1*
K3.	**Knowledge of the effect that a loss or malfunction of the CONTROL ROD DRIVE HYDRAULIC SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Recirculation pumps: Plant-Specific	3.0	3.1
K3.02	Reactor water level	2.6	2.6
K3.03	Control rod drive mechanisms	3.1	3.2
K3.04	Head spray: BWR-3	2.7	2.7
K3.05	Reactor water cleanup pumps: Plant-Specific	2.3	2.3

SYSTEM: 201001 Control Rod Drive Hydraulic System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	**Knowledge of CONTROL ROD DRIVE HYDRAULIC SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Protection against pump runout during SCRAM conditions (location of the CRD system flow element and a restricting orifice in the accumulator charging water line)	2.5	2.6
K4.02	Stable system flow when moving control rods (stabilizing valves)	2.6	2.6
K4.03	Control rod drive mechanism cooling water flow	2.7	2.7
K4.04	Scramming control rods with inoperative SCRAM solenoid valves (back-up SCRAM valves)	3.6	3.6
K4.05	Control rod SCRAM	3.8	3.8
K4,06	Isolation of the SCRAM discharge volumes during SCRAM conditions	3.8	3.9
K4.07	Testing SCRAM discharge volume isolation valves	2.8	2.8
K4.08	Controlling control rod drive header pressure	3.1	3.0
K4.09	Controlling control rod drive cooling header pressure	2.9	2.8
K4.10	Control of rod movement (HCU directional control valves)	3.1	3.0
K4.11	Protection against filling the SDV during non-SCRAM conditions	3.6	3.6
K4.12	Controlling CRD system flow	2.9	2.9
K4.13	Motor cooling	2.3	2.3
K5.	**Knowledge of the operational implications of the following concepts as they apply to CONTROL ROD DRIVE HYDRAULIC SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Pump operation	2.4	2.4
K5.02	Flow indication	2.6	2.6
K5.03	Pressure indication	2.7	2.7
K5.04	Indications of pump cavitation	2.4	2.4
K5.05	Indications of pump runout: Plant-Specific	2.7	2.7
K5.06	Differential pressure indication	2.5	2.6
K5.07	Air operated control valves	2.3	2.4
K5.08	Solenoid operated valves	2.5	2.6
K5.09	System venting	2.2*	2.2*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD DRIVE HYDRAULIC System :** (CFR 41.7 / 45.7)		
K6.01	Condensate system	2.8	2.8
K6.02	Condensate storage tanks	3.0	3.1

SYSTEM: 201001 Control Rod Drive Hydraulic System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.03	Plant air systems	3.0	2.9
K6 04	RPS	3.6	3.7
K6.05	A.C. power	3.3	3.3
K6.06	Component cooling water systems: Plant-Specific	2.8	2.8

ABILITY

A1. **Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD DRIVE HYDRAULIC SYSTEM controls including:**
(CFR 41.5 / 45.5)

A1.01	CRD drive water header pressure	3.1	2.9
A1.02	CRD cooling water header pressure	2.9	2.9
A1.03	CRD system flow	2.9	2.8
A1.04	Head spray flow: BWR-3	2.7	2.7
A1.05	SDV isolation valve position	3.5	3.4
A1.06	HCU pressure/level	3.4	3.4
A1.07	Reactor water level	3.3	3.2
A1.08	Pump amps	2.3	2.2
A1.09	CRD drive water flow	2.9	2.8
A1.10	CRD cooling water flow	2.8	2.6

A2. **Ability to (a) predict the impacts of the following on the CONTROL ROD DRIVE HYDRAULIC SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:**
(CFR 41.5 / 45.6)

A2.01	Pumps trips	3.2	3.3
A2.02	Valve closures	3.2	3.3
A2.03	Power supply failures	3.0	3.1
A2.04	†Scram conditions	3.8	3.9*
A2.05	Discharge strainer(s) becoming plugged	2.9	2.9
A2 06	Suction strainer(s) becoming plugged	2.9	2.9
A2.07	Flow control valve failure	3.2	3.1
A2.08	Inadequate system flow	2.8	2.8
A2.09	Loss of applicable plant air systems	3.2	3.1
A2.10	†Low HCU accumulator pressure/high level	3.5	3.6
A2 11	Valve openings	2.6	2.7
A2.12	High cooling water flow	2.8	2.9
A2.13	Low cooling water flow	2.7	2.8
A2.14	Low drive header pressure	2.8	2.8

SYSTEM: 201001 Control Rod Drive Hydraulic System

Tasks as noted previously

A3.	**Ability to monitor automatic operations of the CONTROL ROD DRIVE HYDRAULIC SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.0	3.0
A3.02	Pump start: Plant-Specific	2.8	2.8
A3.03	System pressure	2.7	2.7
A3.04	System flow	2.8	2.7
A3.05	Reactor water level	2.8	2.8
A3.06	Reactor power	2.8	2.8
A3.07	HCU accumulator pressure/level	3.3	3.3
A3.08	Drive water flow	3.0	2.9
A3.09	Cooling water flow	2.8	2.8
A3.10	Lights and alarms	3.0	2.9
A3.11	SDV level	3.5	3.5
A4.	**Ability to manually operate and/or monitor in the control room:** CFR 41.7 / 45.5 to 45.8)		
A4.01	CRD pumps	3.1	3.1
A4.02	CRD pump discharge valve	2.6	2.6
A4.03	CRD system flow control valve	2.9	2.8
A4.04	Drive water header pressure control valve	3.1	3.0
A4.05	Cooling water header pressure control valve	2.7	2.8
A4.06	SDV isolation valve test switch	2.8	2.7
A4.07	Stabilizing valve selector switch	2.2*	2.1*

SYSTEM: 201003 Control Rod and Drive Mechanism

TASK: Flush a CRD mechanism
Conduct Control Rod Operability Test
Conduct Control Rod Coupling Integrity Test
Perform Control Rod Drive Stall Flow Testing (CRD 18-Month Accumulator Operability Test)
Perform control rod drive accumulator piston seal exercising
Perform the control rod drive timing test (write in)
Perform friction testing

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between CONTROL ROD AND DRIVE MECHANISM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Control rod drive hydraulic system	3.2	3.3
K1.02	Reactor water	2.9	3.0
K1.03	RPIS	3.1	3.1
K1.04	Reactor vessel	2.9	2.9
K1.05	CRD mechanism temperature monitor	2.6	2.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the CONTROL ROD AND DRIVE MECHANISM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor power	3.2	3.4
K3.02	†Flux shaping	2.8	3.1
K3.03	†Shutdown margin	3.2	3.8
K4.	**Knowledge of CONTROL ROD AND DRIVE MECHANISM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Limiting control rod speed in the event of a rod drop	2.9*	3.0*
K4.02	Detection of an uncoupled rod	3.8	3.9
K4.03	Slowing the drive mechanism near the end of its travel following a SCRAM: Plant-Specific	2.1*	2.1*
K4.04	The use of either accumulator or reactor water to SCRAM the control rod	3.6	3.7
K4.05	Rod position indication	3.2	3.3
K4.06	Uncoupling the control rod from the drive mechanism	2.4	2.6
K4.07	Maintaining the control rod at a given location	3.2	3.2
K4.08	Monitoring CRD mechanism temperature	2.6	2.7

SYSTEM: 201003 Control Rod and Drive Mechanism

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to CONTROL ROD AND DRIVE MECHANISM :** (CFR 41.5 / 45.3)		
K5.01	Hydraulics	2.6	2.7
K5.02	†Flux shaping	2.8	3.3
K5.03	Reactor power control	3.3	3.4
K5.04	†Rod sequence patterns	3.1	3.4
K5.05	Reverse power effect	3.0	3.1
K5.06	How control rod worth varies with moderator temperature and voids	2.7	2.9
K5.07	How control rod movements affect core reactivity	3.3	3.6
K5.08	How control rods affect shutdown margin	3.1	3.5
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROD AND DRIVE MECHANISM :** (CFR 41.7 / 45.7)		
K6.01	Control rod drive hydraulic system	3.3	3.3
K6.02	Reactor pressure	3.0	3.0
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROD AND DRIVE MECHANISM controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor power	3.7	3.8
A1 02	CRD drive pressure	2.8	2.8
A1.03	CRD drive water flow	2.9	2.9
A2.	**Ability to (a) predict the impacts of the following on the CONTROL ROD AND DRIVE MECHANISM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	†Stuck rod	3.4	3.6
A2.02	Uncoupled rod	3.7	3.8
A2.03	†Drifting rod	3.4	3.7
A2.04	Single control rod SCRAM	3.5	3.6
A2.05	Reactor Scram	4.1*	4.1
A2.06	Loss of CRD cooling water flow	3.0	3.1
A2.07	Loss of CRD drive water flow	3.1	3.2
A2.08	Low HCU accumulator pressure/high level	3.8	3.7
A2.09	Low reactor pressure	3.2	3.4

SYSTEM: 201003 Control Rod and Drive Mechanism

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.10	†Excessive SCRAM time for a given drive mechanism . . .	3.0	3.4
A3.	**Ability to monitor automatic operations of the CONTROL ROD AND DRIVE MECHANISM including:** (CFR 41.7 / 45.7)		
A3.01	Control rod position	3.7	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	CRD mechanism temperature	2.6*	2.6*
A4.02	CRD mechanism position: Plant-Specific	3.5	3.5

SYSTEM: 201002 Reactor Manual Control System

TASK: Operate Control Rods Using "Single Notch" Mode
Operate Control Rods Using "Notch Override"
Conduct "Emergency Rod In" Control Rods Insertion
Operate The Control Rod Drive System To Bring The Reactor Critical
Operate the Control Rod Drive Manually At Power
Operate the Control Rod Drive System To Shutdown The Reactor
Conduct Refueling Interlocks Functional Test/Control Rod Drive Maintenance Test
What if rod drift alarm occurs?

K/A NO.	**KNOWLEDGE**	**IMPORTANCE** RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR MANUAL CONTROL SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Control rod drive hydraulic system	3.2	3.2
K1.02	Control rod and drive mechanism	3.0	2.9
K1.03	Control rod block interlocks/power operation refueling	3.4	3.6
K1.04	Rod block monitor: Plant-Specific	3.5	3.6
K1.05	Rod worth minimizer: Plant-Specific	3.4	3.5
K1.06	Rod sequence control system: Plant-Specific	3.2	3.3
K1.07	Process computer: Plant-Specific	2.8	2.9
K1.08	†Refueling interlocks: Plant-Specific	3.2	3.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Select matrix	2.1*	2.3
K2.02	CRD HCU directional control valves	2.1*	2.3
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR MANUAL CONTROL SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Ability to move control rods	3.4	3.4
K3.02	†Rod block monitor: Plant-Specific	2.9	3.2
K3.03	Ability to process rod block signals	2.9	3.0
K4.	**Knowledge of REACTOR MANUAL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Detection of sequence timer malfunction	2.7	2.7
K4.02	Control rod blocks	3.5	3.5
K4.03	Detection of drifting control rods	3.6	3.6

SYSTEM: 201002 Reactor Manual Control System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.04	"Single notch" rod withdrawal and insertion	3.3	3.3
K4.05	"Notch override" rod withdrawal	3.3	3.3
K4.06	"Emergency In" rod insertion	3.5	3.5
K4.07	Timing of rod insert and withdrawal cycles (rod movement sequence timer)	2.5*	2.5
K4.08	"Continuous In" rod insertion	3.2	3.2
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR MANUAL CONTROL SYSTEM :** (CFR 41.5 / 45.3)		
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR MANUAL CONTROL SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Select matrix power	2.5	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR MANUAL CONTROL SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	CRD drive water flow	2.8	2.8
A1.02	Control rod position	3.4	3.3
A1.03	Rod movement sequence lights	3.0	2.9
A1.04	Overall reactor power	3.6	3.5
A1.05	Local reactor power	3.4	3.6
A2.	**Ability to (a) predict the impacts of the following on the REACTOR MANUAL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Rod movement sequence timer malfunctions	2.7	2.8
A2.02	Rod drift alarm	3.2	3.3
A2.03	Select block	2.9	2.8
A2.04	Control rod block	3.2	3.1
A3.	**Ability to monitor automatic operations of the REACTOR MANUAL CONTROL SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Control rod block actuation	3.2	3.1
A3.02	Rod movement sequence lights	2.8	2.7

SYSTEM: 201002 Reactor Manual Control System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A3.03	Rod drift alarm	3.2	3.2
A3.04	Rod movement sequence timer malfunction alarm: Plant-Specific	2.8	2.8
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Rod movement control switch	3.5	3.4
A4.02	Emergency in/notch override switch	3.5	3.5
A4.03	Rod drift test switch	2.8	2.8
A4.04	Timer malfunction test switch: Plant-Specific	2.8	2.8
A4.05	Rod select matrix	3.1	3.0
A4.06	Rod select matrix power switch	2.8	2.8

SYSTEM: 202002 Recirculation Flow Control System

TASK: Adjust the recirculation flow using manual control
Operate recirculation pumps in various control modes (adjust the recirculation flow using "master manual" control)
What if flow mismatch exceeds limits of daily surveillance log
What if power to flow is not in specified range?

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RECIRCULATION FLOW CONTROL SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Recirculation system	3.5	3.6
K1.02	Reactor power	4.2*	4.2
K1.03	Reactor core flow	3.7	3.7
K1.04	Reactor/turbine pressure regulating system: Plant-Specific	3.1	3.1
K1.05	Recirculation MG set: Plant-Specific	3.5	3.5
K1.06	A.C. electrical	2.9	3.0
K1.07	D.C. electrical	2.6	2.8
K1.08	Feedwater flow	3.1	3.2
K1.09	Reactor water level	3.1	3.2
K1.10	Rod pattern	2.5	2.6
K1.11	APRM system	3.4	3.4
K1.12	Recirculation flow control valves: Plant-Specific . .	3.7	3.9
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Recirculation flow control system	2.4*	2.4
K2.02	Hydraulic power unit: Plant-Specific	2.6	2.6
K3.	**Knowledge of the effect that a loss or malfunction of the RECIRCULATION FLOW CONTROL SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Core flow	3.5	3.5
K3.02	Reactor power	4.0	4.0
K3.03	Reactor water level	3.3	3.4
K3.04	Reactor/turbine pressure regulation system	2.9	3.1
K3.05	Recirculation pump speed: Plant-Specific	3.2	3.3
K3.06	Recirculation flow control valve position: Plant-Specific	3.7	3.7

SYSTEM: 202002 Recirculation Flow Control System

Tasks as noted previously

K/A NO.	**KNOWLEDGE**	**IMPORTANCE** RO	SRO
K4.	**Knowledge of RECIRCULATION FLOW CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Scoop tube break: Plant-Specific	3.1	3.1
K4.02	Recirculation pump speed control: Plant-Specific . .	3.0	3.0
K4.03	Signal failure detection: Plant-Specific	3.0	3.0
K4.04	Automatic load following: Plant-Specific	2.4*	2.4
K4.05	Limiting recirculation pump speed mismatch: Plant-Specific	3.1	3.4
K4.06	Recirculation pump adequate NPSH: Plant-Specific . .	3.1	3.1
K4.07	Minimum and maximum pump speed setpoints	2.9	2.9
K4.08	Automatic flow control valve positioning: BWR-5,6 . .	3.3	3.4
K4.09	Minimum and maximum flow control valve position setpoints: BWR-5,6	3.3	3.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to RECIRCULATION FLOW CONTROL SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Fluid coupling: BWR-3,4	2.8	2.8
K5.02	Feedback signals	2.6	2.6
K5.03	Error signals	2.4	2.4
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RECIRCULATION FLOW CONTROL SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. power	2.8	2.9
K6.02	D.C. power	2.6	2.6
K6.03	Recirculation system	2.8	2.8
K6.04	Feedwater flow inputs: BWR-3,4,5,6	3.5	3.5
K6.05	Reactor water level	3.1	3.1
K6.06	Reactor/turbine pressure regulating system: Plant-Specific	2.9	2.9
K6.07	APRM signal input: BWR-5,6	3.6	3.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION FLOW CONTROL SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Recirculation pump speed: BWR-2,3,4,5,6	3.2	3.2
A1.02	MG set drive motor amps: Plant-Specific	2.7	2.7
A1.03	MG set generator current, power, voltage	2.5*	2.4*

SYSTEM: 202002 Recirculation Flow Control System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A1.04	Reactor water level	2.9	2.9
A1.05	Reactor power	3.6	3.6
A1.06	Reactor core flow	3.4	3.3
A1.07	Recirculation loop flow: Plant-Specific	3.1	3.1
A1.08	Recirculation FCV position: BWR-5,6	3.4	3.4
A2.	**Ability to (a) predict the impacts of the following on the RECIRCULATION FLOW CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Recirculation pump trip	3.4	3.4
A2.02	Loss of A.C.	2.9	3.0
A2.03	Loss of D.C.	2.6	2.7
A2.04	Recirculation pump speed mismatch between loops: Plant-Specific	3.0	3.2
A2.05	Scoop tube lockup: BWR-2,3,4	3.1	3.1
A2.06	Low reactor water level: Plant-Specific	3.3	3.3
A2.07	Loss of feedwater signal inputs: Plant-Specific	3.3	3.3
A2.08	FCV lockup: BWR-5,6	3.3	3.3
A2.09	†Recirculation flow mismatch: Plant-Specific	3.1	3.3
A3.	**Ability to monitor automatic operations of the RECIRCULATION FLOW CONTROL SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Flow control valve operation: BWR-5,6	3.6	3.4
A3.02	Lights and alarms	3.4	3.4
A3.03	Scoop tube operation: BWR-2,3,4	3.1	3.0
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	MG sets	3.3	3.1
A4.02	Hydraulic power unit: BWR-5,6	2.8	2.8
A4.03	Lights and alarms	3.1	3.1
A4.04	Reactor power	3.8	3.8
A4.05	Reactor level	3.4	3.4
A4.06	Scoop tube power: BWR-2,3,4	2.7	2.6
A4.07	Recirculation pump speed: BWR-2,3,4,5,6	3.3	3.2
A4.08	Recirculation system flow	3.3	3.3
A4.09	Core flow	3.2	3.3

SYSTEM: 202001 Recirculation System

TASK: Perform lineups on the recirculation system
Vent recirculation pump seals
Startup a recirculation pump (startup a second recirculation pump)
Operate recirculation pumps in various control modes (adjust the recirculation flow using "master manual" control)
Monitor recirculation pumps in operation
Monitor jet pump operation
Secure a recirculation pump
Perform jet pump operability test
Conduct heatup and cooldown temperature checks
Conduct recirculation pump startup check of the delta temperature between the reactor coolant in the idle loop to the reactor vessel
Conduct recirculation pump trip logic system functional test
Conduct recirculation loop valve operability test
Conduct recirculation system valve testing
What if jet pumps not operating within required operating band

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RECIRCULATION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Core flow	3.6	3.7
K1.02	Reactor power	4.1	4.1
K1.03	Reactor moderator temperature	3.2	3.3
K1.04	Reactor/turbine pressure regulating system: Plant-Specific	3.3	3.3
K1.05	Reactor pressure	3.4	3.4
K1.06	Jet pumps	3.6	3.6
K1.07	Component cooling water systems	3.1	3.2
K1.08	A.C. electrical	3.1	3.2
K1.09	D.C. electrical	2.7	2.9
K1.10	Control rod drive system: Plant-Specific	2.8	2.8
K1.11	Drywell equipment drain sump	2.7	2.8
K1.12	Recirculation system motor-generator sets: Plant-Specific	3.6	3.6
K1.13	Jet pump ring header and risers: Plant-Specific	3.1	3.2
K1.14	Rod block monitor: Plant-Specific	3.0	3.2
K1.15	Nuclear boiler instrumentation (reactor water level/pressure)	3.2	3.2
K1.16	Low pressure coolant injection logic: Plant-Specific	3.9	3.9
K1.17	Vessel bottom head drain temperature	3.1	3.3
K1.18	RHR shutdown cooling mode	3.3	3.3
K1.19	Feedwater flow	3.2	3.2
K1.20	Plant air systems: Plant-Specific	2.4	2.5
K1.21	Reactor water cleanup system	2.6	2.6

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.22	Reactor water level	3.5	3.6
K1.23	Average power range monitor flow converters: Plant-Specific	3.4	3.5
K1.24	Isolation condenser: Plant-Specific	3.4	3.4
K1.25	Reactor water sampling system	2.6	2.7
K1.26	Recirculation flow control system: Plant-Specific		
K1.27	ATWS circuitry: Plant-Specific	4.1	4.3
K1.28	End-of-cycle recirculation pump trip circuitry: Plant-Specific	3.9	4.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Recirculation pumps: Plant-Specific	3.2*	3.2
K2.02	MG sets: Plant-Specific	3.2	3.3
K2.03	Recirculation system valves	2.7*	2.8*
K2.04	Hydraulic power unit oil pumps: Plant-Specific . . .	2.5*	2.5*
K2.05	MG set oil pumps: Plant-Specific	2.3*	2.3*
K3.	**Knowledge of the effect that a loss or malfunction of the RECIRCULATION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Core flow	3.6	3.6
K3.02	Load following capabilities: Plant-Specific	2.8	2.8
K3.03	Reactor power	3.9	3.9
K3.04	Reactor water level	3.7	3.7
K3.05	Recirculation system MG sets: Plant-Specific	3.3	3.3
K3.06	Low pressure coolant injection logic: Plant-Specific .	3.7	3.9
K3.07	Vessel bottom head drain temperature	2.9	2.9
K3.08	Shutdown cooling system	2.8	2.9
K3.09	Reactor water cleanup system	2.4*	2.5*
K3.10	Average power range monitor flow converters	3.3	3.4
K3.11	Component cooling water systems	2.3*	2.3*
K3.12	Isolation condenser: Plant-Specific	3.0	3.0
K3.13	Reactor water sampling system	2.5	2.5
K3.14	Primary containment integrity: Plant-Specific	3.5	3.5
K4.	**Knowledge of RECIRCULATION System design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	2/3 core coverage: Plant-Specific	3.9	3.9
K4.02	Adequate recirculation pump NPSH	3.1	3.2
K4.03	Recirculation pump motor cooling	2.8	2.8
K4.04	Controlled seal flow	3.0	3.1
K4.05	Seal cooling	2.9	2.9

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.06	Automatic voltage/frequency regulation: Plant-Specific	2.6*	2.7
K4.07	Motor generator set trips: Plant-Specific	2.8	2.9
K4.08	Oil pump automatic starts: Plant-Specific	2.8	2.9
K4.09	Pump minimum flow limit: Plant-Specific	2.7	2.9
K4.10	Pump start permissives: Plant-Specific	3.3	3.4
K4.11	Limitation of recirculation pumps flow mismatch: Plant-Specific	3.1	3.5
K4.12	Minimization of reactor vessel bottom head temperature gradients: Plant-Specific	3.2	3.5
K4.13	†End of cycle recirculation pump trip: Plant-Specific	3.7	4.0*
K4.14	ATWS: Plant-Specific	4.0	4.1*
K4.15	Slow speed pump start: Plant-Specific	3.1	3.4
K4.16	Recirculation pump downshift/runback: Plant-Specific	3.3	3.6
K4.17	Fast speed pump start: Plant-Specific	3.3	3.5
K4.18	Automatic MG set start sequencing: Plant-Specific	2.8	3.0
K5.	**Knowledge of the operational implications of the following concepts as they apply to RECIRCULATION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.7	2.8
K5.02	Jet pump operation: BWR-3,4,5,6	3.1	3.2
K5.03	Pump/motor cooling: Plant-Specific	2.7	2.7
K5.04	System venting	2.4	2.6
K5.05	End of cycle recirculation pump trip: Plant-Specific	3.5	3.6
K5.06	ATWS RPT: Plant-Specific	3.6	3.7
K5.07	Natural circulation: Plant-Specific	3.3	3.4
K5.08	E/P converters: Plant-Specific	2.0*	2.1*
K5.09	Hydraulically operated valves: Plant-Specific	2.6*	2.6*
K5.10	Motor generator set operation: Plant-Specific	2.8*	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RECIRCULATION SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Jet pumps: Plant-Specific	3.5	3.7
K6.02	Component cooling water systems	3.1	3.2
K6.03	A.C. power: Plant-Specific	2.9	3.0
K6.04	D.C. power: Plant-Specific	2.7	2.8
K6.05	Control rod drive system: Plant-Specific	2.7	2.8
K6.06	Recirculation system motor-generator sets: Plant-Specific	3.1	3.1
K6.07	Feedwater flow	3.3	3.3
K6.08	Reactor water cleanup system	2.3	2.3
K6.09	Reactor water level	3.4	3.4

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Recirculation pump flow: Plant-Specific	3.6	3.5
A1.02	Jet pump flow	3.4	3.4
A1.03	Core flow	3.6	3.6
A1.04	Reactor water level	3.3	3.3
A1.05	Reactor power	3.9	3.9
A1.06	Recirculation pump motor amps	2.5	2.6
A1.07	Recirculation pump speed	2.7	2.8
A1.08	Recirculation FCV position: BWR-5,6	3.7	3.7
A1.09	Recirculation pump seal pressures	3.3	3.3
A1.10	Recirculation seal purge flows	2.6	2.7
A1.11	Vessel bottom head drain temperature	2.8	2.9
A1.12	Recirculation pump differential pressure: Plant-Specific	2.6	2.6
A1.13	Recirculation loop temperatures: Plant-Specific	3.1	3.2
A1.14	Recirculation drive motor temperature: Plant-Specific	2.4	2.4
A1.15	Recirculation MG set temperatures: Plant-Specific	2.4	2.4
A1.16	Recirculation MG drive motor amps: Plant-Specific	2.3*	2.3
A1.17	Recirculation MG set generator current, power, voltage: Plant-Specific	2.3*	2.3
A2.	Ability to (a) predict the impacts of the following on the RECIRCULATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	†Jet pump failure: Plant-Specific	3.4	3.9
A2.02	Recirculation system leak	3.7	3.9
A2.03	Single recirculation pump trip	3.6	3.7
A2.04	Multiple recirculation pump trip	3.7	3.8
A2.05	Inadvertent recirculation flow increase	3.8	4.0
A2.06	Inadvertent recirculation flow decrease	3.6	3.8
A2.07	Recirculation pump speed mismatch: Plant-Specific	3.1	3.3
A2.08	Recirculation flow mismatch: Plant-Specific	3.1	3.4
A2.09	Recirculation scoop tube lockup: Plant-Specific	3.2	3.4
A2.10	†Recirculation pump seal failure	3.5	3.9
A2.11	Low reactor water level	3.7	3.9
A2.12	Loss of reactor feedwater	3.6	3.6
A2.13	Carryunder	2.6	2.8

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.14	High reactor pressure (ATWS circuitry initiation): Plant-Specific	3.9	4.2
A2.15	End of cycle trip circuitry: Plant-Specific	3.7	3.9
A2.16	Loss of seal purge flow (CRD)	2.9	3.1
A2.17	Loss of seal cooling water	3.1	3.2
A2.18	Loss of motor cooling	2.9	3.1
A2.19	Loss of A.C. power: Plant-Specific	3.1	3.2
A2.20	Loss of D.C. power: Plant-Specific	2.8	2.9
A2.21	†Recirculation loop temperature out of spec: Plant-Specific	3.3	3 7
A2.22	Loss of component cooling water	3.1	3.2
A2.23	Valve closures	3.2	3.2
A2.24	Valve opening	3.1	3.1
A2.25	Recirculation flow control valve lockup: Plant-Specific	3.3	3.3
A2.26	Incomplete start sequence: Plant-Specific	2.9	3.1
A3.	**Ability to monitor automatic operations of the RECIRCULATION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.1	3.1
A3.02	Pump/MG set start sequence: Plant-Specific	3.1	3.0
A3.03	System flow	3.2	3.2
A3.04	Lights and alarms	3.2	3.1
A3.05	Pump speed: Plant-Specific	2.9	2.9
A3.06	Flow control valve position: BWR-5,6	3.6	3.6
A3.07	Pump trips: Plant-Specific	3.3	3.3
A3.08	Pump downshift: BWR-5,6	3.4	3.3
A3.09	MG set trip: Plant-Specific	3.3	3.3
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Recirculation pumps	3.7	3.7
A4.02	System valves	3.5	3.4
A4.03	Reactor power	4.1	4.1
A4.04	System flow	3.7	3.7
A4.05	Lights and alarms	3.3	3.3
A4.06	Oil pumps	2.7	2.7
A4.07	Vent fans: Plant-Specific	2.4	2.3
A4.08	Motor-generator sets: Plant-Specific	3.2	3.1
A4.09	Reactor water level	3.7	3.7
A4.10	Seal flow: Plant-Specific	2.8	2.8
A4.11	Seal pressures: Plant-Specific	3.2	3.3
A4.12	Core flow	3.9	3.8
A4.13	Core differential pressure	3.1	3.3

SYSTEM: 201005 Rod Control and Information System (RCIS)

TASK: Operate control rods using "single notch" mode
Operate control rods using "notch override"
Conduct "emergency rod in" control rod insertion
Operate control rod drive system to bring the reactor critical
Operate the control rod drive system manually at power
Operate the control rod drive system to shutdown the reactor
Conduct control rod operability test
Conduct refueling interlocks functional test/control rod drive maintenance test
Conduct CRD hydraulics valve testing during cold shutdown
Conduct rod sequence control test
Conduct rod sequence control integrity test
Perform control rod drive stall flow testing (CRD 18-month accumulator operability test)
Startup the rod position indication system
Perform a position indication alignment during a reactor startup
Monitor the rod position indication system
Shutdown the rod position indication system (RPIS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between ROD CONTROL AND INFORMATION SYSTEM (RCIS) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Neutron monitoring system: BWR-6	3.3	3.3
K1.02	Reactor/turbine pressure control system: BWR-6	3.3	3.5
K1.03	Control rod drive system: BWR-6	3.7	3.7
K1.04	Rod position information system: BWR-6	3.7	3.7
K1.05	Rod action control system: BWR-6	3.5	3.5
K1.06	Rod gang drive system: BWR-6	3.3	3.3
K1.07	Rod interface system: BWR-6	3.3	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	A.C. electrical power: BWR-6	2.4	2.6
K3.	**Knowledge of the effect that a loss or malfunction of the ROD CONTROL AND INFORMATION SYSTEM (RCIS) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Control rod drive system: BWR-6	3.3	3.7
K3.02	Reactor startup: BWR-6	3.5	3.5
K3.03	Reactor shutdown: BWR-6	3.0	3.2
K3.04	†FlUX shaping: BWR-6	3.0	3.3

SYSTEM: 201005 Rod Control and Information System (RCIS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	**Knowledge of ROD CONTROL AND INFORMATION SYSTEM (RCIS) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Limiting the effects of a control Rod accident: BWR-6	3.2	3.2
K4.02	Bank position withdrawal sequence (BPWS): BWR-6	3.3	3.3
K4.03	Rod withdrawal block signals: BWR-6	3.5	3.5
K4.04	Rod insertion block signals: BWR-6	3.5	3.5
K4.05	Rod withdrawal limiter: BWR-6	3.5	3.5
K4.06	Rod pattern controller rod blocks: BWR-6	3.5	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to ROD CONTROL AND INFORMATION SYSTEM (RCIS) :** (CFR 41.5 / 45.3)		
K5.01	†Rod pattern and program development: BWR-6	2.3	3.2
K5.02	Rod pattern controller (RPC): BWR-6	2.8	3.3
K5.03	Rod groups: BWR-6	2.3	2.7
K5.04	†Rod sequences: BWR-6	2.7	3.0
K5.05	Rod density: BWR-6	2.7	3.0
K5.06	Target rod pattern: BWR-6	2.8	2.8
K5.07	Low power alarm point: BWR-6	3.5	3.5
K5.08	Transition zone: BWR-6	3.2	3.5
K5.09	High power setpoints BWR-6	3.5	3,5
K5.10	Rod withdrawal limiter: BWR-6	3.2	3.3
K5.11	Control rod motion: BWR-6	3.3	3.3
K5.12	Command word generation and sequencing (operator follow, scan and test): BWR-6	1.8*	2.2*
K5.13	Position indication probes: BWR-6	2.5	2.7
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the ROD CONTROL AND INFORMATION SYSTEM (RCIS) :** (CFR 41.7 / 45.7)		
K6.01	First stage shell pressure or opening of a bypass valve(s): BWR-6	3.2	3.2
K6.02	Rod position signal: BWR-6	3.2	3.3
K6.03	A.C. electrical power: BWR-6	2.5	2.8
K6.04	IRM channel: BWR-6	3.0	3.2
K6.05	SRM channel: BWR-6	3.0	3.2
K6.06	APRM channel: BWR-6	3.0	3.0

SYSTEM: 201005 Rod Control and Information System (RCIS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ROD CONTROL AND INFORMATION SYSTEM (RCIS) controls including:** (CFR 41.5 / 45.5)		
A1.01	First stage shell pressure/turbine load: BWR-6 . . .	3.2	3.3
A2.	**Ability to (a) predict the impacts of the following on the ROD CONTROL AND INFORMATION SYSTEM (RCIS) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	High flux (SRM, IRM, APRM): BWR-6	3.5	3.5
A2.02	Position indication probe failure: BWR-6	2.8	3.2
A2.03	Insert block: BWR-6	3.2	3.2
A2.04	Withdraw block: BWR-6	3.2	3.2
A2.05	Insert required: BWR-6	3.2	3.2
A2.06	Insert inhibit: BWR-6	3.2	3.2
A2.07	Withdraw inhibit: BWR-6	3.2	3.2
A2.08	LPRM upscale/down scale: BWR-6	3.2	3.2
A2.09	Test display blinking: BWR-6	2.8	3.0
A2.10	Data fault: BWR-6	2.8	3.0
A2.11	Accumulator fault: BWR-6	3.3	3.5
A2.12	Rod uncoupled: BWR-6	3.7	3.8
A2.13	Rod drift: BWR-6	3.8	3.8
A3.	**Ability to monitor automatic operations of the ROD CONTROL AND INFORMATION System (RCIS) including:** (CFR 41.7 / 45.7)		
A3.01	Operator control module lights: BWR-6	3.5	3.5
A3.02	Rod display module lights: BWR-6	3.5	3.5
A3.03	†Verification of proper functioning/ operability: BWR-6	3.4	3.3
A3.04	Annunciator and alarm signals: BWR-6	3.3	3.3
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Operator control module (lights and push buttons): BWR-6	3 7	3.7
A4.02	Rod display module (lights and push buttons): BWR-6 .	3.7	3.7
A4.03	Back panel indicating lights: BWR-6	3.4	3.3

SYSTEM: 211000 Standby Liquid Control System

TASK: Perform lineups on the standby liquid control system
Charge the standby liquid control tank
Place the standby liquid control system in standby readiness
Monitor the standby liquid control system
Inject poison solution into the reactor vessel
Purge the standby liquid control tank level indicator
Perform standby liquid control recirculation test
Perform standby liquid control relief valve test
Perform standby liquid control and demineralized water injection reactor vessel test
Perform standby liquid control explosive valve inspection
Perform standby liquid control component inoperable test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between STANDBY LIQUID CONTROL SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Core spray line break detection: Plant-Specific	3.0*	3.3*
K1.02	Core plate differential pressure indication	2.7	2.7
K1.03	Plant air systems: Plant-Specific	2.5	2.6
K1.04	Demineralized water/ condensate storage system	2.2*	2.3*
K1.05	RWCU	3.4	3.6
K1.06	Reactor vessel	3.7	3.7
K1.07	Jet pump differential pressure indication: Plant-Specific	2.6	2.6
K1.08	CRD drive and cooling water differential pressure indication	2.3*	2.4*
K1.09	Core spray system: Plant-Specific	3.2*	3.4*
K1.10	HPCI: Plant-Specific	2.8*	3.0*
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	SBLC pumps	2.9*	3.1*
K2.02	Explosive valves	3.1*	3.2*
K2.03	Heater power	2.2*	2.4*
K3.	**Knowledge of the effect that a loss or malfunction of the STANDBY LIQUID CONTROL SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	†Ability to shutdown the reactor in certain conditions	4.3*	4.4*
K3.02	Core spray line break detection system: Plant-Specific	3.0*	3.2*
K3.03	Core plate differential pressure indication	2.6*	2.7*

SYSTEM: 211000 Standby Liquid Control System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.04	Jet pump differential pressure indication: BWR-3,4,5,6	2.4*	2.5*
K3.05	CRD drive and cooling water differential pressure indication	2.3*	2.3
K4.	**Knowledge of STANDBY LIQUID CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Zero leakage to the reactor (squib valves)	3.1	3.2
K4.02	Component and system testing	3.0	3.2
K4.03	Keeping sodium pentaborate in solution	3.8	3.9
K4.04	Indication of fault in explosive valve firing circuits	3.8	3.9
K4.05	Dispersal of boron upon injection into the vessel	3.4	3.6
K4.06	Core plate differential pressure indication	2.6	2.7
K4.07	RWCU isolation	3.8*	3.9*
K4.08	System initiation upon operation of SBLC control switch	4.2*	4.2*
K4.09	Dampening of positive displacement pump discharge oscillations (accumulators): Plant-Specific	2.5*	2.5*
K4.10	Over pressure protection	2.8	3.1
K5.	**Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Effects of the moderator temperature coefficient of reactivity on the boron	2.7	2.9
K5.02	Chugging (as it pertains to boron mixing)	2.8	3.0
K5.03	Shutdown margin	3.2	3.5
K5.04	Explosive valve operation	3.1	3.2
K5.05	Accumulator operation: Plant-Specific	2.5*	2.5
K5.06	Tank level measurement	3.0	3.2
K5.07	Tank heater operation	2.7	2.9
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY LIQUID CONTROL SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems: Plant-Specific	2.4*	2.4
K6.02	Demineralized water storage system	1.9*	2.0
K6.03	A.C. power	3.2	3.3
K6.04	Core spray system: Plant-Specific	2.7*	2.8
K6.05	HPCI system: Plant-Specific	2.7*	2.7

SYSTEM: 211000 Standby Liquid Control System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the STANDBY LIQUID CONTROL SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Tank level	3.6	3.7
A1.02	Explosive valve indication	3.8	3.9
A1.03	Pump discharge pressure	3.6	3.6
A1.04	Valve operations	3.6	3.7
A1.05	Pump amps: Plant-Specific	2.7*	2.8*
A1.06	Flow indication: Plant-Specific	3.8	3.9
A1.07	Reactor power	4.3*	4.4*
A1.08	RWCU system lineup	3.7	3.8
A1.09	SBLC system lineup	4.0*	4.1
A1.10	Lights and alarms	3.7	3.7
A2.	Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Pump trip	3.5	3.8*
A2.02	Failure of explosive valve to fire	3.6	3.9*
A2.03	A.C. power failures	3.2	3.4*
A2.04	Inadequate system flow	3.1*	3.4*
A2.05	Loss of SBLC tank heaters	3.1	3.4
A2.06	Valve openings	3.1	3.3
A2.07	Valve closures	2.9	3.2
A2.08	Failure to SCRAM	4.1*	4.2*
A3.	Ability to monitor automatic operations of the STANDBY LIQUID CONTROL SYSTEM including: (CFR 41.7 / 45.7)		
A3.01	Pump discharge pressure: Plant-Specific	3.5	3.5
A3.02	Tank level: Plant-Specific	3.9	3.9
A3.03	Explosive valves indicating lights: Plant-Specific	3.8	3.8
A3.04	Reactor power: Plant-Specific	4.3*	4.4*
A3.05	Flow indication: Plant-Specific	4.1*	4.2*
A3.06	RWCU system isolation: Plant-Specific	4.0*	4.1*
A3.07	Lights and alarms: Plant-Specific	3.7	3.6
A3.08	System initiation: Plant-Specific	4.2*	4.2*

SYSTEM: 211000 Standby Liquid Control System

Tasks as noted previously

A4. **Ability to manually operate and/or monitor in the control room:**
(CFR 41.7 / 45.5 to 45.8)

K/A NO.	**ABILITY**	**IMPORTANCE RO**	**SRO**
A4.01	Tank level	3.9	3.9
A4.02	SBLC control switch	4.2*	4.2*
A4.03	Explosive valves firing circuit status	4.1	4.1
A4.04	Reactor power	4.5*	4.6*
A4 05	Flow indication: Plant-Specific	4.1*	4.0
A4 06	RWCU system isolation	3.9*	3.9
A4.07	Lights and alarms	3.6	3.6
A4.08	System initiation: Plant-Specific	4.2*	4.2*

3.2 Reactor Water Inventory Control

206000	High Pressure Coolant Injection System
209002	High Pressure Core Spray System
209001	Low Pressure Core Spray System
256000	Reactor Condensate System
217000	Reactor Core Isolation Cooling System
259001	Reactor Feedwater System
204000	Reactor Water Cleanup System
259002	Reactor Water Level Control System
203000	Residual Heat Removal /Low Pressure Coolant Injection: Injection Mode (Plant Specific)

SYSTEM: 206000 High Pressure Coolant Injection System

TASK: Place the high pressure (Feedwater) coolant injection system (FWCI) in standby readiness
Monitor the high pressure (feedwater) coolant injection system operation
Return the high pressure (feedwater) coolant injection system to standby readiness after automatic initiation
Perform lineups of the high pressure coolant injection system (write in)
Manually initiate high pressure coolant injection
Perform high pressure coolant injection (HPCI) simulated automatic actuation test
Perform high pressure (feedwater) coolant injection flow rate test
Perform high pressure (feedwater) coolant injection (HPCI) pump operability test
Perform high pressure (feedwater) coolant injection motor operated valve operability test
Perform HPCI subsystem logic system functional test
Perform HPCI subsystem automatic isolation logic system functional test
Perform HPCI system inoperable test
Perform HPCI turbine overspeed test
Perform high pressure (feedwater) coolant injection operability test when reactor core isolation cooling is inoperable

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel: BWR-2,3,4	3.8	3.9
K1 02	Reactor water level: BWR-2,3,4	4.0	4.1
K1 03	Reactor pressure: BWR-2,3,4	3.8	3.8
K1.04	Reactor feedwater system: BWR-2,3,4	3.6	3.6
K1 05	Condensate storage system: BWR-2,3,4	3.7	3.7
K1 06	Suppression chamber: BWR-2,3,4	3.7	3.7
K1.07	D.C. power: BWR-2,3,4	3.7*	3.8
K1 08	A.C. power: BWR-2,3,4	3.0*	3.1
K1 09	ECCS keep fill system: BWR-2,3,4(P-Spec)	4.0*	4.0
K1.10	Condensate storage and transfer system: BWR-2,3,4	3.4	3.4
K1.11	PCIS: BWR-2,3,4	3.5	3.5
K1 12	Nuclear boiler instrumentation: BWR-2,3,4	3.4	3.4
K1 13	Main condenser: BWR-2,3,4(P-Spec)	2.8*	2.9
K1.14	SBGT: BWR-2,3,4(P-Spec)	2.9	3.1
K1 15	Plant air systems: BWR-2,3,4	2.3*	2.3
K1 16	Containment/Torus pressure: BWR-2,3,4	3.5	3.5

SYSTEM: 206000 High Pressure Coolant Injection System

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	System valves: BWR-2,3,4	3.2*	3.3*
K2.02	System pumps: BWR-2,3,4	2.8*	3.1*
K2.03	Initiation logic: BWR-2,3,4	2.8*	2.9*
K2.04	Turbine control circuits: BWR-2,3,4	2.5*	2.7*
K3.	**Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE COOLANT INJECTION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level control: BWR-2,3,4	4.0	4.0
K3.02	Reactor pressure control: BWR-2,3,4	3.8*	3.8*
K3.03	Suppression pool level control: BWR-2,3,4	3.4*	3.5*
K4.	**Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Turbine trips: BWR-2,3,4	3.8	3.9
K4.02	System isolation: BWR-2,3,4	3.9	4.0
K4.03	Resetting turbine trips: BWR-2,3,4	4.2	4.1
K4.04	Resetting system isolations: BWR-2,3,4	4.0	3.9
K4.05	Preventing water hammer in turbine exhaust line (procedural control): BWR-2,3,4	3.1	3.4
K4.06	Preventing water hammer in pump discharge line (procedural control): BWR-2, 3, 4	3.2	3.4
K4.07	Automatic system initiation: BWR-2,3,4	4.3*	4.3
K4.08	Manual system initiation: BWR-2,3,4	4.2*	4.3
K4.09	Automatic flow control: BWR-2,3,4	3.8	3.9
K4.10	Surveillance for all operable components: BWR-2,3,4 .	3.7	3.8
K4.11	Turbine speed control: BWR-2,3,4	3.4	3.5
K4.12	Condensation of shaft sealing steam: BWR-2,3,4 . . .	2.9	3.0
K4.13	Turbine and pump lubrication: BWR-2,3,4	3.0	3.1
K4.14	Control oil to turbine speed controls: BWR-2,3,4 . .	3.4	3.4
K4.15	Low speed turning of the turbine rotor: BWR-2,3,4(P-Spec)	3.2	3.2
K4.16	Minimizing fission product concentration in the condensate storage tank (valve closures on system initiation): BWR-2,3,4(P-Spec)	3.1	3.3
K4.17	Protection against draining the condensate storage tank to the suppression pool: BWR-2,3,4	3.4	3.4
K4.18	Pump minimum flow: BWR-2,3,4	3.2	3.3
K4.19	Automatic transfer of HPCI pump suction: BWR-2,3,4 .	3.7	3.8

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Turbine operation: BWR-2,3,4	3.3	3.4
K5.02	Turbine shaft sealing: BWR-2,3,4	2.8	2.9
K5.03	GEMAC controllers: BWR-2,3,4(P-Spec)	3.1	3.1
K5.04	Indications of pump cavitation: BWR-2,3,4	2.6*	2.7
K5.05	Turbine speed control: BWR-2,3,4	3.3	3.3
K5.06	Turbine speed measurement: BWR-2,3,4	2.6*	2.6
K5.07	System venting: BWR-2,3,4	2.8	2.8
K5.08	Vacuum breaker operation: BWR-2,3,4	3.0	3.2
K5.09	Testable check valve operation: BWR-2,3,4	2.7*	2.8
K5.10	Assist core cooling: BWR-2,3,4	3.5	3.5
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems: BWR-2,3,4	2.3*	2.3
K6.02	D.C. power: BWR-2,3,4	3.3	3.7
K6.03	A.C. power: BWR-2,3,4	2.9	3.1
K6.04	Condensate storage tank level: BWR-2,3,4	3.5	3.7
K6.05	Suppression pool level: BWR-2,3,4	3.5	3.7
K6.06	SBGTS: BWR-2,3,4(P-Spec)	3.1	3.2
K6.07	ECCS keep fill system: BWR-2,3,4(P-Spec)	3.4	3.4
K6.08	Reactor pressure: BWR-2,3,4	3.8	3.8
K6.09	Condensate storage and transfer system: BWR-2,3,4	3.5	3.5
K6.10	PCIS: BWR-2,3,4	3.8	4.0
K6.11	Nuclear boiler instrumentation: BWR-2,3,4	3.6	3.7
K6.12	Reactor water level: BWR-2,3,4	4.2*	4.3
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor water level: BWR-2,3,4	4.3*	4.4
A1.02	Reactor pressure: BWR-2,3,4	4.2*	4.2
A1.03	Condensate storage tank level: BWR-2,3,4	3.5	3.6
A1.04	Suppression pool level: BWR-2,3,4	3.7	3.8
A1.05	Suppression pool temperature: BWR-2,3,4	4.1	4.2
A1.06	System flow: BWR-2,3,4	3.8	3.7
A1.07	System discharge pressure: BWR-2,3,4	3.7	3.6
A1.08	System lineup: BWR-2,3,4	4.1*	4.0

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.09	Turbine speed: BWR-2,3,4	3.5	3.4
A2.	**Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Turbine trips: BWR-2,3,4	4.0	4.0
A2.02	Valve closures: BWR-2,3,4	3.5	3.5
A2.03	Valve openings: BWR-2,3,4	3.5	3.5
A2.04	A.C. failures: BWR-2,3,4	2.7*	3.0*
A2.05	D.C. failures: BWR-2,3,4	3.5	3.8*
A2.06	Inadequate system flow: BWR-2,3,4	3.3	3.5
A2.07	Low suppression pool level: BWR-2,3,4	3.4	3.6
A2.08	†High suppression pool temperature: BWR-2,3,4	3.9	4.2
A2.09	†Low condensate storage tank level: BWR-2,3,4	3.5	3.7
A2.10	System isolation: BWR-2,3,4	4.0	4.1
A2.11	Low reactor water level: BWR-2,3,4	4.1	4.2
A2.12	Loss of room cooling: BWR-2,3,4	3.4	3.5
A2.13	Loss of applicable plant air systems: BWR-2,3,4 . . .	2.4*	2.4*
A2.14	Flow controller failure: BWR-2,3,4	3.3	3.4
A2.15	Loss of control oil pressure: BWR-2,3,4	3.4	3.5
A2.16	High drywell pressure: BWR-2,3,4	4.0	4.1
A2.17	†HPCI inadvertent initiation: BWR-2,3,4	3.9	4.3*
A3.	**Ability to monitor automatic operations of the HIGH PRESSURE COOLANT INJECTION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Turbine speed: BWR-2,3,4	3.6	3.5
A3.02	System Flow: BWR-2,3,4	3.8	3.8
A3.03	System lineup: BWR-2,3,4	3.9	3.8
A3.04	Reactor pressure: BWR-2,3,4	4.2*	4.1
A3.05	Reactor water level: BWR-2,3,4	4.3*	4.3
A3.06	System discharge pressure: BWR-2,3,4	3.8	3.8
A3.07	Lights and alarms: BWR-2,3,4	3.9	3.8
A3.08	Condensate storage tank level: BWR-2,3,4	3.7	3.6
A3.09	Response to system isolation: BWR-2,3,4	4.2*	4.1
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Turbine speed controls: BWR-2,3,4	3.8	3.7
A4.02	Flow controller: BWR-2,3,4	4.0*	3.8
A4.03	Turbine temperatures: BWR-2,3,4	3.1	3.0
A4.04	Major system valves: BWR-2,3.4	3.7	3.7

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.05	Reactor water level: BWR-2,3,4	4.4*	4.4*
A4.06	Reactor pressure: BWR-2,3,4	4.3*	4.3*
A4.07	Condensate storage tank level: BWR-2,3,4	3.5	3.5
A4.08	Suppression pool temperature: BWR-2,3,4	4.1*	4.1
A4.09	Suppression pool level: BWR-2,3,4	3.8	3.7
A4.10	System pumps: BWR-2,3,4	3.7	3.5
A4.11	Turning gear: BWR-2,3,4(P-Spec)	3.0	3.0
A4.12	Turbine trip controls: BWR-2,3,4	4.0	3.9
A4.13	Turbine reset control: BWR-2,3,4	4.1*	4.0
A4.14	System auto start control: BWR-2,3,4(P-Spec)	4.2*	4.1

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

TASK: Perform lineups on the core spray system
Place core spray (CS) system in standby readiness
Monitor automatic operation of core spray system
Shutdown core spray cooling system
Perform core spray simulated automatic actuation test
Perform core spray pump operability test
Perform core spray system inop test
Conduct core spray - cold shutdown valve testing

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate transfer and storage system: BWR-5,6 . . .	3.4	3.4
K1.02	Suppression Pool: BWR-5,6	3.5	3.5
K1.03	Water leg (jockey) pump: BWR-5,6	3.0	3.0
K1.04	HPCS diesel generator: BWR-5,6	3.8	3.8
K1.05	Standby liquid control system: Plant-Specific	2.8	2.8
K1.05	Suppression pool cleanup system: BWR-5,6	2.0*	2.0
K1.07	ECCS room coolers: BWR-5,6	2.4	2.4
K1.08	Component cooling water systems: BWR-5,6	2.4	2.6
K1.09	Leak detection: BWR-5,6	2.5	2.5
K1.10	Suppression pool suction strainers: BWR-5,6	2.1*	2.1
K1.11	Adequate core cooling: BWR-5,6	3.8	4.0
K1.12	Reactor vessel: BWR-5,6	3.4	3.6
K1.13	Instrument nitrogen: BWR-5,6	2.7	2.7
K1.14	Plant air systems: BWR-5,6	2.6	2.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pump electrical power: BWR-5,6	3.2	3.3
K2.02	Valve electrical power: BWR-5,6	2.8	2.9
K2.03	Initiation logic: BWR-5,6	2.8	2.9
K3.	**Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level: BWR-5,6	3.9	3.9
K3.02	Standby liquid control system: Plant-Specific	3.3	3.3
K3.03	Adequate core cooling: BWR-5,6	3.9	4.1

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.	Knowledge of HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Prevents water hammer: BWR-5,6	2.9	3.0
K4.02	Prevents over filling reactor vessel: Plant-Specific.	3.4	3.5
K4.03	Prevents pump over heating: BWR-5,6	2.3*	2.4
K4.04	Testable check valve operation: BWR-5,6	2.3*	2.3*
K4.05	Motor operated valve operation: BWR-5,6	2.4	2.4
K4.06	Centrifugal pump operation: BWR-5,6	2.3*	2.4*
K4.07	Override of reactor water level interlock: Plant-Specific	3.5	3-7
K5.	Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation: BWR-5,6	2.5	2.8
K5.02	Heat removal (transfer) mechanism: BWR-5,6	2.6	2.7
K5.03	System venting: BWR-5,6	2.4	2.4
K5.04	Adequate core cooling: BWR-5,6	3.8	4.0
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR 41.7 / 45.7)		
K6.01	Electrical power: BWR-5,6	3.6	3.6
K6.02	Condensate storage tank water level: BWR-5,6	3.4	3.4
K6.03	Component cooling water systems: BWR-5,6	2.5	2.6
K6.04	Suppression pool suction strainer: BWR-5,6	2.5	2.5
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) controls including: (CFR 41.5 / 45.5)		
A1.01	HPCS flow: BWR-5,6	3.6	3.7
A1.02	HPCS pressure: BWR-5,6	3.4	3.6
A1.03	Reactor water level: BWR-5,6	3.7	3.7
A1.04	Reactor pressure: BWR-5,6	3.3	3.3
A1.05	Suppression pool water level: BWR-5,6	3.3	3.4
A1.06	Motor amps: BWR-5,6	1.9*	2.3*
A1.07	Diesel loading: BWR-5,6	2.5*	2.8
A1.08	System lineup: BWR-5,6	3.1	3.3
A1.09	Condensate storage tank level: BWR-5,6	2.6	2.8

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.	**Ability to (a) predict the impacts of the following on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	System initiation: BWR-5,6	3.8	3.8
A2.02	Pump trips: BWR-5,6	3.6	3.7
A2.03	Valve closures: BWR-5,6	3.2	3.4
A2.04	A.C. electrical failure: BWR-5,6	3.1	3.2
A2.05	D.C. electrical failure: BWR-5,6	2.8	2.9
A2.06	Core spray line break: BWR-5,6	3.4	3.6
A2.07	Pump seal failure: BWR-5,6	2.6	3.0
A2.08	Inadequate system flow: BWR-5,6	3.1	3.2
A2.09	Loss of room cooling: BWR-5,6	2.4	2.6
A2.10	Valve openings: BWR-5,6	2.7	3.0
A2.11	Low suppression pool level: BWR-5,6	3.3	3.5
A2.12	High suppression pool level BWR-5,6	3.3	3.5
A2.13	Low condensate storage tank level BWR-5,6	3.4	3.5
A2.14	High suppression pool temperature: BWR-5,6	3.0	3.3
A2.15	Clogged suppression pool suction strainers: BWR-5,6. .	2.4	2.6
A3.	**Ability to monitor automatic operations of the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation: BWR-5,6	3.3	3.3
A3.02	Pump start: BWR-5,6	3.8	3.8
A3.03	System pressure: BWR-5,6	3.6	3.6
A3.04	System flow: BWR-5,6	3.7	3.7
A3.05	Reactor water level BWR-5,6	3.7	3.7
A3.06	Lights and alarms: BWR-5,6	2.8	2.8
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	HPCS pump: BWR-5,6	3.7	3.7
A4.02	Suction valves: BWR-5,6	3.6	3.6
A4.03	Injection valve: BWR-5,6	3.8	3.8
A4.04	Minimum flow valve: BWR-5,6	3.1	3.1
A4.05	Manual Initiation controls: BWR-5,6	3.8	3.8
A4.06	Testable check valve: BWR-5,6.	2.6	2.6
A4.07	Line fill pump: BWR-5,6	2.8	2.8
A4.08	Reactor water level: BWR-5,6	3.6	3.7
A4.09	Suppression pool level: BWR-5,6	3.4	3.5
A4.10	Reactor pressure: BWR-5,6	3.3	3.3
A4.11	System flow: BWR-5,6	3.8	3.8

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A4.12	System pressure: BWR-5,6	3.4	3.4
A4.13	Lights and alarms: BWR-5,6	2.6	2.6
A4.14	Test return valve: BWR-5,6	3.0	3.0
A4.15	Initiation reset: BWR-5,6	3.6	3.6

SYSTEM: 209001 Low Pressure Core Spray System

TASK: Fill the core spray systems
Perform lineups on the core spray systems
Place the core spray system in standby readiness
Monitor automatic operation of the core spray system
Shutdown the core spray cooling system
Fill the reactor cavity from the condensate storage tank with the core spray system
Perform core spray pump flow rate test
Perform core spray simulated automatic actuation test
Perform core spray pump operability test
Perform core spray subsys and low pressure coolant injection subsys discharge piping ventilation
Perform core spray system inop test
Conduct core spray motor operated valve operability test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between LOW PRESSURE CORE SPRAY SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage tank: Plant-Specific	3.1	3.1
K1.02	Torus/suppression pool	3.4	3.4
K1.03	Keep fill system	2.9	3.0
K1.04	condensate transfer system	2.3	2.4
K1.05	Automatic depressurization system	3.7	3.7
K1.06	Plant air systems	2.0*	2.1*
K1.07	D.C. electrical power	2.5	2.7
K1.08	A.C. electrical power	3.2	3.3
K1.09	Nuclear boiler instrumentation	3.2	3.4
K1.10	Emergency generator	3.7	3.8
K1.11	Drywell coolers: Plant-Specific	2.4	2.6
K1.12	ECCS room coolers	2.9	3.1
K1.13	Leak detection	2.8	3.0
K1.14	Reactor vessel	3.7	3.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pump power	3.0*	3.1*
K2.02	Valve power	2.5*	2.7*
K2.03	Initiation logic	2.9*	3.1*

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.	**Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3 01	Reactor water level	3.8	3.9
K3.02	ADS logic	3.8	3.9
K3.03	Emergency generators	2.9	3.0
K3.04	Component cooling water systems	2.1*	2.2
K3.05	Drywell cooling: Plant-Specific	2.3	2.7
K4.	**Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Prevention of overpressurization of core spray piping	3.2	3.4
K4.02	Prevents water hammer	3.0	3.2
K4.03	Motor cooling	2.4	2.5
K4.04	Line break detection	3.0	3.2
K4.05	Pump minimum flow	2.6	2.6
K4.06	Adequate pump net positive suction head	2.6	2.9
K4.07	Pump operability testing	2.8	3.0
K4.08	Automatic system initiation	3.8	4.0
K4.09	Load sequencing	3.3	3.5
K4.10	Testability of all operable components	2.8	2.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to LOW PRESSURE CORE SPRAY SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.6	2.7
K5.02	Differential pressure indication	2.4	2.6
K5.03	Testable check valve operation	2.3	2.4
K5.04	Heat removal (transfer) mechanisms	2.8	2.9
K5.05	System venting	2.5	2.5
K5.06	Recirculation operation: Plant-Specific(BWR-1)	3.7	4.0
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. power	3.4	3.4
K6.02	Emergency generators	3.8	3.9
K6.03	Torus/suppression pool water level	3.3	3.4
K6.04	D.C. power	2.8	2.9
K6.05	ECCS room cooler(s)	2.8	2.9
K6.06	Pump motor cooler(s)	2.4	2.4

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.07	Pump seal cooler(s)	2.3	2.3
K6.08	Keep fill system	2.9	3.0
K6.09	Fire protection: BWR-1	3.0*	3.3
K6.10	ECCS room integrity: Plant-Specific	2.3	2.5
K6.11	ADS	3.6	3.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the LOW PRESSURE CORE SPRAY SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Core spray flow	3.4	3.6
A1.02	Core spray pressure	3.2	3.4
A1.03	Reactor water level	3.8	3.9
A1.04	Reactor pressure	3.7	3.7
A1.05	Torus/suppression pool water level	3.5	3.6
A1.06	Motor amps	2.3*	2.4
A1.07	Emergency generator loading	3.0	3.1
A1.08	System lineup	3.3	3.2
A2.	**Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Pump trips	3.4	3.4
A2.02	Valve closures	3.2	3.2
A2.03	A.C. failures	3.4	3.6
A2.04	D.C. failures	2.9	3.0
A2.05	Core spray line break	3.3	3.6
A2.06	Inadequate system flow	3.2	3.2
A2.07	Loss of room cooling	2.6	2.8
A2.08	Valve openings	3.1	3.1
A2.09	Low suppression pool level	3.1	3.3
A2.10	†High suppression pool temperature	3.1	3.4
A2.11	†Loss of fire protection: BWR-1	2.8*	3.3
A3.	**Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.6	3.6
A3.02	Pump start	3.8	3.7
A3.03	System pressure	3.5	3.5
A3.04	System flow	3.7	3.6
A3.05	Reactor water level	3.9	3.9
A3.06	Lights and alarms	3.6	3.5

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	Core spray pump	3.8	3.6
A4.02	Suction valves	3.5	3.4
A4.03	Injection valves	3.7	3.6
A4.04	Minimal flow valves	2.9	2.9
A4.05	Manual initiation controls	3.8	3.6
A4.06	Testable check valves	2.4	2.4
A4.07	Fill pump	2.7	2.8
A4.08	Reactor water level	3.9	3.9
A4.09	Suppression pool level	3.6	3.5
A4.10	Reactor pressure	3.9	3.8
A4.11	System flow	3.7	3.6
A4.12	System pressure	3.6	3.5
A4.13	Lights and alarms	3.4	3.4
A4.14	Containment level: BWR-1	3.6	3.6

SYSTEM: 256000 Reactor Condensate System

TASK: Perform lineups on condensate system
Fill the condensate storage tank
Deaerate condensate system prior to startup
Fill condenser hotwells
Fill the condenser system
Cleanup the condensate system
Startup the condensate systems
Operate condensate pumps in different combinations
Operate condensate booster pumps in different combinations
Operate hotwell pumps
Operate the hotwell dump and condensate transfer pump
Monitor condensate (and feedwater) system operation
Shut down the condensate system
Operate the low pressure heaters (operate the feedwater heaters)
Operate the low/intermediate pressure heaters
Operate the intermediate pressure heaters
Operate the feedwater heaters (write in)
Operate the condensate booster pumps forced lube oil pumps (write in)
What if hotwell level is high/low?
Perform lineups of the condenser air removal system
Monitor the condenser air removal system
Operate the mechanical vacuum pump(s)
Purge the offgas line

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between REACTOR CONDENSATE SYSTEM and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main turbine	2.6	2.6
K1.02	Reactor feedwater system	3.3	3.3
K1.03	HPCI: Plant-Specific	3.5	3.5
K1.04	RCIC: Plant-Specific	3.2	3.3
K1.05	CRD hydraulics system	3.1	3.1
K1.06	Extraction steam system	2.7	2.7
K1.07	SJAE condenser	2.9	2.9
K1.08	Gland seal steam condenser: Plant-Specific	2.7	2.7
K1.09	Offgas condenser: Plant-Specific	2.9	3.0
K1.10	Exhaust hood spray system	2.4	2.5
K1.11	Plant air systems: Plant-Specific	2.4	2.5
K1.12	Isolation condenser: Plant-Specific	3.3*	3.3*
K1.13	Reactor water level	3.5	3.5
K1.14	RHR (LPCI): Plant-Specific	3.0	3.0
K1.15	HPCS: Plant-Specific	3.6	3.6
K1.16	RWCU	2.6	2.6
K1.17	ECCS keep fill system: Plant-Specific	2.9*	2.9

SYSTEM: 256000 Reactor Condensate System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.18	Circulating water system	2.9	3.0
K1.19	Component cooling water (secondary equipment) systems: Plant-Specific	2.7	2.7
K1.20	Demineralized water storage and makeup system	2.5	2.6
K1.21	Steam seal evaporator: Plant-Specific	2.4	2.4
K1.22	Offgas system	2.8	2.8
K1.23	Auxiliary steam system: Plant-Specific	2.5	2.5
K1.24	Radwaste system: Plant-Specific	2.4	2.4
K1.25	Main steam system: Plant-Specific	3.0	3.1
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	System pumps	2.7*	2.8
K2.02	Motor operated valves	1.9*	2.0*
K3.	Knowledge of the effect that a loss or malfunction of the REACTOR CONDENSATE SYSTEM will have on following: (CFR 41.7 / 45.4)		
K3.01	Main turbine/main generator	3.2	3.2
K3.02	CRD hydraulics system	3.2	3.3
K3.03	Extraction steam system	2.6	2.6
K3.04	Reactor feedwater system	3.6	3.7
K3.05	HPCI: Plant-Specific	3.3	3.3
K3.06	RCIC: Plant-Specific	3.2	3.2
K3.07	Isolation condenser: Plant-Specific	3.0*	3.0*
K3.08	SJAE	2.8	2.8
K3.09	Offgas	2.8	2.8
K3.10	Gland seal steam system: Plant-Specific	2.5	2.5
K3.11	Reactor water level	3.9	3.9
K3.12	HPCS: Plant-Specific	3.3	3.3
K3.13	Main steam system	3.3	3.3
K4.	Knowledge of REACTOR CONDENSATE SYSTEM design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Condensate and/or booster pump auto start: Plant-Specific	3.4	3.4
K4.02	CRD pump suction	2.9	2.9
K4.03	Condensate and/or booster pump protection	2.8	2.8
K4.04	Maintenance of water quality	2.7	2.7
K4.05	Maintenance of 100% system flow if a feedwater string isolates: Plant-Specific	3.0	3.0
K4.06	Control of extraction steam	2.8	2.8
K4.07	Cascading heater drains	2.4	2.4

SYSTEM: 256000 Reactor Condensate System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.08	Dedicated ECCS water supply: Plant-Specific	3.6	3.6
K4.09	Initial main condenser vacuum	2.8	2.8
K4.10	Non-condensable gas removal	2.7	2.7
K4.11	Isolation of SJAE's on low flow: Plant-Specific	2.9	3.0
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR CONDENSATE SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	System venting	2.5	2.5
K5.02	Water conductivity measurement	2.4*	2.4
K5.03	Heat exchanger level operation	2.6	2.7
K5.04	Ion exchange process	2.1*	2.1*
K5.05	Deaeration of condensate	2.2*	2.2
K5.06	Air operated valve operation	2.4	2.4
K5.07	Level controller operation	2.7	2.7
K5.08	Heat removal (transfer) mechanisms	2.6	2.7
K5.09	Pump cavitation	2.5	2.6
K5.10	Air ejection operation	2.8	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR CONDENSATE SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems	2.8	2.8
K6.02	Circulating water system	3.1	3.1
K6.03	Extraction steam system	2.9	2.9
K6.04	A.C. power	2.8	2.8
K6.05	Component cooling water systems	2.9	2.9
K6.06	Reactor feedwater system	3.3	3.3
K6.07	Demineralized water storage and makeup system	2.4	2.4
K6.08	Main turbine	2.9	2.9
K6.09	Offgas system	2.6	2.6
K6.10	Main steam system	2.9	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CONDENSATE SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	System flow	2.9	2.9
A1.02	Pump amps	2.3*	2.3
A1.03	System pressure	2.8	2.8
A1.04	Hotwell level	2.9	2.9
A1.05	Condensate storage tank level	2.9	3.0

SYSTEM: 256000 Reactor Condensate System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.06	Reactor water level	3.5	3.5
A1.07	System lineup	3.1	31
A1.08	System water quality	2.7	2.9
A1.09	Feedwater temperature	3.1	3.1
A1.10	Condenser vacuum	3.1	3.1
A2.	**Ability to (a) predict the impacts of the following on the REACTOR CONDENSATE SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Pump trips	3.3	3.3
A2.02	Valve closures	2.8	2.9
A2.03	Valve openings	2.8	2.9
A2.04	A.C. power failures	2.9	3.0
A2.05	Inadequate system flow	2.9	2.9
A2.06	Low hotwell level	3.2	3.2
A2.07	High hotwell level	2.9	2.9
A2.08	High feedwater heater level	3.1	3.1
A2.09	Low feedwater heater level	2.8	2.8
A2.10	Main turbine trip	3.1	3.1
A2.11	Loss of circulating water system	3.2	3.2
A2.12	Loss of equipment component cooling water systems . . .	3.1	3.1
A2.13	Loss of applicable plant air systems	2.9	3.0
A2.14	Low Condensate storage tank level	3.3	3.4
A2.15	Abnormal water quality	2.8	3.1
A2.16	High demineralizer differential pressure	2.8	2.8
A2.17	Feedwater heater string trip: Plant-Specific	2.9	2.9
A2.18	Loss of SJAE	2.9	2.9
A3.	**Ability to monitor automatic operations of the REACTOR CONDENSATE SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	2.7	2.7
A3.02	Pump starts	3.0	2.9
A3.03	System pressure	2.9	2.9
A3.04	System flow	3.0	3.0
A3.05	Lights and alarms	3.0	2.9
A3.06	Hotwell level	3.0	2.9
A3.07	Feedwater heater level	2.9	2.9
A3.08	Feedwater temperature	3.1	3.1
A3.09	Feedwater heater drain tank level: Plant-Specific . .	2.8	2.9

SYSTEM: 256000 Reactor Condensate System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Hotwell condensate/ condensate booster pumps	3.3	3.3
A4.02	System motor operated valves	2.8	2.8
A4.03	Hotwell level controls	3.2	3.1
A4.04	Minimum flow valves	2.8	2.7
A4.05	System flow	3.1	3.1
A4.06	System pressure	3.1	3.0
A4.07	Lights and alarms	2.9	2.9
A4.08	Reactor water level	3.7	3.7
A4.09	System water quality	2.9	3.1
A4.10	Feedwater temperature	3.2	3.2
A4.11	Condensate storage tank level	3.2	3.4
A4.12	Feedwater heater level: Plant-Specific	3.0	3.0
A4.13	Condenser vacuum	3.3	3.4
A4.14	Feedwater heater drain tank level: Plant-Specific	2.7	2.7
A4.15	Air ejectors: Plant-Specific	3.1	3.0

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

TASK: Lineup the reactor core isolation cooling (RCIC) system
Manually operate and adjust reactor core isolation cooling system flow with the turbine governor
Manually initiate startup of the reactor core isolation cooling (RCIC) system
Operate RCIC pump in different modes
Monitor RCIC operation
Shutdown RCIC

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage and transfer system	3.5	3.5
K1.02	Nuclear boiler system	3.5	3.5
K1.03	Suppression pool	3.6	2.6
K1.04	Main condenser	2.6	2.6
K1.05	Residual heat removal system	2.6	2.6
K1.06	Plant air systems: Plant-Specific	2.3*	2.3*
K1.07	Leak detection	3.1	3.2
K1.08	Line fill pump: Plant-Specific	3.3	3.4
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Motor operated valves	2.8*	2.8*
K2.02	RCIC initiation signals (logic)	2.8*	2.9*
K2.03	RCIC flow controller	2.7*	2.8*
K2.04	Gland seal compressor (vacuum pump)	2.6*	2.6*
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.7	3.7
K3.02	Reactor vessel pressure	3.6	3.6
K3.03	Decay heat removal	3.5	3.5
K3.04	Adequate core cooling	3.6	3.6
K4.	**Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Prevent water hammer: Plant-Specific	2.8	2.8
K4.02	Prevent over filling reactor vessel	3.3	3.3

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.03	Prevents pump over heating	2.9	3.0
K4.04	Prevents turbine damage: Plant-Specific	3.0	3.1
K4.05	Prevents radioactivity release to auxiliary/reactor building	3.2	3.5
K4.06	Manual initiation	3.5	3.5
K4.07	Alternate supplies of water	3.6	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.6*	2.6*
K5.02	Flow indication	3.1	3.1
K5.03	Differential pressure indication	2.6	2.6
K5.04	Testable check valve operation	2.6	2.7
K5.05	Centrifugal pump operation	2.4*	2.4*
K5.06	Turbine operation	2.7*	2.7
K5.07	Assist core cooling	3.1	3.1
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) :** (CFR 41.7 / 45.7)		
K6.01	Electrical power	3.4	3.5
K6.02	Plant air systems	2.2*	2.2
K6.03	Suppression pool water supply	3.5	3.5
K6.04	Condensate storage and transfer system	3.5	3.5
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including:** (CFR 41.5 / 45.5)		
A1.01	RCIC flow	3.7	3.7
A1.02	RCIC pressure	3.3	3.3
A1.03	Reactor water level	4.0	4.0
A1.04	Reactor pressure	3.6*	3.6
A1.05	RCIC turbine speed	3.7	3.7
A1.06	Condensate storage tank level	3.2	3.3
A1.07	Suppression pool level	3.3	3.5
A1.08	Suppression pool temperature	3.5	3.6

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	System initiation signal	3.8	3.7
A2.02	Turbine trips	3.8	3.7
A2.03	Valve closures	3.4	3.3
A2.04	A.C. power loss	2.3*	2.3*
A2.05	D.C. power loss	3.3	3.3
A2.06	Loss of applicable plant air systems	2.2*	2.2
A2.07	Loss of lube oil	3.1	3.1
A2.08	Loss of lube oil cooling	3.0	3.1
A2.09	Loss of vacuum pump	2.9	3.0
A2.10	Turbine control system failures	3.1	3.1
A2.11	Inadequate system flow	3.1	3.2
A2 12	Valve openings	3.0	3.0
A2.13	Loss of room cooling	2.9	3.0
A2.14	Rupture disc failure: Exhaust-Diaphragm	3.3	3.4
A2.15	Steam line break	3.8	3.8
A2.16	Low condensate storage tank level	3.5	3.4
A2.17	High suppression pool level	3.2	3.4
A2.18	Low suppression pool level	3.1	3.2
A2.19	High suppression pool temperature	3.5	3.6
A3.	**Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3 5	3.5
A3.02	Turbine startup	3.6	3.5
A3.03	System pressure	3.7	3.6
A3.04	System flow	3.6	3.5
A3.05	Reactor water level	3.9	3.9
A3.06	Lights and alarms	3.5	3.4
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	RCIC turbine speed	3.7	3.7
A4.02	Turbine trip throttle valve reset	3.9	3.9
A4.03	System valves	3.4	3.3
A4.04	Manually initiated controls	3.6	3.6
A4.05	Reactor water level	4.1	4.1
A4.06	Suppression pool level	3.6	3.7
A4.07	Reactor pressure	3.9	3.8

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.08	System flow	3.7	3.6
A4.09	System pressure	3.7	3.6
A4.10	Lights and alarms	3.6	3.5
A4.11	Condensate storage tank level	3.5	3.5

SYSTEM: 259001 Reactor Feedwater System

TASK: Perform lineups on the reactor feedwater system
Fill the reactor feedwater system
Start a reactor feed pump
Monitor operation of a reactor feedwater pump
Secure a reactor feed pump
Operate feedwater manual/automatic transfer switch (for individual feed regulator valve)
Operate vessel level master control station
Operate feedwater low flow startup valve
Take local/manual control of feedwater regulating valves
Operate the reactor feed pump seal injection system
Secure the reactor feedwater system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between REACTOR FEEDWATER SYSTEM and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel	3.6	3.7
K1.02	HPCI: Plant-Specific	3.6	3.8
K1.03	RWCU	2.7	2.9
K1.04	Extraction steam system	2.8	2.9
K1.05	Condensate system	3.2	3.2
K1.06	Plant air systems	2.9	3.0
K1.07	A.C. electrical power	2.9	2.9
K1.08	Reactor water level control system	3.6	3.7
K1.09	Reactor water level	3.8	3.8
K1.10	Component cooling water systems	2.7	2.7
K1.11	RFP lube oil system	2.7	2.7
K1.12	RFP turbine seal steam system: TDRFP's-Only	2.6	2.6
K1.13	Main turbine generator: Plant-Specific	2.5	2.5
K1.14	RCIC: Plant-Specific	3.1	3.1
K1.15	RHR: Plant-Specific	3.0	3.1
K1.16	Recirculation	3.1	3.1
K1.17	Heater drains: Plant-Specific	2.4	2.4
K1.18	Fire protection system (emergency cooling): Plant-Specific	2.4	2.6
K1.19	†Redundant reactivity control system: Plant-Specific . .	3.0	3.3*
K1.20	Main steam system: TDRFPs-Only	3.1	3.2
K1.21	D.C. electric power	2.4	2.5
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	Reactor feedwater pump(s): Motor-Driven-Only	3.3	3.3
K2.02	..System.motor.operated.val2es	2.2	

SYSTEM: 259001 Reactor Feedwater System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K2.03	RFP auxiliary oil pumps	2.3*	2.4
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR FEEDWATER SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.9	3.9
K3.02	Reactor water level control system	3.8	3.8
K3.03	HPCI: Plant-Specific	3.3	3.3
K3.04	RWCU	2.5	2.5
K3.05	Recirculation pump NPSH	2.9	2.9
K3.06	Core inlet subcooling	3.1	3.1
K3.07	Condensate system	3.0	3.0
K3 08	RCIC	2.9	2.9
K3.09	Extraction steam system	2.5	2.6
K3.10	HPCS: Plant-Specific	3.2*	3.2*
K3.11	RHR: Plant-Specific	3.3*	3.3*
K3.12	Reactor power	3.8	3.9
K4.	**Knowledge of REACTOR FEEDWATER SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Auto start of the RFP's: Plant-Specific	3.8	4.0
K4.02	Feedwater heating	2.8	2.9
K4.03	RFP minimum flow	2.7	2.7
K4.04	Dispersal of feedwater in the reactor vessel	2.5	2.6
K4.05	RFP protection	2.7	2.8
K4.06	RFP lubrication	2.5	2.6
K4.07	RFP motor cooling: Motor-Driven-Only	2.5	2.6
K4.08	RFP turbine seals: TDRFP's-Only	2.3	2.4
K4.09	System isolation from the reactor vessel (check valves, double valve isolation inside/ outside containment)	3.2	3.3
K4.10	Feedpump runbacks: Plant-Specific	3.1	3.4
K4.11	Recirculation runbacks: Plant-Specific	3.5	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR FEEDWATER SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	System venting	2.4*	2.4
K5.02	Water hammer	2.5	2.5
K5.03	Turbine operation: TDRFP's-Only	2.8	2.8

SYSTEM: 259001 Reactor Feedwater System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR FEEDWATER SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems	3.0	3.0
K6.02	Condensate system	3.3	3.4
K6.03	A.C. electrical power	2.9	3.1
K6.04	Extraction steam	2.8	2.9
K6.05	Component cooling water systems	2.7	2.7
K6.06	Plant service water	2.7	2.7
K6.07	Reactor water level control system	3.8	3.8
K6.08	Reactor feedwater pump motor ventilation: Motor-Driven-Only	2.1*	2.1*
K6.09	Reactor feedwater pump lube oil system	2.8	2.9
K6.10	RFP turbine seal system: TDRFP's-Only	2.5	2.5
K6.11	Main steam: TDRFP's-Only	2.8	2.8
K6.12	D.C. electrical power	2.3	2.4
K6.13	†Redundant reactivity control: Plant-Specific	3.0	3.3*
K6.14	Heater drains: Plant-Specific	2.5	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR FEEDWATER SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Feedwater flow/pressure	3.3	3.3
A1.02	Feedwater inlet temperature	3.2	3.3
A1.03	RFP motor amps: Motor-Driven-Only	2.8	2.8
A1.04	RFP turbine speed: Turbine-Driven-Only	2.8	2.7
A1.05	RFP turbine control valve position: Turbine-Driven-Only	2.8	2.7
A1.06	Feedwater heater level	2.7	2.7
A2.	**Ability to (a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Pump trip	3.7	3.7
A2.02	Feedwater heater isolation	3.1	3.3
A2.03	Loss of condensate pump(s)	3.6	3.6
A2.04	Loss of extraction steam	3.3	3.4
A2.05	Loss of applicable plant air systems	3.0	3.0
A2.06	Loss of A.C. electrical power	3.2	3.2

SYSTEM: 259001 Reactor Feedwater System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.07	Reactor water level control system malfunctions	3.7	3.8
A2.08	Loss of D.C. electrical power	2.5	2.6
A2.09	†TDRFP steam inlet pressure flow: Plant-Specific	2.6	2.7
A3.	**Ability to monitor automatic operations of the REACTOR FEEDWATER SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	RFP auto start: Plant-Specific	3.3	3.5
A3.02	Motor amps: Motor-Driven-Only	2.4	2.5
A3.03	System flow	3.3	3.2
A3.04	Reactor water level	3.8	3.7
A3.05	Feedwater inlet temperature	3.1	3.2
A3.06	Pump discharge pressure	3.1	3.1
A3.07	FWRV position	3.2	3.2
A3.08	Turbine speed: TDRFP'S-Only	2.8	2.7
A3.09	Lights and alarms	3.0	3.0
A3.10	Pump trips	3.4	3.4
A3.11	Reactor feedpump runbacks: Plant-Specific	3.2	3.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	System flow	3.6	3.5
A4.02	Manually start/control a RFP/TDRFP	3.9	3.7
A4.03	Feedwater heater/drain controls	2.9	3.0
A4.04	System valves	3.1	2.9
A4.05	Reactor water level	4.0	3.9
A4.06	Feedwater inlet temperature	3.4	3.5
A4.07	Pump discharge pressure	3.3	3.2
A4.08	FWRV position	3.3	3.3

SYSTEM: 204000 Reactor Water Cleanup System

TASK: Perform lineups on the reactor water cleanup system
Startup the reactor cleanup system
Operate the reactor cleanup system while reducing reactor pressure
Place the reactor water cleanup system in operation with the reactor at rated pressure
Remove the reactor cleanup (RWCU) system from service with the reactor at rated pressure
Return drained system to service with the reactor at rated pressure
Route primary system water to the main condenser hotwell
Operate the reactor cleanup system to conduct blowdowns
Route primary system water to radwaste
Drain the reactor cavity and equipment pool to the hotwell via the reactor cleanup system
Monitor the reactor water cleanup system (write in)
Place the reactor water cleanup system in operation with the ( )reactor at rated temperature (write in)
Remove the reactor cleanup system from service with the reactor at rated temperature (write in)
Return drained system to service with the reactor at rated temperature (write in)
Perform reactor cleanup simulated automatic actuation test
Perform reactor cleanup isolation logic system functional test
Conduct reactor cleanup valve testing

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR WATER CLEANUP SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel	3.1	3.3
K1.02	Recirculation system: Plant-Specific	2.9	3.0
K1.03	Reactor feedwater system	3.1	3.1
K1.04	Component cooling water systems	2.9	2.9
K1.05	Plant air systems	2.7	2.7
K1.06	Main condenser	2.8	2.8
K1.07	Radwaste	2.6	2.7
K1.08	SBLC	3.7	3.8
K1.09	Reactor water level	3.2	3.3
K1.10	Reactor water quality	3.3	3.5
K1.11	PCIS/NSSSS	3.5	3.7
K1.12	Condensate storage and transfer system: Plant-Specific	2.6	2.6
K1.13	RHR system: Plant-Specific	2.5	2.5
K1.14	Process sample system	2.5	2.5
K1.15	Leak detection: Plant-Specific	3.1	3.2
K1.16	CRD system: Plant-Specific	2.8	2.8

SYSTEM: 204000 Reactor Water Cleanup System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pumps	2.3*	2.4*
K2.02	Valve motors	2.0*	2.1*
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR WATER CLEANUP SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water quality	3.2	3.6
K3.02	Reactor water level	3.1	3.1
K3.03	Component cooling water systems	2.4	2.4
K3.04	Reactor water temperature	2.6	2.6
K3.05	Area temperature	2.4*	2.4*
K3.06	Area radiation levels	2.6	2.7
K3.07	Drywell temperature	2.1*	2.2*
K3.08	Drywell pressure	2.2*	2.3*
K4.	**Knowledge of REACTOR WATER CLEANUP SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Pump protection	2.5	2.5
K4.02	Piping over-pressurization protection: Plant-Specific	2.7	2.9
K4.03	Over temperature protection for system components	2.9	2.9
K4.04	System isolation upon-receipt of isolation signals		
K4.05	Double valve isolation from the reactor	3.0	3.1
K4.06	Maximize plant efficiency (use of regenerative heat exchanger)	2.6	2.8
K4.07	Draining of reactor water to various locations	2.9	2.9
K4.08	Reducing reactor pressure upstream of low pressure piping: LP-RWCU	3.3	3.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER CLEANUP SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Electro/ pneumatic converter operation	1.9*	2.1*
K5.02	Control device operation	2.2*	2.2*
K5.03	Demineralizer operation	2.4	2.5
K5.04	Heat exchanger operation	2.7	2.7
K5.05	Flow controllers	2.6	2.6
K5.06	Pressure controllers	2.6*	2.6
K5.07	Conductivity measurement	2.5	2.6
K5.08	Temperature measurement	2.6	2.6

SYSTEM: 204000 Reactor Water Cleanup System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR WATER CLEANUP SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Component cooling water systems	3.1	3.3
K6.02	Main condenser	2.4	2.4
K6.03	Radwaste	2.4	2.4
K6.04	Plant air systems	2.7	2.8
K6.05	A. C. power	2.6	2.6
K6.06	Reactor feedwater system	2.4*	2.4
K6.07	SBLC logic	3.3	3.5
K6.08	PCIS/NSSSS	3.5	3.5
K6.09	CRD hydraulics: Plant-Specific	2.7	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER CLEANUP SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor water level	3.1	3.2
A1.02	Component cooling water temperature	2.9	2.9
A1.03	Reactor water temperature	2.8	2.9
A1.04	System flow	2.8	2.8
A1.05	System pressure	2.6	2.6
A1.06	System temperature	2.8	2.8
A1.07	RWCU drain flow	2.9	2.9
A1.08	Main condenser hotwell level	2.3	2.3
A1.09	Reactor water conductivity	3.0	3.2
A2.	**Ability to (a) predict the impacts of the following on the REACTOR WATER CLEANUP SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Loss of component cooling water	3.2	3.4
A2.02	Pressure control valve failure: LP-RWCU	3.2	3.2
A2.03	Flow control valve failure	2.9	2.9
A2.04	Pump trips	2.7	2.9
A2.05	Valve openings	2.7	2.8
A2.06	A.C. failure	2.5	2.6
A2.07	Loss of plant air systems	2.5	2.6
A2.08	RWCU pump seal failure	2.9	3.1
A2.09	Loss of room coolers	2.8	2.8
A2.10	Valve closures	2.7	2.8

SYSTEM: 204000 Reactor Water Cleanup System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.11	Inadequate system flow: Plant-Specific	2.6	2.7
A2.12	Excessive drain flow rates	2.7	2.8
A2.13	Signal received which results in a system isolation	3.4	3.4
A2.14	System high temperature	3.2	3.2
A2.15	Cleanup demineralizer high differential pressure	2.8	2.9
A3.	**Ability to monitor automatic operations of the REACTOR WATER CLEANUP SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	System pressure downstream of the pressure regulating valve: LP-RWCU	3.3	3.3
A3.02	Reactor water quality	2.9	3.2
A3.03	Response to system isolations	3.6	3.6
A3.04	Response to interlocks and trips designed to protect system components	3.4	3.5
A3.05	Reactor water temperature	2.8	2.8
A3.06	Lights and alarms	3.1	3.1
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	System pumps	3.1	3.0
A4.02	Valve controllers	2.9	2.9
A4.03	RWCU drain flow regulator	3.2	3.1
A4.04	Heat exchanger operation	2.8	2.8
A4.05	System pressure	2.9	2.8
A4.06	System flow	3.0	2.9
A4.07	System temperature	3.1	3.1
A4.08	Reactor water level	3.4	3.4
A4.09	Reactor water temperature	2.9	2.9

SYSTEM: 259002 Reactor Water Level Control System

TASK: Operate feedwater manual/automatic transfer switch (for individual feed regulator valve)
Operate vessel level master control station
Operate feedwater low flow startup valve
Place the high pressure (feedwater) coolant injection system (FWCI) in standby readiness
Monitor the high pressure (feedwater) coolant injection system operation
Return the high pressure (feedwater) coolant injection system to standby readiness after automatic initiation
Perform high pressure (feedwater) coolant injection operability test when reactor core isolation coolant is inoperable

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	RPS	3.8	3.9
K1.02	Main steam flow	3.2	3.3
K1.03	Reactor water level	3.8	3.9
K1.04	Reactor feedwater flow	3.5	3.6
K1.05	Reactor feedwater system	3.6	3.7
K1.06	Plant air systems	3.0	3.1
K1.07	Rod worth minimizer: Plant-Specific	2.6	2.7
K1.08	Recirculation system: Plant-Specific	3.2	3.2
K1.09	P sat/T sat (compensation)	2.9	3.0
K1.10	Emergency generator(s): FWCI/HPCI	2.9	3.0
K1.11	Drywell pressure: FWCI/HPCI	3.0	3.2
K1.12	Emergency condensate transfer pump: FWCI/HPCI	2.6*	2.6*
K1.13	Condensate system	3.2	3.2
K1.14	Main turbine	2.9	3.0
K1.15	Recirculation flow control system	3.2	3.2
K1.16	HPCI: Plant-Specific	3.4	3.5
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Reactor water level control system circuits	2.4*	2.7
K2.02	Feedwater coolant injection (FWCI) initiation logic: FWCI/HPCI	3.5*	3.5*

SYSTEM: 259002 Reactor Water Level Control System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR WATER LEVEL CONTROL SYSTEM will have on following:** (CFR 41.7 / 45.4)		
	(CFR 41.7 / 45.5 to 45.8)		
K3.01	Reactor water level	3.8	3.8
K3 02	Reactor feedwater system	3.7	3.7
K3 03	Rod worth minimizer: Plant-Specific	2.7	2.9
K3.04	Recirculation system: Plant-Specific	2.9	3.0
K3.05	Recirculation flow control system	2.8	2.9
K3.06	Main turbine	2.8	2.8
K3.07	Reactor water level indication	3.4*	3.4
K4.	**Knowledge of REACTOR WATER LEVEL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Ensuring adequate NPSH for recirculation pumps: Plant-Specific	3.0	3.1
K4.02	Bypassing of the RWM: Plant-Specific	2.8	2.0
K4.03	Reactor feedpump runout protection: MDFP	2.8*	2.8
K4.04	Reactor water level setpoint setdown following a reactor scram	2.9	2.9
K4.05	P sat/T sat (compensation)	2.9	2.9
K4 06	Control signal failure	3.1	3.2
K4 07	TDRFP 20% power interlock: TDRFP	3.1	3.3
K4 08	TDRFP speed control: TDRFP	2.9	3.0
K4 09	Single element control (reactor water level provides the only input)	3.1	3.1
K4.10	Three element control (main steam flow, reactor feedwater flow and reactor water level provide input)	3.4	3.4
K4.11	DP control: Plant-Specific	3.3	3.3
K4.12	Manual and automatic control of the system	3.5	3.4
K4 13	FWRV lockup	3.5	3.6
K4 14	Selection of various instruments to provide reactor water level input	3.4	3.4
K4.15	Automatic initiation of the feedwater system upon receipt of an ECCS initiation signal: FWCI/HPCI	4.5*	4.5
K4.16	Dedication of feedwater string(s) to ECCS: FWCI/HPCI	4.5*	4.5
K4.17	Simultaneous Manual and Auto operation of the system (i.e. 1 FP in Auto, 1 FP in Manual)	3.1	3.0

SYSTEM: 259002 Reactor Water Level Control System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER LEVEL CONTROL SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	GEMAC/Foxboro/Bailey controller operation: Plant-Specific	3.1	3.1
K5.02	Electro/ Pneumatic converter operation	2.2*	2.4
K5.03	Water level measurement	3.1	3.2
K5.04	Moisture carryover	2.3	2.3
K5.05	Moisture carryunder		
K5.06	Pump runout	2.4	2.4
K5.07	Turbine speed control mechanisms: TDRFP	2.7	2.7
K5.08	Heat removal mechanisms: FWCI	3.6	3.8
K5.09	†Adequate core cooling: FWCI	3.8	4.2*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR WATER LEVEL CONTROL SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems	3.2	3.2
K6.02	A.C. power	3.3	3.4
K6.03	Main steam flow input	3.1	3.1
K6.04	Reactor feedwater flow input	3.1	3.1
K6.05	Reactor water level input	3.5	3.5
K6.06	Reactor pressure/temperature input (for water level input compensation)	2.6	2.7
K6.07	Drywell pressure input: FWCI	3.0*	3.0*
K6.08	Loss of dP across startup level control bypass valve: Plant-Specific	2.7	2.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR WATER LEVEL CONTROL SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor water level	3.8	3.8
A1.02	Reactor feedwater flow	3.6	3.5
A1.03	Reactor power	3.8	3.8
A1.04	Reactor water level control controller indications	3.6	3.6
A1.05	FWRV/startup level control position: Plant-Specific	2.9	2.9
A1.06	Feedwater string(s) selected for FWCI: FWCI	3.3*	3.3*
A1.07	TDRFP speed: TDRFP	2.6	2.6

SYSTEM: 259002 Reactor Water Level Control System

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the REACTOR WATER LEVEL CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Loss of any number of main steam flow inputs	3.3	3.4
A2.02	Loss of any number of reactor feedwater flow inputs .	3.3	3.4
A2.03	Loss of reactor water level input	3.6	3.7
A2.04	RFP runout condition: Plant-Specific	3.0	3.1
A2.05	Loss of applicable plant air systems	3.2	3.4
A2.06	Loss of controller signal output	3.3	3.4
A2.07	Loss of comparator bias signal	2.4	2.5
A2.08	Receipt of an ECCS initiation signal: FWCI	4.5*	4.5
A2.09	FWCI system failure alarm: FWCI	4.0	4.0
A3.	**Ability to monitor automatic operations of the REACTOR WATER LEVEL CONTROL SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Runout flow control: Plant-Specific	3.0*	3.0
A3.02	Changes in reactor water level	3.4	3.4
A3.03	Changes in main steam flow	3.2	3.2
A3.C4	Changes in reactor feedwater flow	3.2	3.2
A3.05	Changes in reactor power	3.4	3.4
A3.06	Reactor water level setpoint setdown following a reactor scram: Plant-Specific	3.0	3.0
A3.07	FWRV lockup	3.5	3.6
A3.08	FWCI system initiation: FWCI	4.0	4.0
A3.09	Transfer of system from flow control to level control mode: FWCI	4.3*	4-3
A3.10	TDRFP lockup: TDRFP	3.1	3.0
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	All individual component controllers in the manual mode	3.8	3.6
A4.02	All individual component controllers in the automatic mode	3.7	3.6
A4.03	All individual component controllers when transferring from manual to automatic modes	3.8	3.6
A4.04	FWRV lockup reset controls	3.7	3.6
A4.05	Runout flow control reset controls: Plant-Specific .	3.8	3.5
A4.06	DP/Single/three element control selector switch: Plant-Specific	3.1	3.2
A4.07	All individual component controllers when transferring from automatic to manual mode	3.8	3.6
A4.08	Manually initiate FWCI: FWCI	4.5*	4.5
A4.09	TDRFP lockout reset: TDRFP	3.4	3.1
A4.10	Setpoint setdown reset controls: Plant-Specific . . .	3.1	2.9
A4.11	High level lockout reset controls: Plant-Specific . .	3.5	3.3

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

TASK: Perform lineups on the low pressure coolant injection system
Place the low pressure coolant injection system in standby readiness
Monitor operational sequence of low pressure coolant injection (LPCI) system
Secure the low pressure coolant injection system
Perform LPCI subsystem logic system functional test
Perform LPCI mode inoperable test
Perform LPCI mov power supply simulated auto. act test and battery serv. tests
Conduct LPCI independent power supply weekly battery test
Conduct LPCI independent power supply performance discharge test
Perform low pressure coolant injection sound analysis and flow test (write in)

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage and transfer system: Plant-Specific	2.8	2.8
K1.02	Suppression pool	3.9	3.9
K1.03	Condensate transfer	2.5*	2.6*
K1.04	Keep fill system	3.3	3.4
K1.05	Recirculation system: BWR-3,4	3.8	3.8
K1.06	Automatic depressurization	3.9	3.9
K1.07	D.C. electrical power	3.1	3.3
K1.08	A.C. electrical power	3.5	3.5
K1.09	Emergency generators	3.8	3.8
K1.10	ECCS room coolers	3.2	3.2
K1.11	Nuclear boiler instrumentation	3.7	3.7
K1.12	Plant air systems: Plant-Specific	2.6*	2.7*
K1.13	Drywell pressure	3.9	4.0
K1.14	Shutdown cooling system: Plant-Specific	3.6	3.7
K1.15	Reactor building drain system: Plant-Specific	2.4*	2.6
K1.16	Component cooling water systems	3.1	3.2
K1.17	Reactor pressure	4.0	4.0
K1.18	Reactor vessel: Plant-Specific	3.8	3.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pumps	3.5*	3.5*
K2.02	Valves	2.5*	2.7*
K2.03	Initiation logic	2.7*	2.9*

SYSTEM 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.	**Knowledge of the effect that a loss or malfunction of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	4.3*	4.4*
K3.02	Suppression pool level	3.5	3.5
K3.03	Automatic depressurization logic	4.2*	4.3*
K3.04	Adequate core cooling	4.6*	4.6*
K4.	**Knowledge of RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic system initiation/ injection	4.2*	4.2
K4.02	Prevention of piping overpressurization	3.3	3.4
K4.03	Pump minimum flow protection	3.2	3.3
K4.04	Pump motor cooling: Plant-Specific	2.6	2.7
K4.05	Prevention of water hammer	3.2	3.3
K4.06	Adequate pump net positive suction head (interlock suction valve open): Plant-Specific	3.5	3.5
K4.07	Emergency generator load sequencing	3.7	3.9
K4.08	Pump operability testing	3.3	3.4*
K4.09	Surveillance for all operable components	3.1	3.4
K4.10	Dedicated injection system during automatic system initiation (injection valve interlocks)	3.9	4.1
K4.11	Loop selection logic: Plant-Specific	4.0	4.0
K4.12	System redundancy	3.5	3.6
K4.13	The prevention of leakage to the environment through LPCI/RHR heat exchanger: Plant-Specific	3.4	3.7
K4.14	†Operation from remote shutdown panel	3.6	3.7
K4.15	Pump runout protection: Plant-Specific	2.5*	2.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) :** (CFR 41.5 / 45.3)		
K5.01	Testable check valve operation	2.7*	2.9
K5.02	†Core cooling methods	3.5	3.7
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	3.6	3.7
K6.02	D.C. electrical power	2.8*	3.0*
K6.03	Emergency generator	3.7	3.9

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.04	Keep fill system	3.3	3.5
K6.05	Condensate storage and transfer system: Plant-Specific	2.5	2.5
K6.07	Plant air systems: Plant-Specific	2.7	2.7
K6.08	ECCS room cooling	2.9	3.1
K6.09	Nuclear boiler instrumentation	3.4	3.4
K6.10	Component cooling water systems	3.0	3.1
k6.11	ADS	4.1*	4.1
K6.12	†ECCS room integrity	2.7	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor water level	4.2*	4.3
A1.02	Reactor pressure	3.9*	4.0
A1.03	System flow	3.8	3.7
A1.04	System pressure	3.6	3.6
A1.05	Suppression pool level	3.8	3.7
A1.06	Condensate storage tank level: Plant-Specific	2.4*	2.5
A1.07	Motor amps: Plant-Specific	2.4*	2.5
A1.08	†Emergency generator loading	3.7	3.8
A1.09	Component cooling water systems	2.9	2.9
A2.	**Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Inadequate net positive suction head	3.2	3.4
A2.02	Pump trips	3.5	3.5
A2.03	Valve closures	3.2	3.3
A2.04	A.C. failures	3.5	3.6
A2.05	D.C. failures	3.0	3.2
A2.06	Emergency generator failure	3.8	3.9
A2.07	Pump seal failure	3.0	3.1
A2.08	Inadequate room cooling	2.9	3.0
A2.09	Inadequate system flow	3.3	3.4
A2.10	Nuclear boiler instrument failures	3.3	3.5
A2.11	Motor operated valve failures	3.4	3.6

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.14	Initiating logic failure	3.8	3.9*
A2.15	Loop selection logic failure: Plant-Specific	4.2*	4.2*
A2.16	Loss of coolant accident	4.4*	4.5*
A2.17	Keep fill system failure	3.3	3.5
A3.	**Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.8*	3.7
A3.02	Pump start	4.0	3.9
A3.03	Pump discharge pressure	3.7	3.6
A3.04	System flow	3.8	3.7
A3.05	Reactor water level	4.4*	4.4*
A3.06	Indicating lights and alarms	3.7*	3.6
A3.07	Loop selection: Plant-Specific	4.2*	4.6*
A3.08	System initiation sequence	4.1	4.1
A3.09	Emergency generator load sequencing	3.6	3.9*
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pumps	4.3*	4.1
A4.02	System valves	4.1*	4.1
A4.03	Keep fill system	3.4	3.4
A4.04	Heat exchanger cooling flow	3.6	3.6
A4.05	Manual initiation controls	4.3*	4.1
A4.06	System reset following automatic initiation: Plant-Specific	3.9	3.9
A4.07	Reactor water level	4.5*	4.5
A4.08	Reactor pressure	4.3*	4.3
A4.09	System flow	4.1	4.0
A4.10	Pump/system discharge pressure: Plant-Specific	3.7	3.6
A4.11	Indicating lights and alarms	3.7*	3.5
A4.12	Condensate storage tank level: Plant-Specific	2.5	2.6
A4.13	Suppression pool level/temperature	3.9	3.9
A4.14	Testable check valves	2.7*	2.7

3.3 Pressure Control

218000	Automatic Depressurization System
239001	Main and Reheat Steam System
241000	Reactor/Turbine Pressure Regulating System
239002	Safety Relief Valves

SYSTEM: 218000 Automatic Depressurization System

TASK: Monitor the automatic depressurization system (ADS)
Manually operate the automatic depressurization system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between AUTOMATIC DEPRESSURIZATION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	RHR/LPCI: Plant-Specific	4.0	4.1
K1.02	Low pressure core spray: Plant-Specific	4.0	4.1
K1.03	Nuclear boiler instrument system	3.7	3.8
K1.04	Drywell/containment pressure: Plant-Specific	3.9	4.2
K1.05	Remote shutdown system: Plant-Specific	3.9	3.9
K1.06	Safety/relief valves	3.9*	3.9*
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	ADS logic	3.1*	3.3
K3.	**Knowledge of the effect that a loss or malfunction of the AUTOMATIC DEPRESSURIZATION SYSTEM will have on following:** (CFR 41.7 / 41.4)		
K3.01	Restoration of reactor water level after a break that does not depressurize the reactor when required	4.4*	4.4*
K3.02	Ability to rapidly depressurize the reactor	4.5*	4.6*
K4.	**Knowledge of AUTOMATIC DEPRESSURIZATION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Prevent inadvertent initiatior of ADS logic	3.7	3.9
K4.02	Allows manual initiation of ADS logic	3.8	4.0
K4.03	ADS logic control	3.8	4.0
K4.04	Insures adequate air supply to ADS valves: Plant-Specific	3.5	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to AUTOMATIC DEPRESSURIZATION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	ADS logic operation	3.8	3.8

SYSTEM: 218000 Automatic Depressurization System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the AUTOMATIC DEPRESSURIZATION SYSTEM : (CFR 41.7 / 45.7)		
K6.01	RHR/LPCI system pressure: Plant-Specific	3.9	4.1
K6.02	Low pressure core spray system pressure: Plant-Specific	4.1	4.1
K6.03	Nuclear boiler instrument system (level indication) . .	3.8	3.9
K6.04	Air supply to ADS valves: Plant-Specific	3.6	3.7
K6.05	A.C. power: Plant-Specific	3.0*	3.1*
K6.06	D.C. power: Plant-Specific	3.4*	3.6*
K6.07	Primary containment instrumentation	3.4	3.5
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the AUTOMATIC DEPRESSURIZATION SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	ADS valve tail pipe temperatures	3.4	3.6
A1.02	ADS valve acoustical monitor noise: Plant-Specific . .	3.7	4.0
A1.03	ADS valve Air supply pressure: Plant-Specific	3.2	3.4*
A1.04	Reactor pressure	4.1*	4.2*
A1.05	Reactor water level	4.1*	4.1
A1.06	Suppression pool temperature	4.1	4.3*
A2.	Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM , and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Small steam line break LOCA	4.1	4.3*
A2.02	Large break LOCA	3.5	3.6*
A2.03	Loss of air supply to ADS valves: Plant-Specific . . .	3.4	3.6
A2.04	ADS failure to initiate	4.1	4.2*
A2.05	Loss of A.C. or D.C. power to ADS valves	3.4*	3.6*
A2.06	ADS initiation signals present	4.2	4.3*
A3.	Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including: (CFR 41.7 / 45.7)		
A3.01	ADS valve operation	4.2*	4.3
A3.02	ADS valve tail pipe temperatures	3.6	3.7
A3.03	ADS valve acoustical monitor noise: Plant-Specific . .	3.7	3.8
A3.04	Primary containment pressure	3.7	3.8

SYSTEM: 218000 Automatic Depressurization System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A3.05	Suppression pool level	3.6	3.7
A3.06	Suppression pool temperature	3.9	3.9
A3.07	Lights and alarms	3.7	3.6
A3.08	Reactor pressure	4.2*	4.3*
A3.09	Reactor vessel water level	4.1*	4.2*
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	ADS valves	4.4*	4.4*
A4.02	ADS logic initiation	4.2*	4.2*
A4.03	ADS logic reset	4.2*	4.2*
A4.04	ADS inhibit: Plant-Specific	4.1	4.1*
A4.05	ADS timer reset	4.2*	4.2*
A4.06	ADS valve tail pipe temperature	3.5	3.6
A4.07	ADS valve acoustical monitor noise: Plant-Specific . .	3.5	3.8
A4.08	Suppression pool level	3.7	3.8
A4.09	Suppression pool temperature	3.9	3.9
A4.10	Lights and alarms	3.8	3.8
A4.11	Reactor pressure	4.3*	4.3*
A4.12	Reactor vessel water level	4.2*	4.3*

SYSTEM: 239001 Main and Reheat Steam System

TASK: Perform lineups on the main steam system
Startup the main steam system (cold)
Operate the main steam isolation valves
Place the automatic pressure relief valves in service
Monitor the main steam system
Perform main steam isolation valve (MSIV) fast closure test (MSIV operability testing)
Perform main steam line high radiation functional test perform MSIV's, steam line drain valves and reactor sample valves logic functional test
Perform main mechanical vacuum pump and valve
Isolation system functional test
Perform main steam isolation valve, main steam drain valve and reactor water sample valve simulated automatic isolation test
Perform main steam isolation valves limit switch instrument functional test
Perform main steam line closure scram (MSLCS) operational test
Perform one train MSLCS inop surveillance
Perform main steam leakage control system operational test (write in)
Perform one train main steam leakage control system operability surveillance (write in)
Perform monthly main steam leakage control system division 1 and division 2 fan and heater tests (write in)

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between MAIN AND REHEAT STEAM SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel	3.4	3.4
K1.02	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.6	2.8
K1 03	Main turbine	3.4	3.4
K1 04	Moisture separators	2.8	2.9
K1.05	Moisture separator reheaters: Plant-Specific	2.8	2.8
K1.06	Steam bypass system	3.4	3.4
K1.07	Offgas system	3.1	3.1
K1.08	Condenser air removal system	2.9	3.1
K1.09	Steam seal/gland seal system	2.7	2.8
K1.10	Extraction steam system	2.7	2.8
K1.11	High pressure heater drains and vents	2.5	2.5
K1.12	Plant air systems	2.5	2.6
K1.13	Main steam isolation valve leakage control: Plant-Specific	2.6	2.8
K1.14	Positive leakage control system: Plant Specific . . .	2.8	3.1
K1.15	Process computer/ performance monitor system	2.1*	2.1
K1.16	Process radiation monitoring system	3.2	3.4

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.17	Containment system	3.1	3.2
K1.18	High pressure coolant injection: Plant-Specific	3.5	3.6
K1.19	Reactor core isolation cooling system: Plant-Specific	3.1	3.2
K1.20	Residual heat removal system: Plant-Specific	2.9	2.9
K1.21	Isolation condenser system: Plant-Specific	3.7	3.7
K1.22	Feedwater system	3.1	3.2
K1.23	Reactor water level control system	3.2	3.3
K1.24	Head vent	2.7	2.7
K1.25	Relief valves	3.5	3.5
K1.26	Safety valves	3.7	3.8
K1.27	Reactor protection system	4.0	4.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Main steam isolation valve solenoids	3.2*	3.3*
K2.02	Main steam line shutoff valves (guard valves): Plant-Specific	2.3*	2.3*
K3.	**Knowledge of the effect that a loss or malfunction of the MAIN AND REHEAT STEAM SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Turbine generator	3.2	3.3
K3.02	Condenser	3.1	3.2
K3.03	Reactor feedpump turbines: Plant-Specific	3.2	3.3
K3.04	Offgas system	2.8	2.8
K3.05	Condenser air removal	2.8	2.9
K3.06	Seal steam/gland and seal system	2.6	2.7
K3.07	Containment	3.1	3.3
K3.08	Decay heat removal	3.4	3.5
K3.09	Steam bypass capability	3.6	3.7
K3.10	High pressure coolant injection system: Plant-Specific	3.5	3.5
K3.11	Reactor core isolation cooling system: Plant-Specific	3.2	3.3
K3.12	Isolation condenser: Plant-Specific	3.7	3.7
K3.13	Moisture separator reheaters: Plant-Specific	2.4	2.4
K3.14	Residual heat removal system: Plant-Specific	2.7	2.7
K3.15	Reactor water level control	3.5	3.5
K3.16	Relief/safety valves	3.6	3.6
K3.17	Reactor vessel and internals	3.2	3.3

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.	**Knowledge of MAIN AND REHEAT STEAM SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic isolation of steam lines	3.8	3.8
K4.02	Automatic isolation and opening of drain valves: Plant-Specific	3.1	3.2
K4.03	Insures that steam released from a steam line break will not bypass suppression pool; BWR-6	3.2	3.3
K4.04	Limits steam flow during a steam line rupture to 200%	3.4	3.5
K4.05	Steam flow measurement	3.1	3.2
K4.06	Allows for removal or prevents escape of radioactive steam from systems that have leaky MSIV's	3.1	3.2
K4.07	Over pressure control	3.7	3.7
K4.08	Removal of non condensable gases from reactor head area	2.5	2.6
K4.09	Equalization of pressure across the MSIV's before opening	3.3	3.3
K4.10	Moisture removal from steam lines prior to admitting steam	2.9	3.0
K4.11	Positive sealing of the MSIV's when shutdown: Plant-Specific	2.9	3.1
K5.	**Knowledge of the operational implications of the following concepts as they apply to MAIN AND REHEAT STEAM SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Constant enthalpy expansion through a valve	2.0*	2.2
K5.02	Definition and causes of steam/water hammer	2.9	3.1
K5.03	Definition and causes of thermal stress	2.7	2.9
K5.04	Definition and reason for steam blanketing of moisture separator reheater: Plant-Specific	1.8*	1.9
K5.05	Flow indication	2.8	2.8
K5.06	Air operated MSIV's	2.8	2.9
K5.07	Hydraulic operated MSIV's	2.6	2.7
K5.08	Solenoid operated valves	2.6	2.7
K5.09	Decay heat removal	3.4	3.5
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the MAIN AND REHEAT STEAM SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Electrical power	3.1	3.3
K6 02	Plant air systems	3.2	3.2
K6 03	Safety valve operability	3.6	3.6
K6.04	Relief valve operability: Plant-Specific	3.4	3.5

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.06	MSIV isolation signal	3.8	3.9
K6.07	MSIV leakage control	2.8	3.2
K6.08	Main condenser vacuum	3.3	3.4
K6.09	PCIS/NSSSS	3.9	4.1
K6.10	ADS/low low set: Plant-Specific	3.6	3.7
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the MAIN AND REHEAT STEAM SYSTEM controls including: (CFR 41.5 / 45.5)		
A1. 01	Main steam pressure	3.6	3.6
A1. 02	Main steam temperature	2.6	2.6
A1.03	Reheat steam pressure: Plant-Specific	2.2*	2.2
A1.04	Reheater temperature: Plant-Specific	2.3*	2.3
A1.05	Main steam line radiation monitors	3.6	3.6
A1.06	Air ejector process radiation monitor	3.4	3.4
A1.07	Reactor water level	3.7	3.7
A1.08	Reactor pressure	3.8	3.8
A1.09	Main steam flow	3.5	3.4
A1.10	Reactor power	3.8	3.8
A2.	Ability to (a) predict the impacts of the following on the MAIN AND REHEAT STEAM SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Malfunction of reactor turbine pressure regulating system	3.8	3.9
A2.02	Change in steam demand and its effect on reactor pressure and power	3.6	3.8
A2.03	MSIV closure	4.0	4.2
A2.04	Main steam line low pressure	3.5	3.6
A2.05	†Main steam line high radiation	3.9	4.2
A2.06	Turbine trip without bypass valves	4.1	4.3
A2.G7	Main steam area high temperature or differential temperature high	3.8	3.9
A2.08	Low condenser vacuum	3.6	3.6
A2.09	Opening of head vent to drywell equipment sump with pressure in the reactor vessel	3.4	3.7
A2.10	Closure of one or more MSIV's at power	3.8	3.9
A2.11	Steam line break	4.1	4.3
A2.12	PCIS/NSSSS actuation	4.2*	4.3

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A2.13	High reactor water level	3.5	3.7
A2.14	Inadvertent initiation of HPCI/HPCS/RCIC (steam quality and steam flow): Plant-Specific	3.4	3.5
A3.	**Ability to monitor automatic operations of the MAIN AND REHEAT STEAM SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Isolation of main steam system	4.2*	4.1*
A3.02	Opening and closing of drain valves as turbine load changes: Plant-Specific	2.9	2.9
A3.03	Moisture separator reheat steam supply: Plant-Specific	2.8	2.8
A3.04	Isolation of moisture separator reheater: Plant-Specific	2.7	2.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	MSIV's	4.2*	4.0
A4.02	Main steam line drain valves	3.2	3.2
A4.03	System flow	3.5	3.5
A4.04	System pressure	3.8	3.7
A4.05	System temperature	2.7	2.7
A4.06	System radiation levels	3.6	3.8
A4.07	Lights and alarms	3.3	3.3
A4.08	Reactor water level	3.7	3.7
A4.09	Reactor pressure	3.9	3.9
A4.10	Reactor power	3.8	3.8
A4.11	Alternate methods of verifying valve positions	3.1	3.3

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

TASK: Manually operate the steam dump/turbine bypass control systems
Monitor steam dump/turbine bypass control system
Lineup reactor pressure control system for auto operation (write in)
Test control system prior to auto operation (write in)
Perform lineups of the electro-hydraulic control hydraulic power unit
Fill the hydraulic power unit when shutdown
Startup the electro-hydraulic control hydraulic power unit
Operate EHC hydraulic pumps
Shift EHC hydraulic coolers
Operate polishing filters (fuller earth filters)
Replace electro-hydraulic control system filters
Fill the hydraulic power unit reservoir during normal operations
Sample EHC hydraulic fluid
Change accumulators during operation
Monitor electro-hydraulic control hydraulic unit operation
Adjust turbine load limits
Operate the turbine governor test mechanism (test for operation of the overspeed trip device and mechanical trip valve)
Shutdown the electro-hydraulic control power unit
Discharge hydraulic fluid while shutdown
Perform test of the turbine overspeed protection controller (write in)
Test the turbine overspeed trip by actual turbine overspeed (write in)
Perform manual trip of turbine at front standard (write in)
Adjust turbine load limits
Operate the turbine governor test mechanism
Operate the reactor turbine pressure regulating system using manual control mode
Shift control modes (mechanical [manual]/electrical) of the reactor/turbine pressure regulating system
Monitor the reactor/turbine pressure regulating system
What if reactor pressure is high?
Shift control modes (manual/automatic) of the reactor/turbine pressure regulating system
Adjust the reactor/turbine pressure regulating system pressure

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR/TURBINE PRESSURE REGULATING SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor power	3.8	3.9
K1.02	Reactor pressure	3.9	4.1
K1.03	Reactor water level	3.6	3.7
K1.04	Reactor steam flow	3.7	3.7

SYSTEM: 241000 Reactor Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.05	Main turbine steam flow	3.5	3.6
K1.06	Bypass valves	3.8	3.9
K1.07	Main stop/throttle valves	3.4	3.6
K1.08	Control/governor valves	3.6	3.7
K1.09	Combined intermediate valves: Plant-Specific	3.1	3.4
K1.10	Front standard trip system	3.2	3.3
K1.11	RPS	3.7	3.8
K1.12	FW extraction non-return valves	2.4	2.6
K1.13	Bearing oil	2.6	2.6
K1.14	A.C. electrical power	2.8	2.9
K1.15	D.C. electrical power	2.6	2.7
K1.16	Component cooling water systems	2.5	2.6
K1.17	Turbine chest warming: EHC-Only	2.4	2.5
K1.18	Turbine shell warming: EHC-Only	2.4	2.5
K1.19	Turbine acceleration	2.6	2.6
K1.20	Turbine speed	2.7	2.7
K1.21	Turbine inlet pressure	2.7	2.7
K1.22	Turbine trip	3.4	3.5
K1.23	Recirculation flow control system: Plant-Specific . .	3.0	3.1
K1.24	Main generator	2.7	2.8
K1.25	Stator water cooling: Plant-Specific	2.8	2.8
K1.26	Main turbine PMG: Plant-Specific	2.4	2.6
K1.27	Condenser vacuum	3.1	3.1
K1.28	Reactor startup	3.2	3.2
K1.29	Reactor heatup	3.4	3.4
K1.30	Reactor cooldown	3.2	3.3
K1.31	Turbine protection	3.1	3.2
K1.32	Turbine monitoring	2.7	2.8
K1.33	FW extraction steam valves	2.4	2.6
K1.34	EGC system: Plant-Specific	2.8	3.3
K1.35	Low pressure stop and control valves: Plant-Specific.	2.4	2.6
K1.36	Primary water system: Plant-Specific	2.1*	2.1*
K1.37	Turbine stress evaluator: Plant-Specific	1.8*	1.8*
K1.38	PCIS/NSSSS: Plant-Specific	2.7	2.8
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2. 01	Pumps	2.1*	2.2*
K2. 02	Controls	2.1*	2.1*
K3.	Knowledge of the effect that a loss or malfunction of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM will have on following: (CFR 41.7 / 45.4)		
K3. 01	Reactor power	4.1	4.1

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.02	Reactor pressure	4.2*	4.3*
K3.03	Reactor water level	3.7	3.8
K3.04	Reactor steam flow	3.8	3.9
K3.05	Main turbine steam flow	3.7	3.7
K3.06	Bypass valves	4.1*	4.1
K3.07	Main stop/throttle valves	3.3	3.3
K3.08	Control/governor valves	3.7	3.7
K3.09	Combined intermediate valves: Plant-Specific	3.2	3.3
K3.10	Front standard trip system	2.9	3.0
K3.11	RPS	3.8	3.8
K3.12	FW extraction steam valves: Plant-Specific	2.4	2.4
K3.13	FW extraction non-return valves	2.3	2.4
K3.14	Component cooling water systems: Plant-Specific	2.3	2.3
K3.15	Turbine chest warming: EHC-Only	2.8	2.8
K3.16	Turbine shell warming: EHC-Only	2.8	2.8
K3.17	Turbine acceleration	2.7	2.8
K3.18	Turbine speed	2.9	2.9
K3.19	Turbine inlet pressure	2.7	2.7
K3.20	Turbine trip	3.3	3.4
K3.21	Recirculation flow control system: Plant-Specific	2.8	2.8
K3.22	Main generator	2.6	2.6
K3.23	Turbine trip testing: Plant-Specific	2.8	2.9
K3.24	Reactor heatup	3.2	3.2
K3.25	Reactor cooldown	3.3	3.3
K3.26	Turbine protection	3.1	3.2
K3.27	Turbine monitoring	2.4	2.6
K3.28	Low pressure stop and control valves: Plant-Specific.	2.5	2.5
K3.29	PCIS/NSSSS	2.9	3.1
K3.30	EGC: Plant-Specific	3.0	3.0
K4.	**Knowledge of REACTOR/TURBINE PRESSURE REGULATING SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Reactor pressure control	3.8	3.8
K4.02	Turbine inlet pressure control	3.3	3.3
K4.03	Turbine speed control	3.0	3.1
K4.04	Turbine acceleration control	2.8	2.8
K4.05	Reactor scram	3.7*	3.8*
K4.06	Turbine trip	3.6	3.7*
K4.07	Generator runback: Plant-Specific	3.2	3.5
K4.08	Feedwater heater isolation: Plant-Specific	2.6	2.9
K4.09	Turbine chest warming: EHC-Only	2.4	2.4
K4.10	Turbine shell warming: EHC-Only	2.5	2.5
K4.11	Load following: Plant-Specific	2.6	2.6
K4.12	Recirculation flow control: Plant-Specific	2.9	2.9

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.13	Turbine trip testing: Plant-Specific	2.9	3.0
K4.14	Reactor/turbine pressure regulating system oil cooling: Plant-Specific	2.2	2.4
K4.15	Automatic pump start	2.6	2.6
K4.16	Reactor cooldown	3.3	3.4
K4.17	Turbine monitoring	2.4	2.6
K4.18	Turbine protection	2.8	2.8
K4.19	Steam bypass valve control	3.6	3.7
K5.	**Knowledge of the operational Implications of the following concepts as they apply to REACTOR/TURBINE PRESSURE REGULATING SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Accumulator operation: Plant-Specific	2.0*	2.1
K5.02	Limit switch operation	2.1*	2.2
K5.03	Reactor power vs. reactor pressure	3.5	3.6
K5.04	Turbine inlet pressure vs. reactor pressure	3.3	3.3
K5.05	Turbine inlet pressure vs. turbine load	2.8	2.9
K5.06	Turbine speed measurement	2.3	2.3
K5.07	Unitized actuator operation: Fermi-Only	2.5	3.0
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	2.8	2.9
K6.02	D.C. electrical power	2.6	2.7
K6.03	Component cooling water systems	2.5	2.5
K6.04	Recirculation flow control system: Plant-Specific . .	3.0	3.0
K6.05	Condenser vacuum	3.4	3.4
K6.06	Reactor pressure	3.8*	3.9
K6.07	Turbine inlet pressure	3.4	3.4
K6 08	Reactor power	3.6	3.7
K6 09	Main turbine steam flow	3.1	3.1
K6.10	Bypass valves	3.6	3.7
K6.11	Main stop/throttle valves	3.4	3.4
K6.12	Control/governor valves	3.3	3.4
K6.13	Combined intermediate valves: Plant-Specific	3.1	3.2
K6.14	Bearing oil	2.7	2.8
K6.15	Turbine speed signal	2.3	2.4
K6.16	Stator water cooling system: Plant-Specific	2.9	3.1
K6.17	Main turbine PMG: Plant-Specific	2.7	2.8
K6.18	Low pressure stop and control valves: Plant-Specific.	2.6	2.7
K6.19	Primary water system: Plant-Specific	2.1*	2.3
K6.20	Main generator	2.8	3.0

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the REACTOR/TURBINE PRESSURE REGULATING SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Reactor pressure	3.9	3.8
A1. 02	Reactor power	4.1*	3.9
A1.03	Reactor water level	3.7	3.7
A1.04	Main turbine inlet pressure	3.1	3.1
A1.OS	Reactor steam flow	3.5	3.6
A1.06	Ma in turbine steam flow	3.2	3.2
A1.07	Bypass valve position	3.8	3.7
A1.08	control/governor valve position	3.3	3.2
A1.09	Main stop throttle valve position	3.3	3.3
A1.10	Combined intermediate valve position: Plant-Specific.	3.3	3.2
A1.11	Reactor/turbine pressure regulating system oil pressure: Plant-Specific	2.7	2.7
A1.12	Reactor/turbine pressure regulating system load set/reference: Plant-Specific	2.9	2.8
A1.13	Main turbine speed	2.7	2.7
A1.14	Pressure setpoint/pressure demand	3.4	3.4
A1.15	Maximum combined flow limit	3.1	3.1
A1.16	Load limit set: Plant-Specific	3.3	3.3
A1.17	Reactor/turbine pressure regulating system oil pump current: Plant-Specific	1.9*	1.9*
A1.18	Reactor/turbine pressure regulating system reservoir oil level: Plant-Specific	2.1*	2.0*
A1.19	Reactor/turbine pressure regulating system reservoir oil temperature: Plant-Specific	2.0*	1.9*
A1.20	Servo valve currents: Plant-Specific	2.2*	2.1*
A1.21	Main condenser vacuum	3.4	3.4
A1.22	Reactor cooldown	3.4	3.3
A1.23	Main turbine vibration	2.8	2.8
A1.24	Main turbine eccentricity	2.6	2.7
A1.25	Main turbine expansion	2.6	2.6
A1.26	Governor valve limit: Plant-Specific	2.4	2.4
A2.	Ability to (a) predict the impacts of the following on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Loss of turbine inlet pressure signal	3.5	3.7
A2.02	High reactor pressure	3.7	3.7

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.03	Failed open/closed bypass valve(s)	4.1*	4.2*
A2.04	Failed open/closed control/governor valve(s)	3.7	3.8
A2.05	Failed open/closed main stop valve(s)	3.8	3.9
A2.06	Low reactor/turbine pressure regulating system oil pressure: Plant-Specific	3.1	3.2
A2.07	Loss of condenser vacuum	3.7	3.6
A2.08	Main turbine overspeed	3.3	3.3
A2.09	Loss of generator load	3.4	3.5
A2.10	Loss of stator water cooling: Plant-Specific	3.1	3.2
A2.11	Loss of A.C. electrical power	3.1	3.1
A2.12	Loss of D.C. electrical power	2.7	2.8
A2.13	Loss of component cooling water systems	2.6	2.7
A2.14	Loss of main turbine PMG: Plant-Specific	2.7	2.7
A2.15	Loss of main turbine speed feedback: Plant-Specific .	2.4	2.4
A2.16	Low turbine inlet pressure (loss of pressure signal) .	3.4	3.4
A2.17	Turbine trip: Plant-Specific	3.8	3.8
A2.18	Generator trip: Plant-Specific	3.5	3.5
A2.19	Reactor scram	3.8	3.8
A2.20	Low reactor/turbine pressure regulating system oil level: Plant-Specific	2.5	2.6
A2.21	Reactor/turbine pressure regulating system pump trip: Plant-Specific	2.7	2.8
A2.22	Turbine high vibration	2.8	2.9
A2.23	Turbine high eccentricity	2.6	2.6
A2.24	Turbine high differential expansion	2.4	2.5
A2.25	Loss of primary water system: Plant-Specific	2.1	2.3
A3.	**Ability to monitor automatic operations of the REACTOR/TURBINE PRESSURE REGULATING SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Turbine speed control: Plant-Specific	2.8	2.7
A3.02	Turbine acceleration control: Plant-Specific	2.6	2.6
A3.03	Turbine inlet pressure control	2.8	2.7
A3.04	Reactor/turbine pressure regulating system pump start: Plant-Specific	2.5	2.5
A3.05	Reactor/turbine pressure regulating system low pressure turbine trip: Plant-Specific	2.9	2.8
A3.06	Reactor/turbine pressure regulating system low pressure reactor scram: Plant-Specific	3.3	3.3
A3.07	Reactor/turbine pressure regulating system oil temperature control: Plant-Specific	2.3	2.3
A3.08	Steam bypass valve operation	3.8	3.8
A3.09	Control/governor valve operation	3.3	3.2
A3.10	Main stop/throttle valve operation	3.3	3.3
A3.11	Combined intermediate valve operation: Plant-Specific	3.3	3.1
A3.12	Turbine trip testing	2.9	2.9

SYSTEM: 241000 Reactor/Turbine Pressure Regulating System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A3.13	FW heater isolation: Plant-Specific	2.7	2.8
A3.14	Grid load following: Plant-Specific	2.6	2.7
A3.15	Recirculation pump flow control: Plant-Specific . . .	2.8	2.9
A3.16	Lights and alarms	3.0	2.9
A3.17	Turbine runback	3.3	3.4
A3.13	Turbine startup: Plant-Specific	3.0	3.0
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Reactor power	3.9	4.0
A4.03	Reactor water level	3.8*	3.9*
A4.04	Reactor steam flow	3.6	3.7
A4.05	Main turbine steam flow	3.3	3.3
A4.06	Bypass valves (operation)	3.9	3.9
A4.07	Main stop/throttle valves (operation)	3.5	3.4
A4.08	Control/governor valves (operation)	3.5	3.4
A4.09	Combined intermediate valves (operation): Plant-Specific	3.2	3.1
A4.10	Reactor/turbine pressure regulating system pumps: Plant-Specific	2.9	2.9
A4.11	Turbine speed	3.1	3.1
A4.12	Turbine acceleration	3.0	3.0
A4.13	Turbine inlet pressure	2.9	2.9
A4.14	Turbine trip	3.8	3.7
A4.15	Generator load	3.2	3.2
A4.16	Lights and alarms	3.3	3.2
A4.17	Turbine chest warming: Plant-Specific	2.9	2.8
A4.18	Turbine shell warming: Plant-Specific	2.9	2.8
A4.19	Turbine panel controls	3.5	3.4

SYSTEM: 239002 Relief/Safety Valves

TASK: Place the automatic pressure relief valves in service

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RELIEF/SAFETY VALVES and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Nuclear boiler	3.8	3.9
K1.02	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5*	2.9
K1.03	Nuclear boiler instrument system	3.5	3,6
K1.04	Main steam	3.6	3.7
K1.05	Plant air systems: Plant-Specific	3.1	3.3
K1.06	Drywell instrument air/ drywell pneumatics: Plant-Specific	3.4	3.6
K1.07	Suppression pool	3.6	3.8
K1.08	Automatic depressurization system	4.0*	4.1
K1.09	Drywell pressure (for safety valves which discharge to the drywell airspace): Plant-Specific	4.0	4.0
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	SRV solenoids	2.8*	3.2*
K3.	**Knowledge of the effect that a loss or malfunction of the RELIEF/SAFETY VALVES will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor pressure control	3.9	4.0
K3.02	Reactor over pressurization	4.2*	4.4
K3.03	Ability to rapidly depressurize the reactor	4.3*	4.4
K4.	**Knowledge of RELIEF/SAFETY VALVES design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Insures that only one or two safety/relief valves reopen following the initial portion of a reactor isolation event (LLS logic): Plant-Specific	3.9	4.0
K4.02	Minimizes containment fatigue duty cycles resulting from relief valve cycling during decay-heat-dominant period late in an isolation transient (LLS logic): Plant-Specific	3.4	3.6
K4.03	Prevents siphoning of water into SRV discharge piping and limits loads on subsequent actuation of SRV's . .	3.1	3.3
K4.04	Ensures even distribution of heat load to suppression pool, and adequate steam condensing	3.4	3.6

SYSTEM: 239002 Relief/Safety Valves

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.05	Allows for SRV operation from more than one location: Plant-Specific	3.6	3.7
K4.06	Detection of valve leakage	3.5	3.7
K4.07	Minimum steam pressure required to keep SRV open or to open SRV	3.1	3.2
K4.08	Opening of the SRV from either an electrical or mechanical signal .,	3.6	3.7
K4.09	Manual opening of the SRV	3.7	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to RELIEF/SAFETY VALVES :** (CFR 41.5 / 45.3)		
K5.01	Relief function of SRV operation	3.4	3.5
K5.02	Safety function of SRV operation	3.7	3.8
K5.03	Acoustical monitoring: Plant-Specific	3.7	3.8
K5.04	Tail pipe temperature monitoring	3.3	3.5
K5.05	Discharge line quencher operation	2.6	2.9
K5.06	Vacuum breaker operation	2.7	3.0
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RELIEF/SAFETY VALVES :** (CFR 41.7 / 45.7)		
K6.01	Nuclear boiler instrument system (pressure indication)	3.2	3.4
K6.02	Air (Nitrogen) supply: Plant-Specific	3.4	3.5
K6.03	A.C. power: Plant-Specific	2.7*	2.9*
K6.04	D.C. power: Plant-Specific	3.0	3.2
K6.05	Discharge line vacuum breaker	3.0	3.2
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RELIEF/SAFETY VALVES controls including:** (CFR 41.5 / 45.5)		
A1.01	Tail pipe temperature	3.3	3.4
A1.02	Acoustical monitor noise: Plant-Specific	3.7	3.8
A1.03	Air supply: Plant-Specific	2.8	2.9
A1.04	Reactor pressure	3.8	3.8
A1.05	Reactor water level	3.7	3.8
A1.06	Reactor power	3.7	3.8
A1.07	Turbine load	2.9	3.0
A1.08	Suppression pool water temperature	3.8	4.1
A1.09	Indicated vs. actual steam flow: Plant-Specific	3.1	3.3

SYSTEM: 239002 Relief/Safety Valves

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.	Ability to (a) predict the impacts of the following on the RELIEF/SAFETY VALVES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Stuck open vacuum breakers	3.0	3.3
A2.02	Leaky SRV	3.1	3.2
A2.03	Stuck open SRV	4.1	4.2*
A2.04	ADS actuation	4.1*	4.2*
A2.05	Low reactor pressure	3.2	3.4
A2.06	Reactor high pressure	4.1	4.3*
A3.	Ability to monitor automatic operations of the RELIEF/SAFETY VALVES including: (CFR 41.7 / 45.7)		
A3.01	SRV operation after ADS actuation	3.8*	3.9*
A3.02	SRV operation on high reactor pressure	4.3*	4.3*
A3.03	Tail pipe temperatures	3.6	3.6
A3.04	Acoustical monitor noise: Plant-Specific	3.6	3.7
A3.05	Suppression pool temperature	4.1*	4.2*
A3.06	Reactor pressure	4.1*	4.1*
A3.07	Reactor water level	3.8	3.9
A3.08	Lights and alarms	3.6	3.6
A3.09	Low low set logic: Plant-Specific	3.9	3.9
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	SRV's	4.4*	4.4*
A4.02	Tail pipe temperatures	3.6	3.7
A4.03	Acoustical monitor noise: Plant-Specific	3.8	3.9
A4.04	Suppression pool temperature	4.3*	4.3*
A4.05	Reactor pressure	4.3*	4.3*
A4.06	Reactor water level	3.9	4.1
A4.07	Lights and alarms	3.6	3.6
A4.08	Plant air system pressure: Plant-Specific	3.2	3.2

3.4 Heat Removal from Reactor Core

206000	High Pressure Coolant Injection System
209002	High Pressure Core Spray System
207000	Isolation (Emergency) Condenser
209001	Low Pressure Core Spray System
239001	Main and Reheat Steam System
245000	Main Turbine Generator and Auxiliary Systems
217000	Reactor Core Isolation Cooling System
202001	Recirculation System
203000	Residual Heat Removal /Low Pressure Coolant Injection: Injection Mode
205000	Shutdown Cooling System (RHR Shutdown Cooling Mode)

SYSTEM: 206000 High Pressure Coolant Injection System

TASK: Place the high pressure (Feedwater) coolant injection system (FWCI) in standby readiness
Monitor the high pressure (feedwater) coolant injection system operation
Return the high pressure (feedwater) coolant injection system to standby readiness after automatic initiation
Perform lineups of the high pressure coolant injection system (write in)
Manually initiate high pressure coolant injection
Perform high pressure coolant injection (HPCI) simulated automatic actuation test
Perform high pressure (feedwater) coolant injection flow rate test
Perform high pressure (feedwater) coolant injection (HPCI) pump operability test
Perform high pressure (feedwater) coolant injection motor operated valve operability test
Perform HPCI subsystem logic system functional test
Perform HPCI subsystem automatic isolation logic system functional test
Perform HPCI system inoperable test
Perform HPCI turbine overspeed test
Perform high pressure (feedwater) coolant injection operability test when reactor core isolation cooling is inoperable

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel: BWR-2,3,4	3.8	3.9
K1 02	Reactor water level: BWR-2,3,4	4.0	4.1
K1 03	Reactor pressure: BWR-2,3,4	3.8	3.8
K1.04	Reactor feedwater system: BWR-2,3,4	3.6	3.6
K1 05	Condensate storage system: BWR-2,3,4	3.7	3.7
K1 06	Suppression chamber: BWR-2,3,4	3.7	3.7
K1.07	D.C. power: BWR-2,3,4	3.7*	3.8
K1 08	A.C. power: BWR-2,3,4	3.0*	3.1
K1 09	ECCS keep fill system: BWR-2,3,4(P-Spec)	4.0*	4.0
K1.10	Condensate storage and transfer system: BWR-2,3,4	3.4	3.4
K1.11	PCIS: BWR-2,3,4	3.5	3.5
K1 12	Nuclear boiler instrumentation: BWR-2,3,4	3.4	3.4
K1 13	Main condenser: BWR-2,3,4(P-Spec)	2.8*	2.9
K1.14	SBGT: BWR-2,3,4(P-Spec)	2.9	3.1
K1 15	Plant air systems: BWR-2,3,4	2.3*	2.3
K1 16	Containment/Torus pressure: BWR-2,3,4	3.5	3.5

SYSTEM: 206000 High Pressure Coolant Injection System

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	System valves: BWR-2,3,4	3.2*	3.3*
K2.02	System pumps: BWR-2,3,4	2.8*	3.1*
K2.03	Initiation logic: BWR-2,3,4	2.8*	2.9*
K2.04	Turbine control circuits: BWR-2,3,4	2.5*	2.7*
K3.	**Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE COOLANT INJECTION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level control: BWR-2,3,4	4.0	4.0
K3.02	Reactor pressure control: BWR-2,3,4	3.8*	3.8*
K3.03	Suppression pool level control: BWR-2,3,4	3.4*	3.5*
K4.	**Knowledge of HIGH PRESSURE COOLANT INJECTION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Turbine trips: BWR-2,3,4	3.8	3.9
K4.02	System isolation: BWR-2,3,4	3.9	4.0
K4.03	Resetting turbine trips: BWR-2,3,4	4.2	4.1
K4.04	Resetting system isolations: BWR-2,3,4	4.0	3.9
K4.05	Preventing water hammer in turbine exhaust line (procedural control): BWR-2,3,4	3.1	3.4
K4.06	Preventing water hammer in pump discharge line (procedural control): BWR-2, 3, 4	3.2	3.4
K4.07	Automatic system initiation: BWR-2,3,4	4.3*	4.3
K4.08	Manual system initiation: BWR-2,3,4	4.2*	4.3
K4.09	Automatic flow control: BWR-2,3,4	3.8	3.9
K4.10	Surveillance for all operable components: BWR-2,3,4	3.7	3.8
K4.11	Turbine speed control: BWR-2,3,4	3.4	3.5
K4.12	Condensation of shaft sealing steam: BWR-2,3,4	2.9	3.0
K4.13	Turbine and pump lubrication: BWR-2,3,4	3.0	3.1
K4.14	Control oil to turbine speed controls: BWR-2,3,4	3.4	3.4
K4.15	Low speed turning of the turbine rotor: BWR-2,3,4(P-Spec)	3.2	3.2
K4.16	Minimizing fission product concentration in the condensate storage tank (valve closures on system initiation): BWR-2,3,4(P-Spec)	3.1	3.3
K4.17	Protection against draining the condensate storage tank to the suppression pool: BWR-2,3,4	3.4	3.4
K4.18	Pump minimum flow: BWR-2,3,4	3.2	3.3
K4.19	Automatic transfer of HPCI pump suction: BWR-2,3,4	3.7	3.8

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K5.	Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE COOLANT INJECTION SYSTEM : (CFR 41.5 / 45.3)		
K5.01	Turbine operation: BWR-2,3,4	3.3	3.4
K5.02	Turbine shaft sealing: BWR-2,3,4	2.8	2.9
K5.03	GEMAC controllers: BWR-2,3,4(P-Spec)	3.1	3.1
K5.04	Indications of pump cavitation: BWR-2,3,4	2.6*	2.7
K5.05	Turbine speed control: BWR-2,3,4	3.3	3.3
K5.06	Turbine speed measurement: BWR-2,3,4	2.6*	2.6
K5.07	System venting: BWR-2,3,4	2.8	2.8
K5.08	Vacuum breaker operation: BWR-2,3,4	3.0	3.2
K5.09	Testable check valve operation: BWR-2,3,4	2.7*	2.8
K5.10	Assist core cooling: BWR-2,3,4	3.5	3.5
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE COOLANT INJECTION SYSTEM : (CFR 41.7 / 45.7)		
K6.01	Plant air systems: BWR-2,3,4	2.3*	2.3
K6.02	D.C. power: BWR-2,3,4	3.3	3.7
K6.03	A.C. power: BWR-2,3,4	2.9	3.1
K6.04	Condensate storage tank level: BWR-2,3,4	3.5	3.7
K6.05	Suppression pool level: BWR-2,3,4	3.5	3.7
K6.06	SBGTS: BWR-2,3,4(P-Spec)	3.1	3.2
K6.07	ECCS keep fill system: BWR-2,3,4(P-Spec)	3.4	3.4
K6.08	Reactor pressure: BWR-2,3,4	3.8	3.8
K6.09	Condensate storage and transfer system: BWR-2,3,4	3.5	3.5
K6.10	PCIS: BWR-2,3,4	3.8	4.0
K6.11	Nuclear boiler instrumentation: BWR-2,3,4	3.6	3.7
K6.12	Reactor water level: BWR-2,3,4	4.2*	4.3
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Reactor water level: BWR-2,3,4	4.3*	4.4
A1.02	Reactor pressure: BWR-2,3,4	4.2*	4.2
A1.03	Condensate storage tank level: BWR-2,3,4	3.5	3.6
A1.04	Suppression pool level: BWR-2,3,4	3.7	3.8
A1.05	Suppression pool temperature: BWR-2,3,4	4.1	4.2
A1.06	System flow: BWR-2,3,4	3.8	3.7
A1.07	System discharge pressure: BWR-2,3,4	3.7	3.6
A1.08	System lineup: BWR-2,3,4	4.1*	4.0

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.09	Turbine speed: BWR-2,3,4	3.5	3.4
A2.	**Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Turbine trips: BWR-2,3,4	4.0	4.0
A2.02	Valve closures: BWR-2,3,4	3.5	3.5
A2.03	Valve openings: BWR-2,3,4	3.5	3.5
A2.04	A.C. failures: BWR-2,3,4	2.7*	3.0*
A2.05	D.C. failures: BWR-2,3,4	3.5	3.8*
A2.06	Inadequate system flow: BWR-2,3,4	3.3	3.5
A2.07	Low suppression pool level: BWR-2,3,4	3.4	3.6
A2.08	†High suppression pool temperature: BWR-2,3,4	3.9	4.2
A2.09	†Low condensate storage tank level: BWR-2,3,4	3.5	3.7
A2.10	System isolation: BWR-2,3,4	4.0	4.1
A2.11	Low reactor water level: BWR-2,3,4	4.1	4.2
A2.12	Loss of room cooling: BWR-2,3,4	3.4	3.5
A2.13	Loss of applicable plant air systems: BWR-2,3,4	2.4*	2.4*
A2.14	Flow controller failure: BWR-2,3,4	3.3	3.4
A2.15	Loss of control oil pressure: BWR-2,3,4	3.4	3.5
A2.16	High drywell pressure: BWR-2,3,4	4.0	4.1
A2.17	†HPCI inadvertent initiation: BWR-2,3,4	3.9	4.3*
A3.	**Ability to monitor automatic operations of the HIGH PRESSURE COOLANT INJECTION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Turbine speed: BWR-2,3,4	3.6	3.5
A3.02	System Flow: BWR-2,3,4	3.8	3.8
A3.03	System lineup: BWR-2,3,4	3.9	3.8
A3.04	Reactor pressure: BWR-2,3,4	4.2*	4.1
A3.05	Reactor water level: BWR-2,3,4	4.3*	4.3
A3.06	System discharge pressure: BWR-2,3,4	3.8	3.8
A3.07	Lights and alarms: BWR-2,3,4	3.9	3.8
A3.08	Condensate storage tank level: BWR-2,3,4	3.7	3.6
A3.09	Response to system isolation: BWR-2,3,4	4.2*	4.1
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Turbine speed controls: BWR-2,3,4	3.8	3.7
A4.02	Flow controller: BWR-2,3,4	4.0*	3.8
A4.03	Turbine temperatures: BWR-2,3,4	3.1	3.0
A4.04	Major system valves: BWR-2,3.4	3.7	3.7

SYSTEM: 206000 High Pressure Coolant Injection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.05	Reactor water level: BWR-2,3,4	4.4*	4.4*
A4.06	Reactor pressure: BWR-2,3,4	4.3*	4.3*
A4.07	Condensate storage tank level: BWR-2,3,4	3.5	3.5
A4.08	Suppression pool temperature: BWR-2,3,4	4.1*	4.1
A4.09	Suppression pool level: BWR-2,3,4	3.8	3.7
A4.10	System pumps: BWR-2,3,4	3.7	3.5
A4.11	Turning gear: BWR-2,3,4(P-Spec)	3.0	3.0
A4.12	Turbine trip controls: BWR-2,3,4	4.0	3.9
A4.13	Turbine reset control: BWR-2,3,4	4.1*	4.0
A4.14	System auto start control: BWR-2,3,4(P-Spec)	4.2*	4.1

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

TASK: Perform lineups on the core spray system
Place core spray (CS) system in standby readiness
Monitor automatic operation of core spray system
Shutdown core spray cooling system
Perform core spray simulated automatic actuation test
Perform core spray pump operability test
Perform core spray system inop test
Conduct core spray - cold shutdown valve testing

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate transfer and storage system: BWR-5,6 . . .	3.4	3.4
K1.02	Suppression Pool: BWR-5,6	3.5	3.5
K1.03	Water leg (jockey) pump: BWR-5,6	3.0	3.0
K1.04	HPCS diesel generator: BWR-5,6	3.8	3.8
K1.05	Standby liquid control system: Plant-Specific	2.8	2.8
K1.05	Suppression pool cleanup system: BWR-5,6	2.0*	2.0
K1.07	ECCS room coolers: BWR-5,6	2.4	2.4
K1.08	Component cooling water systems: BWR-5,6	2.4	2.6
K1.09	Leak detection: BWR-5,6	2.5	2.5
K1.10	Suppression pool suction strainers: BWR-5,6	2.1*	2.1
K1.11	Adequate core cooling: BWR-5,6	3.8	4.0
K1.12	Reactor vessel: BWR-5,6	3.4	3.6
K1.13	Instrument nitrogen: BWR-5,6	2.7	2.7
K1.14	Plant air systems: BWR-5,6	2.6	2.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pump electrical power: BWR-5,6	3.2	3.3
K2.02	Valve electrical power: BWR-5,6	2.8	2.9
K2.03	Initiation logic: BWR-5,6	2.8	2.9
K3.	**Knowledge of the effect that a loss or malfunction of the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level: BWR-5,6	3.9	3.9
K3.02	Standby liquid control system: Plant-Specific	3.3	3.3
K3.03	Adequate core cooling: BWR-5,6	3.9	4.1

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.	Knowledge of HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Prevents water hammer: BWR-5,6	2.9	3.0
K4.02	Prevents over filling reactor vessel: Plant-Specific.	3.4	3.5
K4.03	Prevents pump over heating: BWR-5,6	2.3*	2.4
K4.04	Testable check valve operation: BWR-5,6	2.3*	2.3*
K4.05	Motor operated valve operation: BWR-5,6	2.4	2.4
K4.06	Centrifugal pump operation: BWR-5,6	2.3*	2.4*
K4.07	Override of reactor water level interlock: Plant-Specific	3.5	3.7
K5.	Knowledge of the operational implications of the following concepts as they apply to HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation: BWR-5,6	2.5	2.8
K5.02	Heat removal (transfer) mechanism: BWR-5,6	2.6	2.7
K5.03	System venting: BWR-5,6	2.4	2.4
K5.04	Adequate core cooling: BWR-5,6	3.8	4.0
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS): (CFR 41.7 / 45.7)		
K6.01	Electrical power: BWR-5,6	3.6	2.6
K6.02	Condensate storage tank water level: BWR-5,6	3.4	3.4
K6.03	Component cooling water systems: BWR-5,6	2.5	2.6
K6.04	Suppression pool suction strainer: BWR-5,6	2.5	2.5
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) controls including: (CFR 41.5 / 45.5)		
A1.01	HPCS flow: BWR-5,6	3.6	3.7
A1.02	HPCS pressure: BWR-5,6	3.4	3.6
A1.03	Reactor water level: BWR-5,6	3.7	3.7
A1.04	Reactor pressure: BWR-5,6	3.3	3.3
A1.05	Suppression pool water level: BWR-5,6	3.3	3.4
A1.06	Motor amps: BWR-5,6	1.9*	2.3*
A1.07	Diesel loading: BWR-5,6	2.5*	2.8
A1.08	System lineup: BWR-5,6	3.1	3.3
A1.09	Condensate storage tank level: BWR-5,6	2.6	2.8

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.	**Ability to (a) predict the impacts of the following on the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	System initiation: BWR-5,6	3.8	3.8
A2.02	Pump trips: BWR-5,6	3.6	3.7
A2.03	Valve closures: BWR-5,6	3.2	3.4
A2.04	A.C. electrical failure: BWR-5,6	3.1	3.2
A2.05	D.C. electrical failure: BWR-5,6	2.8	2.9
A2.06	Core spray line break: BWR-5,6	3.4	3.6
A2.07	Pump seal failure: BWR-5,6	2.6	3.0
A2.08	Inadequate system flow: BWR-5,6	3.1	3.2
A2.09	Loss of room cooling: BWR-5,6	2.4	2.6
A2.10	Valve openings: BWR-5,6	2.7	3.0
A2.11	Low suppression pool level: BWR-5,6	3.3	3.5
A2.12	High suppression pool level BWR-5,6	3.3	3.5
A2.13	Low condensate storage tank level BWR-5,6	3.4	3.5
A2.14	High suppression pool temperature: BWR-5,6	3.0	3.3
A2.15	Clogged suppression pool suction strainers: BWR-5,6.	2.4	2.6
A3.	**Ability to monitor automatic operations of the HIGH PRESSURE CORE SPRAY SYSTEM (HPCS) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation: BWR-5,6	3.3	3.3
A3.02	Pump start: BWR-5,6	3.8	3.8
A3.03	System pressure: BWR-5,6	3.6	3.6
A3.04	System flow: BWR-5,6	3.7	3.7
A3.05	Reactor water level BWR-5,6	3.7	3.7
A3.06	Lights and alarms: BWR-5,6	2.8	2.8
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	HPCS pump: BWR-5,6	3.7	3.7
A4.02	Suction valves: BWR-5,6	3.6	3.6
A4.03	Injection valve: BWR-5,6	3.8	3.8
A4.04	Minimum flow valve: BWR-5,6	3.1	3.1
A4.05	Manual Initiation controls: BWR-5,6	3.8	3.8
A4.06	Testable check valve: BWR-5,6.	2.6	2.6
A4.07	Line fill pump: BWR-5,6	2.8	2.8
A4.08	Reactor water level: BWR-5,6	3.6	3.7
A4.09	Suppression pool level: BWR-5,6	3.4	3.5
A4.10	Reactor pressure: BWR-5,6	3.3	3.3
A4.11	System flow: BWR-5,6	3.8	3.8

SYSTEM: 209002 High Pressure Core Spray System (HPCS)

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A4.12	System pressure: BWR-5,6	3.4	3.4
A4.13	Lights and alarms: BWR-5,6	2.6	2.6
A4.14	Test return valve: BWR-5,6	3.0	3.0
A4.15	Initiation reset: BWR-5,6	3.6	3.6

SYSTEM: 207000 Isolation (Emergency) Condenser

TASK: Perform lineups on the isolation condenser system
Fill and add makeup to the isolation condenser system
Place the isolation condenser (Iso-Cond) in standby
Place the isolation condenser system in service from a standby readiness condition
Remove the isolation condenser system from service

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between ISOLATION (EMERGENCY) CONDENSER and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel: BWR-2,3	3.8	4.0
K1.02	Reactor pressure: BWR-2,3	4.0	4.2
K1.03	Reactor water level: BWR-2,3	3.7	3.8
K1.04	Condensate transfer system: BWR-2,3	3.5	3.8
K1.05	Demineralized water system: BWR-2,3(P-Spec)	3.4	3.6
K1.06	Fire protection/service water: BWR-2,3	3.3*	3.7
K1.07	LPCI: BWR-2,3(P-Spec)	3.0*	3.3*
K1.08	Recirculation system: BWR-2,3	3.0	3.2
K1.09	Main steam system: BWR-2,3.	3.0	3.2
K1.10	Plant air systems: BWR-2,3	3.0*	3.2
K1.11	Primary containment isolation system: BWR-2,3	3.4	3.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Motor operated valves: BWR-2,3	3.6	3.8
K2.02	Initiation logic: BWR-2,3	3.5	3.7
K3.	**Knowledge of the effect that a loss or malfunction of the ISOLATION (EMERGENCY) CONDENSER will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor pressure control during conditions in which the reactor vessel is isolated: BWR-2,3	4.2*	4.3*
K3.02	†Reactor water level (EPG's address the isolation condenser as a water source): BWR-2,3	3.8*	4.0*
K4.	**Knowledge of ISOLATION (EMERGENCY) CONDENSER design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Isolation of the system in the event of a line break: BWR-2,3	4.3*	4.5*
K4.02	Automatic initiation: BWR-2,3	4.2*	4.2

SYSTEM: 207000 Isolation (Emergency) Condenser

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.03	Filling of the system: BWR-2,3	3.3	3.5
K4.04	Steam and condensate flow indication: BWR-2,3	3.2	3.4
K4.05	Detection of a tube bundle leak: BWR-2,3	4.0*	4.2
K4.06	Throttling of system flow: BWR-2,3	3.8*	4.0
K4.07	Manual operation of the system: BWR-2,3	3.8*	4.0
K4.08	Protection against incomplete steam condensation (condensate outlet valve does not fully open): BWR-2,3,(P-Spec)	3.4	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to ISOLATION (EMERGENCY) CONDENSER :** (CFR 41.5 / 45.3)		
K5.01	Flow measurement across an elbow using differential pressure: BWR-2,3	2.6*	3.0*
K5.02	Heat exchanger operation: BWR-2,3	3.0	3.3
K5.03	Heat transfer: BWR-2,3	2.7	3.0
K5.04	Latent heat of vaporization: BWR-2,3	2.3*	2.7*
K5.05	Saturated steam: BWR-2,3	2.5*	2.7
K5.06	Saturated liquid: BWR-2,3	2.5*	2.7
K5.07	Temperature sensing: BWR-2,3	2.7*	2.8
K5.08	Level indicator operation: BWR-2,3	2.8*	3.0
K5.09	Cooldown rate: BWR-2,3	3.7	4.0
K5.10	System venting: BWR-2,3	3.0	3.2
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the ISOLATION (EMERGENCY) CONDENSER :** (CFR 41.7 / 45.7)		
K6.01	Demineralized water system: BWR-2,3(P-Spec)	3.3	3.7
K6.02	Fire protection/service water system: BWR-2,3	3.5	3.7
K6.03	Condensate transfer system: BWR-2,3	3.5	3.8
K6.04	Plant air systems: BWR-2,3	3.2*	3.3*
K6.05	Primary containment isolation system: BWR-2,3	3.6	3.8
K6.06	Recirculation system: BWR-2,3	3.0	3.2
K6.07	A.C. power: BWR-2,3	3.0*	3.2
K6.08	D.C. power: BWR-2,3	3.5	3.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ISOLATION (EMERGENCY) CONDENSER controls including:** (CFR 41.5 / 45.5)		
A1.01	Isolation condenser level: BWR-2,3	3.7	3.8
A1.02	Shell side water temperature: BWR-2,3	3.2	3.4

SYSTEM: 207000 Isolation (Emergency) Condenser

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A1.03	Steam flow: BWR-2,3	3.3*	3-5
A1.04	Condensate flow: BWR-2,3(P-Spec)	3.3	3.5
A1.05	Reactor pressure: BWR-2,3	4.0*	4.2
A1.06	Reactor water level: BWR-2,3	3.5	3.7
A1.07	Vent radiation level: BWR-2,3	3.5	3.7
A1.08	Cooldown rate: BWR-2,3	3.7	4.0
A1.09	Valve operations: BWR-2,3	3.7	3.7
A1.10	Primary side temperature: BWR-2,3	3.2	3.4
A2.	**Ability to (a) predict the impacts of the following on the ISOLATION (EMERGENCY) CONDENSER ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Tube bundle leak: BWR-2,3	4.2*	4.5
A2.02	†High vent radiation: BWR-2,3	4.3*	4.7
A2.03	PCIS signal resulting in system isolation: BWR-2,3	3.8*	4.0
A2.04	Inadequate system flow: BWR-2,3	3.8	4.0
A2.05	Insufficient shell side makeup flow: BWR-2,3	4.0	4.0
A2.06	Valve openings: BWR-2,3	3.3	3.3
A2.07	Valve closures: BWR-2,3	3.5	3.5
A2.08	System initiation: BWR-2,3	3.8*	3.8
A3.	**Ability to monitor automatic operations of the ISOLATION (EMERGENCY) CONDENSER including:** (CFR 41.7 / 45.7)		
A3.01	Isolation condenser level: BWR-2,3	3.5	3.7
A3.02	Reactor pressure: BWR-2,3	3.8	4.0
A3.03	Reactor water level: BWR-2,3	3.5	3.7
A3.04	Vent radiation levels: BWR-2,3	4.0*	4.2
A3.05	System lineup: BWR-2,3	3.6	3.8
A3.06	Lights and alarms: BWR-2,3	3.3	3.3
A3.07	Primary and shell side temperatures: BWR-2,3	3.2	3.3
A3.08	System flow: BWR-2,3	3.2	3.4
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Isolation condenser level: BWR-2,3	3.7	3.8
A4.02	Steam line pressure: BWR-2,3	3.2	3.3
A4.03	Primary and shell side temperatures: BWR-2,3	3.0	3.2
A4.04	Vent line radiation levels: BWR-2,3	3.8*	4.0
A4.05	Major system valves: BWR-2,3	3.5	3.7
A4.06	Shell side makeup valves: BWR-2,3	3.8*	4.0
A4.07	Manually initiate the isolation condenser: BWR-2,3	4.2*	4.3

SYSTEM: 209001 Low Pressure Core Spray System

TASK: Fill the core spray systems
Perform lineups on the core spray systems
Place the core spray system in standby readiness
Monitor automatic operation of the core spray system
Shutdown the core spray cooling system
Fill the reactor cavity from the condensate storage tank with the core spray system
Perform core spray pump flow rate test
Perform core spray simulated automatic actuation test
Perform core spray pump operability test
Perform core spray subsys and low pressure coolant injection subsys discharge piping ventilation
Perform core spray system inop test
Conduct core spray motor operated valve operability test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between LOW PRESSURE CORE SPRAY SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage tank: Plant-Specific	3.1	3.1
K1.02	Torus/suppression pool	3.4	3.4
K1.03	Keep fill system	2.9	3.0
K1.04	condensate transfer system	2.3	2.4
K1.05	Automatic depressurization system	3.7	3.7
K1.06	Plant air systems	2.0*	2.1*
K1.07	D.C. electrical power	2.5	2.7
K1.08	A.C. electrical power	3.2	3.3
K1.09	Nuclear boiler instrumentation	3.2	3.4
K1.10	Emergency generator	3.7	3.8
K1.11	Drywell coolers: Plant-Specific	2.4	2.6
K1.12	ECCS room coolers	2.9	3.1
K1.13	Leak detection	2.8	3.0
K1.14	Reactor vessel	3.7	3.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pump power	3.0*	3.1*
K2.02	Valve power	2.5*	2.7*
K2.03	Initiation logic	2.9*	3.1*

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.	**Knowledge of the effect that a loss or malfunction of the LOW PRESSURE CORE SPRAY SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3 01	Reactor water level	3.8	3.9
K3.02	ADS logic	3.8	3.9
K3.03	Emergency generators	2.9	3.0
K3.04	Component cooling water systems	2.1*	2.2
K3.05	Drywell cooling: Plant-Specific	2.3	2.7
K4.	**Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Prevention of overpressurization of core spray piping	3.2	3.4
K4.02	Prevents water hammer	3.0	3.2
K4.03	Motor cooling	2.4	2.5
K4.04	Line break detection	3.0	3.2
K4.05	Pump minimum flow	2.6	2.6
K4.06	Adequate pump net positive suction head	2.6	2.9
K4.07	Pump operability testing	2.8	3.0
K4.08	Automatic system initiation	3.8	4.0
K4.09	Load sequencing	3.3	3.5
K4.10	Testability of all operable components	2.8	2.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to LOW PRESSURE CORE SPRAY SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.6	2.7
K5.02	Differential pressure indication	2.4	2.6
K5.03	Testable check valve operation	2.3	2.4
K5.04	Heat removal (transfer) mechanisms	2.8	2.9
K5.05	System venting	2.5	2.5
K5.06	Recirculation operation: Plant-Specific(BWR-1)	3.7	4.0
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. power	3.4	3.4
K6.02	Emergency generators	3.8	3.9
K6.03	Torus/suppression pool water level	3.3	3.4
K6.04	D.C. power	2.8	2.9
K6.05	ECCS room cooler(s)	2.8	2.9
K6.06	Pump motor cooler(s)	2.4	2.4

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.07	Pump seal cooler(s)	2.3	2.3
K6.08	Keep fill system	2.9	3.0
K6.09	Fire protection: BWR-1	3.0*	3.3
K6.10	ECCS room integrity: Plant-Specific	2.3	2.5
K6.11	ADS	3.6	3.7
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the LOW PRESSURE CORE SPRAY SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Core spray flow	3.4	3.6
A1.02	Core spray pressure	3.2	3.4
A1.03	Reactor water level	3.8	3.9
A1.04	Reactor pressure	3.7	3.7
A1.05	Torus/suppression pool water level	3.5	3.6
A1.06	Motor amps	2.3*	2.4
A1.07	Emergency generator loading	3.0	3.1
A1.08	System lineup	3.3	3.2
A2.	Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Pump trips	3.4	3.4
A2.02	Valve closures	3.2	3.2
A2.03	A.C. failures	3.4	3.6
A2.04	D.C. failures	2.9	3.0
A2.05	Core spray line break	3.3	3.6
A2.06	Inadequate system flow	3.2	3.2
A2.07	Loss of room cooling	2.6	2.8
A2.08	Valve openings	3.1	3.1
A2.09	Low suppression pool level	3.1	3.3
A2.10	†High suppression pool temperature	3.1	3.4
A2.11	†Loss of fire protection: BWR-1	2.8*	3.3
A3.	Ability to monitor automatic operations of the LOW PRESSURE CORE SPRAY SYSTEM including: (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.6	3.6
A3.02	Pump start	3.8	3.7
A3.03	System pressure	3.5	3.5
A3.04	System flow	3.7	3.6
A3.05	Reactor water level	3.9	3.9
A3.06	Lights and alarms	3.6	3.5

SYSTEM: 209001 Low Pressure Core Spray System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Core spray pump	3.8	3.6
A4.02	Suction valves	3.5	3.4
A4.03	Injection valves	3.7	3.6
A4.04	Minimal flow valves	2.9	2.9
A4.05	Manual initiation controls	3.8	3.6
A4.06	Testable check valves	2.4	2.4
A4.07	Fill pump	2.7	2.8
A4.08	Reactor water level	3.9	3.9
A4.09	Suppression pool level	3.6	3.5
A4.10	Reactor pressure	3.9	3.8
A4.11	System flow	3.7	3.6
A4.12	System pressure	3.6	3.5
A4.13	Lights and alarms	3.4	3.4
A4.14	Containment level: BWR-1	3.6	3.6

SYSTEM: 239001 Main and Reheat Steam System

TASK: Perform lineups on the main steam system
Startup the main steam system (cold)
Operate the main steam isolation valves
Place the automatic pressure relief valves in service
Monitor the main steam system
Perform main steam isolation valve (MSIV) fast closure test (MSIV operability testing)
Perform main steam line high radiation functional test perform MSIV's, steam line drain valves and reactor sample valves logic functional test
Perform main mechanical vacuum pump and valve
Isolation system functional test
Perform main steam isolation valve, main steam drain valve and reactor water sample valve simulated automatic isolation test
Perform main steam isolation valves limit switch instrument functional test
Perform main steam line closure scram (MSLCS) operational test
Perform one train MSLCS inop surveillance
Perform main steam leakage control system operational test (write in)
Perform one train main steam leakage control system operability surveillance (write in)
Perform monthly main steam leakage control system division 1 and division 2 fan and heater tests (write in)

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between MAIN AND REHEAT STEAM SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor vessel	3.4	3.4
K1.02	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.6	2.8
K1 03	Main turbine	3.4	3.4
K1 04	Moisture separators	2.8	2.9
K1.05	Moisture separator reheaters: Plant-Specific	2.8	2.8
K1.06	Steam bypass system	3.4	3.4
K1.07	Offgas system	3.1	3.1
K1.08	Condenser air removal system	2.9	3.1
K1.09	Steam seal/gland seal system	2.7	2.8
K1.10	Extraction steam system	2.7	2.8
K1.11	High pressure heater drains and vents	2.5	2.5
K1.12	Plant air systems	2.5	2.6
K1.13	Main steam isolation valve leakage control: Plant-Specific	2.6	2.8
K1.14	Positive leakage control system: Plant Specific	2.8	3.1
K1.15	Process computer/ performance monitor system	2.1*	2.1
K1.16	Process radiation monitoring system	3.2	3.4

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.17	Containment system	3.1	3.2
K1.18	High pressure coolart injection: Plant-Specific . . .	3.5	3.6
K1.19	Reactor core isolation cooling system: Plant-Specific	3.1	3.2
K1.20	Residual heat removal system: Plant-Specific	2.9	2.9
K1.21	Isolation condenser system: Plant-Specific	3.7	3.7
K1.22	Feedwater system	3.1	3.2
K1.23	Reactor water level control system	3.2	3.3
K1.24	Head vent	2.7	2.7
K1.25	Relief valves	3.5	3.5
K1.26	Safety valves	3.7	3.8
K1.27	Reactor protection system	4.0	4.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Main steam isolation valve solenoids	3.2*	3.3*
K2.02	Main steam line shutoff valves (guard valves): Plant-Specific	2.3*	2.3*
K3.	**Knowledge of the effect that a loss or malfunction of the MAIN AND REHEAT STEAM SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Turbine generator	3.2	3.3
K3.02	Condenser	3.1	3.2
K3.03	Reactor feedpump turbines: Plant-Specific	3.2	3.3
K3.04	Offgas system	2.8	2.8
K3.05	Condenser air removal	2.8	2.9
K3.06	Seal steam/gland and seal system	2.6	2.7
K3.07	Containment	3.1	3.3
K3.08	Decay heat removal	3.4	3.5
K3.09	Steam bypass capability	3.6	3.7
K3.10	High pressure coolant injection system: Plant-Specific	3.5	3.5
K3.11	Reactor core isolation cooling system: Plant-Specific	3.2	3.3
K3.12	Isolation condenser: Plant-Specific	3.7	3.7
K3.13	Moisture separator reheaters: Plant-Specific	2.4	2.4
K3.14	Residual heat removal system: Plant-Specific	2.7	2.7
K3.15	Reactor water level control	3.5	3.5
K3.16	Relief/safety valves	3.6	3.6
K3.17	Reactor vessel and internals	3.2	3.3

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	**Knowledge of MAIN AND REHEAT STEAM SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic isolation of steam lines	3.8	3.8
K4.02	Automatic isolation and opening of drain valves: Plant-Specific	3.1	3.2
K4.03	Insures that steam released from a steam line break will not bypass suppression pool; BWR-6	3.2	3.3
K4.04	Limits steam flow during a steam line rupture to 200% .	3.4	3.5
K4.05	Steam flow measurement	3.1	3.2
K4.06	Allows for removal or prevents escape of radioactive steam from systems that have leaky MSIV's	3.1	3.2
K4.07	Over pressure control	3.7	3.7
K4.08	Removal of non condensable gases from reactor head area	2.5	2.6
K4.09	Equalization of pressure across the MSIV's before opening	3.3	3.3
K4.10	Moisture removal from steam lines prior to admitting steam	2.9	3.0
K4.11	Positive sealing of the MSIV's when shutdown: Plant-Specific	2.9	3.1
K5.	**Knowledge of the operational implications of the following concepts as they apply to MAIN AND REHEAT STEAM SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Constant enthalpy expansion through a valve	2.0*	2.2
K5.02	Definition and causes of steam/water hammer	2.9	3.1
K5.03	Definition and causes of thermal stress	2.7	2.9
K5.04	Definition and reason for steam blanketing of moisture separator reheater: Plant-Specific	1.8*	1.9
K5.05	Flow indication	2.8	2.8
K5.06	Air operated MSIV's	2.8	2.9
K5.07	Hydraulic operated MSIV's	2.6	2.7
K5.08	Solenoid operated valves	2.6	2.7
K5.09	Decay heat removal	3.4	3.5
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the MAIN AND REHEAT STEAM SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Electrical power	3.1	3.3
K6 02	Plant air systems	3.2	3.2
K6 03	Safety valve operability	3.6	3.6
K6.04	Relief valve operability: Plant-Specific	3.4	3.5

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted Previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.06	MSIV isolation signal	3.8	3.9
K6.07	MSIV leakage control	2.8	3.2
K6.08	Main condenser vacuum	3.3	3.4
K6.09	PCIS/NSSSS	3.9	4.1
K6.10	ADS/low low set: Plant-Specific	3.6	3.7

ABILITY

A1. **Ability to predict and/or monitor changes in parameters associated with operating the MAIN AND REHEAT STEAM SYSTEM controls including:**
(CFR 41.5 / 45.5)

A1. 01	Main steam pressure	3.6	3.6
A1. 02	Main steam temperature	2.6	2.6
A1.03	Reheat steam pressure: Plant-Specific	2.2*	2.2
A1.04	Reheater temperature: Plant-Specific	2.3*	2.3
A1.05	Main steam line radiation monitors	3.6	3.6
A1.06	Air ejector process radiation monitor	3.4	3.4
A1.07	Reactor water level	3.7	3.7
A1.08	Reactor pressure	3.8	3.8
A1.09	Main steam flow	3.5	3.4
A1.10	Reactor power	3.8	3.8

A2. **Ability to (a) predict the impacts of the following on the MAIN AND REHEAT STEAM SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:**
(CFR 41.5 / 45.6)

A2.01	Malfunction of reactor turbine pressure regulating system	3.8	3.9
A2.02	Change in steam demand and its effect on reactor pressure and power	3.6	3.8
A2.03	MSIV closure	4.0	4.2
A2.04	Main steam line low pressure	3.5	3.6
A2.05	†Main steam line high radiation	3.9	4.2
A2.06	Turbine trip without bypass valves	4.1	4.3
A2.G7	Main steam area high temperature or differential temperature high	3.8	3.9
A2.08	Low condenser vacuum	3.6	3.6
A2.09	Opening of head vent to drywell equipment sump with pressure in the reactor vessel	3.4	3.7
A2.10	Closure of one or more MSIV's at power	3.8	3.9
A2.11	Steam line break	4.1	4.3
A2.12	PCIS/NSSSS actuation	4.2*	4.3

SYSTEM: 239001 Main and Reheat Steam System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.13	High reactor water level	3.5	3.7
A2.14	Inadvertent initiation of HPCI/HPCS/RCIC (steam quality and steam flow): Plant-Specific	3.4	3.5
A3.	**Ability to monitor automatic operations of the MAIN AND REHEAT STEAM SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Isolation of main steam system	4.2*	4.1*
A3.02	Opening and closing of drain valves as turbine load changes: Plant-Specific	2.9	2.9
A3.03	Moisture separator reheat steam supply: Plant-Specific	2.8	2.8
A3.04	Isolation of moisture separator reheater: Plant-Specific	2.7	2.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	MSIV's	4.2*	4.0
A4.02	Maim steam line drain valves	3.2	3.2
A4.03	System flow	3.5	3.5
A4.04	System pressure	3.8	3.7
A4.05	System temperature	2.7	2.7
A4.06	System radiation levels	3.6	3.8
A4.07	Lights and alarms	3.3	3.3
A4.08	Reactor water level	3.7	3.7
A4.09	Reactor pressure	3.9	3.9
A4.10	Reactor power	3.8	3.8
A4.11	Alternate methods of verifying valve positions	3.1	3.3

SYSTEM: 245000 Main Turbine Generator and Auxiliary Systems

TASK: Perform lineups of the main turbine generator
Start up the turbine to rated speed
Perform generator excitation
Operate generator voltage regulator
Synchronize turbine generator with output grid at minimum load
Increase load on the turbine generator
Monitor the turbine generator
Secure the amplidyne (generator in service)
Return the amplidyne to service
Unload the turbine generator electrically to minimum load
Secure generator output and excitation
Shut down the turbine generator
Operate the turbine turning gear
Operate the turbine bearing lift oil pumps (jacking oil pumps)
Synchronize turbine generator with output grid at minimum load
Increase load on the turbine generator

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	A. C. electrical distribution	3.2	3.3
K1.02	Condensate system	2.5	2.5
K1.03	Main steam system	3.2	3.3
K1.04	Reactor protection system	3.6	3.7
K1.05	Extraction steam system	2.7	2.7
K1.06	Component cooling water systems	2.6	2.6
K1.07	Plant air systems	2.5	2.5
K1.08	Reactor/turbine pressure control system: Plant-Specific	3.4	3.5
K1.09	D. C . electrical distribution	2.7	2.7
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Stator water cooling pumps: Plant-Specific	2.4*	2.4
K2.02	Main lubricating oil pumps	2.3*	2.4*
K2.03	Amplidyne: Plant-Specific	1.7*	1.8*
K2.04	Hydrogen seal oil pumps	2.3*	2.3*
K2.05	Air seal oil pumps: Plant-Specific	1.7*	1.7*
K2.06	Turbine supervisory instrumentation	2.3	2.5

SYSTEM: 245000 Main Turbine Generator and Auxiliary Systems

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.	**Knowledge of the effect that a loss or malfunction of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS will have on following:** (CFR 41.7 / 45.4)		
K3.01	A.C. electrical distribution	3.4	3.7
K3.02	Reactor pressure	3.9	4.0
K3.03	Reactor power	3.9	4.0
K3.04	Reactor feedwater system (feedwater heaters)	3.3	3.5
K3.05	Reactor feedwater pump: Plant-Specific	2.7	2.8
K3.06	Condensate system	2.5	2.5
K3.07	Reactor protection system	3.6	3.7
K3.08	Reactor/turbine pressure control system: Plant-Specific	3.7	3.8
K4.	**Knowledge of MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Bearing lubrication	2.4	2.5
K4.02	Generator cooling	2.4	2.5
K4.03	Sealing to prevent hydrogen leakage	2.7	2.8
K4.04	Hydrogen cooling	2.4	2.5
K4.05	Turbine protection	2.9	3.0
K4.06	Generator protection	2.7	2.8
K4.07	Generator voltage regulation	2.5	2.6
K4.08	Moisture removal from turbine steam	2.4	2.4
K4.09	Turbine control	3.1	3.2
K4.10	Extraction steam	2.6	2.7
K5.	**Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS :** (CFR 41.5 / 45.3)		
K5.01	Heat exchanger operation	2.3*	2.3*
K5.02	Turbine operation and limitations	2.8	3.1
K5.03	Hydraulically operated valve operation	2.6	2.6
K5.04	Turbine speed measurement	1.9*	2.0*
K5.05	Relief valve operation	2.4	2.4
K5.06	Turbine shaft sealing	2.5	2.6
K5.07	Generator operations and limitations	2.6	2.9
K5.08	Generator cooling	2.4	2.6
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS :** (CFR 41.7 / 45.7)		

SYSTEM: 245000 Main Turbine Generator and Auxiliary Systems

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.01	Gland seal	2.8	2.9
K6.02	Reactor/turbine pressure control system: Plant-Specific	3.5	3.7
K6.03	Hydrogen seal oil	2.8	3.1
K6.04	Hydrogen cooling	2.6*	2.7
K6.05	Stator water cooling	2.9	2.9
K6.06	Electrical distribution	3.0	3.2
K6.07	Extraction steam	2.4	2.5
K6.08	Main steam	3.0	3.1
K6.09	Voltage regulation	2.3*	2.5*
K6.10	Lube oil system	2.8*	2.9

ABILITY

A1. **Ability to predict and/or monitor changes in parameters associated with operating the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS controls including:** (CFR 41.5 / 45.5)

K/A NO.	ABILITY	RO	SRO
A1.01	Generator megawatts	2.7	2.7
A1.02	Turbine speed	2.6	2.5
A1.03	Turbine valve position	2.7	2.7
A1.04	Steam flow	2.7	2.8
A1.05	Reactor pressure	3.5	3.4
A1.06	Condenser vacuum	3.3	3.2
A1.07	First stage turbine pressure	2.8	2.8
A1.08	Generator output voltage/reactive load	2.5*	2.7

A2. **Ability to (a) predict the impacts of the following on the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)

K/A NO.	ABILITY	RO	SRO
A2.01	Turbine trip	3.7	3.9
A2.02	Loss of lube oil	3.3	3.5
A2.03	Loss of condenser vacuum	3.5	3.6
A2.04	Reactor scram	3.7	3.8
A2.05	Generator trip	3.6	3.8
A2.06	Loss of extraction steam	2.9	3.1
A2.07	Loss of reactor/turbine pressure control system: Plant-Specific	3.8	3.9
A2.08	Turbine rotor bow	2.3	2.6
A2.09	Turbine vibration	2.5	2.8

SYSTEM: 245000 Main Turbine Generator and Auxiliary Systems

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A3.	**Ability to monitor automatic operations of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS including:** (CFR 41.7 / 45.7)		
A3.01	Turbine trip	3.6	3.6
A3.02	Turbine roll to rated speed	2.8	2.8
A3.03	Generator megawatt output	2.8	2.9
A3.04	Turbine speed	2.7*	2.8
A3.05	Control valve operation	3.0	3.1
A3.06	Turbine lube oil pressure	2.5	2.6
A3.07	Hydrogen seal oil pressure	2.5	2.6
A3.08	Hydrogen gas pressure	2.5	2.6
A3.09	Hydrogen gas temperature	2.4	2.5
A3.10	Generator output voltage/reactive load	2.5	2.6
A3.11	Generator power factor: Plant-Specific	1.8*	2.1
A3.12	Automatic turbine control: Plant-Specific	3.3	3.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Turbine lube oil pumps	2.7	2.7
A4.02	Generator controls	3.1	2.9
A4.03	Stator water cooling pumps: Plant-Specific	2.7	2.8
A4.04	Hydrogen seal oil pumps	2.7	2.7
A4.05	Generator megawatt output	2.7	2.7
A4.06	Turbine speed	2.7	2.6
A4.07	Turbine valve position	2.9	2.9
A4.08	Turbine oil pressure	2.7	2,7
A4.09	Hydrogen seal oil pressure	2.6	2.6
A4.10	Hydrogen gas pressure	2.6	2.6
A4.11	Hydrogen gas temperature	2.4	2.4
A4 12	Generator output voltage	2.6	2.6
A4 13	Generator power factor: Plant-Specific	1.9*	2.1
A4.14	Generator megavar output	2.5	2.5

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

TASK: Lineup the reactor core isolation cooling (RCIC) system
Manually operate and adjust reactor core isolation cooling system flow with the turbine governor
Manually initiate startup of the reactor core isolation cooling (RCIC) system
Operate RCIC pump in different modes
Monitor RCIC operation
Shutdown RCIC

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage and transfer system	3.5	3.5
K1.02	Nuclear boiler system	3.5	3.5
K1.03	Suppression pool	3.6	2.6
K1.04	Main condenser	2.6	2.6
K1.05	Residual heat removal system	2.6	2.6
K1.06	Plant air systems: Plant-Specific	2.3*	2.3*
K1.07	Leak detection	3.1	3.2
K1.08	Line fill pump: Plant-Specific	3.3	3.4
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Motor operated valves	2.8*	2.8*
K2.02	RCIC initiation signals (logic)	2.8*	2.9*
K2.03	RCIC flow controller	2.7*	2.8*
K2.04	Gland seal compressor (vacuum pump)	2.6*	2.6*
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.7	3.7
K3.02	Reactor vessel pressure	3.6	3.6
K3.03	Decay heat removal	3.5	3.5
K3.04	Adequate core cooling	3.6	3.6
K4.	**Knowledge of REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Prevent water hammer: Plant-Specific	2.8	2.8
K4.02	Prevent over filling reactor vessel	3.3	3.3

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.03	Prevents pump over heating	2.9	3.0
K4.04	Prevents turbine damage: Plant-Specific	3.0	3.1
K4.05	Prevents radioactivity release to auxiliary/reactor building	3.2	3.5
K4.06	Manual initiation	3.5	3.5
K4.07	Alternate supplies of water	3.6	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.6*	2.6*
K5.02	Flow indication	3.1	3.1
K5.03	Differential pressure indication	2.6	2.6
K5.04	Testable check valve operation	2.6	2.7
K5.05	Centrifugal pump operation	2.4*	2.4*
K5.06	Turbine operation	2.7*	2.7
K5.07	Assist core cooling	3.1	3.1
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) :** (CFR 41.7 / 45.7)		
K6.01	Electrical power	3.4	3.5
K6.02	Plant air systems	2.2*	2.2
K6.03	Suppression pool water supply	3.5	3.5
K6.04	Condensate storage and transfer system	3.5	3.5
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including:** (CFR 41.5 / 45.5)		
A1.01	RCIC flow	3.7	3.7
A1.02	RCIC pressure	3.3	3.3
A1.03	Reactor water level	4.0	4.0
A1.04	Reactor pressure	3.6*	3.6
A1.05	RCIC turbine speed	3.7	3.7
A1.06	Condensate storage tank level	3.2	3.3
A1.07	Suppression pool level	3.3	3.5
A1.08	Suppression pool temperature	3.5	3.6

Tasks as noted previously

	KNOWLEDGE	IMPORTANCE RO	SRO
A2.	**Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	System initiation signal	3.8	3.7
A2.02	Turbine trips	3.8	3.7
A2.03	Valve closures	3.4	3.3
A2.04	A.C. power loss	2.3*	2.3*
A2.05	D.C. power loss	3.3	3.3
A2.06	Loss of applicable plant air systems	2.2*	2.2
A2.07	Loss of lube oil	3.1	3.1
A2.08	Loss of lube oil cooling	3.0	3.1
A2.09	Loss of vacuum pump	2.9	3.0
A2.10	Turbine control system failures	3.1	3.1
A2.11	Inadequate system flow	3.1	3.2
A2 12	Valve openings	3.0	3.0
A2.13	Loss of room cooling	2.9	3.0
A2.14	Rupture disc failure: Exhaust-Diaphragm	3.3	3.4
A2.15	Steam line break	3.8	3.8
A2.16	Low condensate storage tank level	3.5	3.4
A2.17	High suppression pool level	3.2	3.4
A2.18	Low suppression pool level	3.1	3.2
A2.19	High suppression pool temperature	3.5	3.6
A3.	**Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3 5	3.5
A3.02	Turbine startup	3.6	3.5
A3.03	System pressure	3.7	3.6
A3.04	System flow	3.6	3.5
A3.05	Reactor water level	3.9	3.9
A3.06	Lights and alarms	3.5	3.4
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	RCIC turbine speed	3.7	3.7
A4.02	Turbine trip throttle valve reset	3.9	3.9
A4.03	System valves	3.4	3.3
A4.04	Manually initiated controls	3.6	3.6
A4.05	Reactor water level	4.1	4.1
A4.06	Suppression pool level	3.6	3.7
A4.07	Reactor pressure	3.9	3.8

SYSTEM: 217000 Reactor Core Isolation Cooling System (RCIC)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.08	System flow	3.7	3.6
A4.09	System pressure	3.7	3.6
A4.10	Lights and alarms	3.6	3.5
A4.11	Condensate storage tank level	3.5	3.5

SYSTEM: 202001 Recirculation System

TASK: Perform lineups on the recirculation system
Vent recirculation pump seals
Startup a recirculation pump (startup a second recirculation pump)
Operate recirculation pumps in various control modes (adjust the recirculation flow using "master manual" control)
Monitor recirculation pumps in operation
Monitor jet pump operation
Secure a recirculation pump
Perform jet pump operability test
Conduct heatup and cooldown temperature checks
Conduct recirculation pump startup check of the delta temperature between the reactor coolant in the idle loop to the reactor vessel
Conduct recirculation pump trip logic system functional test
Conduct recirculation loop valve operability test
Conduct recirculation system valve testing
What if jet pumps not operating within required operating band

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RECIRCULATION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Core flow	3.6	3.7
K1.02	Reactor power	4.1	4.1
K1.03	Reactor moderator temperature	3.2	3.3
K1.04	Reactor/turbine pressure regulating system: Plant-Specific	3.3	3.3
K1.05	Reactor pressure	3.4	3.4
K1.06	Jet pumps	3.6	3.6
K1.07	Component cooling water systems	3.1	3.2
K1.08	A.C. electrical	3.1	3.2
K1.09	D.C. electrical	2.7	2.9
K1.10	Control rod drive system: Plant-Specific	2.8	2.8
K1.11	Drywell equipment drain sump	2.7	2.8
K1.12	Recirculation system motor-generator sets: Plant-Specific	3.6	3.6
K1.13	Jet pump ring header and risers: Plant-Specific	3.1	3.2
K1.14	Rod block monitor: Plant-Specific	3.0	3.2
K1.15	Nuclear boiler instrumentation (reactor water level/pressure)	3.2	3.2
K1.16	Low pressure coolant injection logic: Plant-Specific	3.9	3.9
K1.17	Vessel bottom head drain temperature	3.1	3.3
K1.18	RHR shutdown cooling mode	3.3	3.3
K1.19	Feedwater flow	3.2	3.2
K1.20	Plant air systems: Plant-Specific	2.4	2.5
K1.21	Reactor water cleanup system	2.6	2.6

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.22	Reactor water level	3.5	3.6
K1.23	Average power range monitor flow converters: Plant-Specific	3.4	3.5
K1.24	Isolation condenser: Plant-Specific	3.4	3.4
K1.25	Reactor water sampling system	2.6	2.7
K1.26	Recirculation flow control system: Plant-Specific		
K1.27	ATWS circuitry: Plant-Specific	4.1	4.3
K1.28	End-of-cycle recirculation pump trip circuitry: Plant-Specific	3.9	4.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Recirculation pumps: Plant-Specific	3.2*	3.2
K2.02	MG sets: Plant-Specific	3.2	3.3
K2.03	Recirculation system valves	2.7*	2.8*
K2.04	Hydraulic power unit oil pumps: Plant-Specific	2.5*	2.5*
K2.05	MG set oil pumps: Plant-Specific	2.3*	2.3*
K3.	**Knowledge of the effect that a loss or malfunction of the RECIRCULATION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	Core flow	3.6	3.6
K3.02	Load following capabilities: Plant-Specific	2.8	2.8
K3.03	Reactor power	3.9	3.9
K3.04	Reactor water level	3.7	3.7
K3.05	Recirculation system MG sets: Plant-Specific	3.3	3.3
K3.06	Low pressure coolant injection logic: Plant-Specific	3.7	3.9
K3.07	Vessel bottom head drain temperature	2.9	2.9
K3.08	Shutdown cooling system	2.8	2.9
K3.09	Reactor water cleanup system	2.4*	2.5*
K3.10	Average power range monitor flow converters	3.3	3.4
K3.11	Component cooling water systems	2.3*	2.3*
K3.12	Isolation condenser: Plant-Specific	3.0	3.0
K3.13	Reactor water sampling system	2.5	2.5
K3.14	Primary containment integrity: Plant-Specific	3.5	3.5
K4.	**Knowledge of RECIRCULATION System design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	2/3 core coverage: Plant-Specific	3.9	3.9
K4.02	Adequate recirculation pump NPSH	3.1	3.2
K4.03	Recirculation pump motor cooling	2.8	2.8
K4.04	Controlled seal flow	3.0	3.1
K4.05	Seal cooling	2.9	2.9

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.06	Automatic voltage/frequency regulation: Plant-Specific	2.6*	2.7
K4.07	Motor generator set trips: Plant-Specific	2.8	2.9
K4.08	Oil pump automatic starts: Plant-Specific	2.8	2.9
K4.09	Pump minimum flow limit: Plant-Specific	2.7	2.9
K4.10	Pump start permissives: Plant-Specific	3.3	3.4
K4.11	Limitation of recirculation pumps flow mismatch: Plant-Specific	3.1	3.5
K4.12	Minimization of reactor vessel bottom head temperature gradients: Plant-Specific	3.2	3.5
K4.13	†End of cycle recirculation pump trip: Plant-Specific	3.7	4.0*
K4.14	ATWS: Plant-Specific	4.0	4.1*
K4.15	Slow speed pump start: Plant-Specific	3.1	3.4
K4.16	Recirculation pump downshift/runback: Plant-Specific	3.3	3.6
K4.17	Fast speed pump start: Plant-Specific	3.3	3.5
K4.18	Automatic MG set start sequencing: Plant-Specific	2.8	3.0
K5.	**Knowledge of the operational implications of the following concepts as they apply to RECIRCULATION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Indications of pump cavitation	2.7	2.8
K5.02	Jet pump operation: BWR-3,4,5,6	3.1	3.2
K5.03	Pump/motor cooling: Plant-Specific	2.7	2.7
K5.04	System venting	2.4	2.6
K5.05	End of cycle recirculation pump trip: Plant-Specific	3.5	3.6
K5.06	ATWS RPT: Plant-Specific	3.6	3.7
K5.07	Natural circulation: Plant-Specific	3.3	3.4
K5.08	E/P converters: Plant-Specific	2.0*	2.1*
K5.09	Hydraulically operated valves: Plant-Specific	2.6*	2.6*
K5.10	Motor generator set operation: Plant-Specific	2.8*	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RECIRCULATION SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Jet pumps: Plant-Specific	3.5	3.7
K6.02	Component cooling water systems	3.1	3.2
K6.03	A.C. power: Plant-Specific	2.9	3.0
K6.04	D.C. power: Plant-Specific	2.7	2.8
K6.05	Control rod drive system: Plant-Specific	2.7	2.7
K6.06	Recirculation system motor-generator sets: Plant-Specific	3.1	3.1
K6.07	Feedwater flow	3.3	3.3
K6.08	Reactor water cleanup system	2.3	2.3
K6.09	Reactor water level	3.4	3.4

SYSTEM: 202001 Recirculation System Tasks as noted previously

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RECIRCULATION SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Recirculation pump flow: Plant-Specific	3.6	3.5
A1.02	Jet pump flow	3.4	3.4
A1.03	Core flow	3.6	3.6
A1.04	Reactor water level	3.3	3.3
A1.05	Reactor power	3.9	3.9
A1.06	Recirculation pump motor amps	2.5	2.6
A1.07	Recirculation pump speed	2.7	2.8
A1.08	Recirculation FCV position: BWR-5,6	3.7	3.7
A1.09	Recirculation pump seal pressures	3.3	3.3
A1.10	Recirculation seal purge flows	2.6	2.7
A1.11	Vessel bottom head drain temperature	2.8	2.9
A1.12	Recirculation pump differential pressure: Plant-Specific	2.6	2.6
A1.13	Recirculation loop temperatures: Plant-Specific	3.1	3.2
A1.14	Recirculation drive motor temperature: Plant-Specific	2.4	2.4
A1.15	Recirculation MG set temperatures: Plant-Specific	2.4	2.4
A1.16	Recirculation MG drive motor amps: Plant-Specific	2.3*	2.3
A1.17	Recirculation MG set generator current, power, voltage: Plant-Specific	2.3*	2.3
A2.	**Ability to (a) predict the impacts of the following on the RECIRCULATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	†Jet pump failure: Plant-Specific	3.4	3.9
A2.02	Recirculation system leak	3.7	3.9
A2.03	Single recirculation pump trip	3.6	3.7
A2.04	Multiple recirculation pump trip	3.7	3.8
A2.05	Inadvertent recirculation flow increase	3.8	4.0
A2.06	Inadvertent recirculation flow decrease	3.6	3.8
A2.07	Recirculation pump speed mismatch: Plant-Specific	3.1	3.3
A2.08	Recirculation flow mismatch: Plant-Specific	3.1	3.4
A2.09	Recirculation scoop tube lockup: Plant-Specific	3.2	3.4
A2.10	†Recirculation pump seal failure	3.5	3.9
A2.11	Low reactor water level	3.7	3.9
A2.12	Loss of reactor feedwater	3.6	3.8
A2.13	Carryunder	2.6	2.8

SYSTEM: 202001 Recirculation System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.14	High reactor pressure (ATWS circuitry initiation): Plant-Specific	3.9	4.2
A2.15	End of cycle trip circuitry: Plant-Specific	3.7	3.9
A2.16	Loss of seal purge flow (CRD)	2.9	3.1
A2.17	Loss of seal cooling water	3.1	3.2
A2.18	Loss of motor cooling	2.9	3.1
A2.19	Loss of A.C. power: Plant-Specific	3.1	3.2
A2.20	Loss of D.C. power: Plant-Specific	2.8	2.9
A2.21	†Recirculation loop temperature out of spec: Plant-Specific	3.3	3 7
A2.22	Loss of component cooling water	3.1	3.2
A2.23	Valve closures	3.2	3.2
A2.24	Valve opening	3.1	3.1
A2.25	Recirculation flow control valve lockup: Plant-Specific	3.3	3.3
A2.26	Incomplete start sequence: Plant-Specific	2.9	3.1
A3.	**Ability to monitor automatic operations of the RECIRCULATION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.1	3.1
A3.02	Pump/MG set start sequence: Plant-Specific	3.1	3.0
A3.03	System flow	3.2	3.2
A3.04	Lights and alarms	3.2	3.1
A3.05	Pump speed: Plant-Specific	2.9	2.9
A3.06	Flow control valve position: BWR-5,6	3.6	3.6
A3.07	Pump trips: Plant-Specific	3.3	3.3
A3.08	Pump downshift: BWR-5,6	3.4	3.3
A3.09	MG set trip: Plant-Specific	3.3	3.3
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Recirculation pumps	3.7	3.7
A4.02	System valves	3.5	3.4
A4.03	Reactor power	4.1	4.1
A4.04	System flow	3.7	3.7
A4.05	Lights and alarms	3.3	3.3
A4.06	Oil pumps	2.7	2.7
A4.07	Vent fans: Plant-Specific	2.4	2.3
A4.08	Motor-generator sets: Plant-Specific	3.2	3.1
A4.09	Reactor water level	3.7	3.7
A4.10	Seal flow: Plant-Specific	2.8	2.8
A4.11	Seal pressures: Plant-Specific	3.2	3.3
A4.12	Core flow	3.9	3.8
A4.13	Core differential pressure	3.1	3.3

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

TASK: Perform lineups on the low pressure coolant injection system
Place the low pressure coolant injection system in standby readiness
Monitor operational sequence of low pressure coolant injection (LPCI) system
Secure the low pressure coolant injection system
Perform LPCI subsystem logic system functional test
Perform LPCI mode inoperable test
Perform LPCI mov power supply simulated auto. act test and battery serv. tests
Conduct LPCI independent power supply weekly battery test
Conduct LPCI independent power supply performance discharge test
Perform low pressure coolant injection sound analysis and flow test (write in)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate storage and transfer system: Plant-Specific	2.8	2.8
K1.02	Suppression pool	3.9	3.9
K1.03	Condensate transfer	2.5*	2.6*
K1.04	Keep fill system	3.3	3.4
K1.05	Recirculation system: BWR-3,4	3.8	3.8
K1.06	Automatic depressurization	3.9	3.9
K1.07	D.C. electrical power	3.1	3.3
K1.08	A.C. electrical power	3.5	3.5
K1.09	Emergency generators	3.8	3.8
K1.10	ECCS room coolers	3.2	3.2
K1.11	Nuclear boiler instrumentation	3.7	3.7
K1.12	Plant air systems: Plant-Specific	2.6*	2.7*
K1.13	Drywell pressure	3.9	4.0
K1.14	Shutdown cooling system: Plant-Specific	3.6	3.7
K1.15	Reactor building drain system: Plant-Specific	2.4*	2.6
K1.16	Component cooling water systems	3.1	3.2
K1.17	Reactor pressure	4.0	4.0
K1.18	Reactor vessel: Plant-Specific	3.8	3.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Pumps	3.5*	3.5*
K2.02	Valves	2.5*	2.7*
K2.03	Initiation logic	2.7*	2.9*

SYSTEM 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.	Knowledge of the effect that a loss or malfunction of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) will have on following: (CFR 41.7 / 45.4)		
K3.01	Reactor water level	4.3*	4.4*
K3.02	Suppression pool level	3.5	3.5
K3.03	Automatic depressurization logic	4.2*	4.3*
K3.04	Adequate core cooling	4.6*	4.6*
K4.	Knowledge of RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Automatic system initiation/ injection	4.2*	4.2
K4.02	Prevention of piping overpressurization	3.3	3.4
K4.03	Pump minimum flow protection	3.2	3.3
K4.04	Pump motor cooling: Plant-Specific	2.6	2.7
K4.05	Prevention of water hammer	3.2	3.3
K4.06	Adequate pump net positive suction head (interlock suction valve open): Plant-Specific	3.5	3.5
K4.07	Emergency generator load sequencing	3.7	3.9
K4.08	Pump operability testing	3.3	3.4*
K4.09	Surveillance for all operable components	3.1	3.4
K4.10	Dedicated injection system during automatic system initiation (injection valve interlocks)	3.9	4.1
K4.11	Loop selection logic: Plant-Specific	4.0	4.0
K4.12	System redundancy	3.5	3.6
K4.13	The prevention of leakage to the environment through LPCI/RHR heat exchanger: Plant-Specific	3.4	3.7
K4.14	†Operation from remote shutdown panel	3.6	3.7
K4.15	Pump runout protection: Plant-Specific	2.5*	2.5
K5.	Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) : (CFR 41.5 / 45.3)		
K5.01	Testable check valve operation	2.7*	2.9
K5.02	†Core cooling methods	3.5	3.7
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) : (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	3.6	3.7
K6.02	D.C. electrical power	2.8*	3.0*
K6.03	Emergency generator	3.7	3.9

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.04	Keep fill system	3.3	3.5
K6.05	Condensate storage and transfer system: Plant-Specific	2.5	2.5
K6.07	Plant air systems: Plant-Specific	2.7	2.7
K6.08	ECCS room cooling	2.9	3.1
K6.09	Nuclear boiler instrumentation	3.4	3.4
K6.10	Component cooling water systems	3.0	3.1
k6.11	ADS	4.1*	4.1
K6.12	†ECCS room integrity	2.7	2.9
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including: (CFR 41.5 / 45.5)		
A1.01	Reactor water level	4.2*	4.3
A1.02	Reactor pressure	3.9*	4.0
A1.03	System flow	3.8	3.7
A1.04	System pressure	3.6	3.6
A1.05	Suppression pool level	3.8	3.7
A1.06	Condensate storage tank level: Plant-Specific	2.4*	2.5
A1.07	Motor amps: Plant-Specific	2.4*	2.5
A1.08	†Emergency generator loading	3.7	3.8
A1.09	Component cooling water systems	2.9	2.9
A2.	Ability to (a) predict the impacts of the following on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Inadequate net positive suction head	3.2	3.4
A2.02	Pump trips	3.5	3.5
A2.03	Valve closures	3.2	3.3
A2.04	A.C. failures	3.5	3.6
A2.05	D.C. failures	3.0	3.2
A2.06	Emergency generator failure	3.8	3.9
A2.07	Pump seal failure	3.0	3.1
A2.08	Inadequate room cooling	2.9	3.0
A2.09	Inadequate system flow	3.3	3.4
A2.10	Nuclear boiler instrument failures	3.3	3.5
A2.11	Motor operated valve failures	3.4	3.6

SYSTEM: 203000 RHR/LPCI: Injection Mode (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.14	Initiating logic failure	3.8	3.9*
A2.15	Loop selection logic failure: Plant-Specific	4.2*	4.2*
A2.16	Loss of coolant accident	4.4*	4.5*
A2.17	Keep fill system failure	3.3	3.5
A3.	**Ability to monitor automatic operations of the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.8*	3.7
A3.02	Pump start	4.0	3.9
A3.03	Pump discharge pressure	3.7	3.6
A3.04	System flow	3.8	3.7
A3.05	Reactor water level	4.4*	4.4*
A3.06	Indicating lights and alarms	3.7*	3.6
A3.07	Loop selection: Plant-Specific	4.2*	4.6*
A3.08	System initiation sequence	4.1	4.1
A3.09	Emergency generator load sequencing	3.6	3.9*
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pumps	4.3*	4.1
A4.02	System valves	4.1*	4.1
A4.03	Keep fill system	3.4	3.4
A4.04	Heat exchanger cooling flow	3.6	3.6
A4.05	Manual initiation controls	4.3*	4.1
A4.06	System reset following automatic initiation: Plant-Specific	3.9	3.9
A4.07	Reactor water level	4.5*	4.5
A4.08	Reactor pressure	4.3*	4.3
A4.09	System flow	4.1	4.0
A4.10	Pump/system discharge pressure: Plant-Specific	3.7	3.6
A4.11	Indicating lights and alarms	3.7*	3.5
A4.12	Condensate storage tank level: Plant-Specific	2.5	2.6
A4.13	Suppression pool level/temperature	3.9	3.9
A4.14	Testable check valves	2.7*	2.7

SYSTEM: 205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)

TASK: Perform lineups of the residual heat removal (RHR) system
Fill and vent the residual heat removal system
Start up the residual heat removal system
Operate a residual heat removal heat exchanger
Perform purification of the residual heat removal system during shutdown cooling
Operate residual heat removal system with fuel pool cooling system
Monitor the residual heat removal system
Add chemicals to the residual heat removal system
Operate the residual heat removal system using the high pressure safety injection pumps
Shutdown the residual heat removal system
Drain the residual heat removal system
Fill the refueling cavity and/or dryer-separator using the residual heat removal system
Drain the refueling cavity and/or dryer-separator using the residual heat removal system
Perform RHR pump flow rate test
Perform residual heat removal pump operability test
Perform RHR service water pump flow rate test
Perform one RHR service water pump inoperable test
Perform one RHR pump inoperable test
Perform residual heat removal isolation valves, shutdown cooling valves and head spray simulated automatic actuation test
Perform residual heat removal service water pump and motor operated valve operability test
Conduct RHR valve testing
Conduct RHR isolation valve control logic system functional test
Monitor the residual heat removal system
Shutdown the residual heat removal system
Fill the refueling cavity and/or dryer-separator using the residual heat removal system
Drain the refueling cavity and/or dryer-separator using the residual heat removal system
Perform one residual heat removal service water pump inoperable test
Perform one residual heat removal pump inoperable test
Perform residual heat removal isolation valves, shutdown cooling valves and head spray simulated automatic actuation test
Conduct residual heat removal isolation valve control logic system functional test

SYSTEM: 205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor pressure	3.6	3.6
K1.02	Reactor water level	3.6	3.6
K1.03	Recirculation loop temperature	3.4	3.5
K1.04	Fuel pool cooling assist: Plant-Specific	2.7	2.7
K1.05	Component cooling water systems	3.1	3.1
K1.06	A.C. electrical power	3.2	3.3
K1.07	D.C. electrical power	2.4	2.6
K1.08	LPCI	3.9	3.9
K1.09	Auxiliary steam supply: Plant-Specific	2.2*	2.2*
K1.10	RWCU	2.3*	2.3*
K1.11	Nitrogen: Plant-Specific	1.8*	1.8*
K1.12	Isolation Condenser: Plant-Specific	2.4*	2.4*
K1.13	Floor drain system: Plant-Specific	1.7*	1.7*
K1.14	Reactor temperatures (moderator, vessel, flange)	3.6	3.6
K1.15	RHR service water: Plant-Specific	3.5	3.6
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	Pump motors	3.1*	3.1*
K2.02	Motor operated valves	2.5*	2.7*
K3.	Knowledge of the effect that a loss or malfunction of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) will have on following: (CFR 41.7 / 45.4)		
K3.01	Reactor pressure	3.3	3.3
K3.02	Reactor water level: Plant-Specific	3.2	3.3
K3.03	Reactor temperatures (moderator, vessel, flange)	3.8	3.9
K3.04	Recirculation loop temperatures	3.7	3.7
K3.05	Fuel pool cooling assist: Plant-Specific	2.6	2.7
K4.	Knowledge of SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	High temperature isolation: Plant-Specific	3.4	3.4
K4.02	High pressure isolation: Plant-Specific	3.7	3.8
K4.03	Low reactor water level: Plant-Specific	3.8	3.8
K4.04	Adequate pump NPSH	2.6	2.6
K4.05	Reactor cooldown rate	3.6	3.7
K4.06	Motor cooling: Plant-Specific	2.3*	2.3
K4.07	Pump minimum flow	2.7	2.8

SYSTEM: 205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K5.	Knowledge of the operational implications of the following concepts as they apply to SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) : (CFR 41.5 / 45.3)		
K5.01	NPSH	2.2*	2.4
K5.02	Valve operation	2.8	2.9
K5.03	Heat removal mechanisms	2.8	3.1
K5.04	System venting	2.4	2.4
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) : (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	3.3	3.4
K6.02	D.C. electrical power	2.7	2.9
K6.03	Recirculation system	3.1	3.2
K6.04	Reactor water level	3.6	3.6
K6.05	Component cooling water systems	3.2	3.3
K6.06	Auxiliary steam supply: Plant-Specific	2.0*	2.0*
K6.07	Nitrogen: Plant-Specific	1.8*	1.8*
K6.08	RHR service water: Plant-Specific	3.5	3.7
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) controls including: (CFR 41.5 / 45.5)		
A1.01	Heat exchanger cooling flow	3.3	3.2
A1.02	SDC/RHR pump flow	3.3	3.2
A1.03	Recirculation loop temperatures	3.3	3.3
A1.04	SDC/RHR pump suction pressure	2.7	2.7
A1.05	Reactor water level	3.4	3.4
A1.06	Reactor temperatures (moderator, vessel, flange)	3.7	3.7
A1.07	Motor amps: Plant--Specific	2.2*	2.1
A1.08	Heat exchanger temperatures	3.1	2.9
A1.09	SDC/RHR pump/system discharge pressure	2.8	2.8
A1.10	Throttle valve position	3.0	2.9

SYSTEM: 205000 Shutdown Cooling System (RHR Shutdown Cooling Mode)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.	Ability to (a) predict the impacts of the following on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Recirculation loop high temperature: Plant-Specific .	3.1	3.3
A2.02	Low shutdown cooling suction pressure: Plant-Specific	2.6	2.7
A2.03	A.C. failure	3.2	3.2
A2.04	D.C. failure	2.5	2.6
A2.05	System isolation	3.5	3.7
A2.06	SDC/RHR pump trips	3.4	3.5
A2.07	Loss of motor cooling: Plant-Specific	2.7	2.7
A2.08	Loss of heat exchanger cooling	3.3	3.5
A2.09	Reactor low water level	3.6	3.8
A2.10	Valve operation	2.9	2.9
A2.11	Recirculation pump trips: Plant-Specific	2.5	2.7
A2.12	Inadequate system flow	2.9	3.0
A3.	Ability to monitor automatic operations of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) including: (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.2	3.1
A3.02	Pump tri[illegible]	3.2	3.2
A3.03	Lights and alarms	3.5	3.3
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	SDC/RHR pumps	3.7	3.7
A4.02	SDC/RHR suction valves	3.6	3.5
A4.03	SDC/RHR discharge valves	3.6	3.5
A4.04	Heat exchanger cooling water valves	3.4	3.3
A4.05	Minimum flow valves	3.2	3.2
A4.06	Reactor water level	3.8	3.7
A4.07	Reactor temperatures (moderator, vessel, flange) . . .	3.7	3.7
A4.08	Reactor power: Plant-Specific	3.1	3.2
A4.09	System flow	3.1	3.1
A4.10	System pressures	2.9	3.0
A4.11	Heat exchanger cooling flow	3.2	3.2
A4.12	Recirculation loop temperatures	3.4	3.4

3.5 Containment Integrity

223001	Primary Containment System and Auxiliaries
223002	Primary Containment Isolation System /Nuclear Steam Supply Shut-Off
290002	Reactor Vessel Internals
219000	RHR/LPCI: Torus/Suppression Pool Cooling Mode
226001	RHR/LPCI: Containment Spray System Mode
230000	RHR/LPCI: Torus/Suppression Pool Spray Mode
290001	Secondary Containment

SYSTEM: 223001 Primary Containment System and Auxiliaries

TASK: Conduct lineups on the containment system
Conduct containment inerting-normal purge on startup
Conduct containment inerting-makeup operation
Ventilate the containment during heatup and startup
Conduct containment de-inerting Monitor the containment system in standby readiness
Pump torus water to radwaste (pump suppression pool water to radwaste)
Refill the torus/suppression pool from the condensate storage tank
Startup the suppression pool cleanup system (write in)
Shutdown the suppression pool cleanup system (write in)
Perform external visual inspection of suppression chamber after relief valve operation
Conduct pressure suppression chamber (PSC)-drywell vacuum breaker visual inspection

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Containment isolation/integrity: Plant-Specific . . .	3.7	3.9
K1.02	Drywell isolation/integrity: Plant-Specific	3.6	3.8
K1.03	Containment/drywell atmosphere control	3.2	3.3
K1.04	Drywell floor and equipment floor drain system	3.1	3.2
K1.05	Suppression pool makeup system: Mark-III	3.3	3.5
K1.06	RHR/LPCI	3.4	3.6
K1.07	Suppression pool cleanup system: Plant-Specific . . .	2.4	2.5
K1.08	Relief/safety valves	3.6	3.8
K1.09	SBGT/FRVS: Plant-Specific	3.4	3.6
K1.10	Plant air systems	3.0	3.1
K1.11	Post accident sampling system	2.7	2.9
K1.12	LPCS: Plant-Specific	3.5	3.6
K1.13	HPCS: Plant-Specific	3.4	3.5
K1.14	RCIC: Plant-Specific	3.3	3.6
K1.15	HPCI: Plant-Specific	3.5	3.9
K1.16	Containment and drywell atmosphere monitoring: Plant-Specific	3.3	3.4
K1.17	Reactor building HVAC: Plant-Specific	3.1	3.1
K1.18	Drywell pneumatic compressors: Plant-Specific	2.6	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Atmosphere containment/ atmospheric dilution compressors: Plant-Specific	2.0*	2.1
K2.02	Drywell compressors	1.8*	1.9*

SYSTEM: 223001 Primary Containment System and Auxiliaries

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K2.03	Pumpback compressors: Plant-Specific	1.8*	1.8*
K2.04	Combustible gas mixing compressors: Mark-III	2.0*	2.4
K2.05	Hydrogen recombiners: Plant-Specific	2.2*	2.4*
K2.06	Hydrogen igniters: Plant-Specific	2.0*	2.4
K2.07	Containment atmosphere monitoring system	2.3*	2.6*
K2.08	Containment cooling air handling units: Plant-Specific	2.7	3.0*
K2.09	Drywell cooling fans: Plant-Specific	2.7	2.9*
K2.10	Drywell chillers: Plant-Specific	2.7	2.9*
K3.	**Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES will have on following:** (CFR 41.7 / 45.4)		
K3.01	Secondary containment	3.6	3.8
K3.02	Containment/drywell temperature: Plant-Specific	3.3	3.4
K3.03	Containment/drywell pressure: Plant-Specific	3.4	3.5
K3.04	Containment/drywell hydrogen gas concentration	3.3	3.5
K3.05	Containment/drywell oxygen gas concentration	3.1	3.2
K3.06	Differential pressure between secondary and primary containment	3.3	3.6
K3.07	Differential pressure between suppression pool and drywell/containment	3.1	3.2
K3.08	Pneumatically operated valves internal to containment/drywell: Plant-Specific	2.7	2.9
K3.09	Nuclear boiler instrumentation	2.8	3.1
K3.10	Containment/drywell moisture content	2.4	2.6
K4.	**Knowledge of PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Allows for absorption of the energy released during a LOCA	3.7	3.8
K4.02	Contains fission products after a LOCA	3.6	3.7
K4.03	Containment/drywell isolation	3.7	3.8
K4.04	Prevents hydrogen from reaching an explosive mixture	3.5	3.8
K4.05	Maintains proper suppression pool to drywell differential pressure	2.9	3.1
K4.06	Maintains proper containment/secondary containment to drywell differential pressure	3.1	3.3
K4.07	Prevents localized heating of suppression pool (SRV steam quenchers)	3.1	3.3

SYSTEM: 223001 Primary Containment System and Auxiliaries

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES :** (CFR 41.5 / 45.3)		
K5.01	Vacuum breaker/relief operation	3.1	3.3
K5.02	Guard pipe operation: Mark-III	2.3	2.4
K5.03	Down comer operation	2.8	2.9
K5.04	Horizontal vent operation: Mark-III	2.4	2.6
K5.05	Hydrogen recombiner operation: Plant-Specific	2.8	3.0
K5.06	Hydrogen igniter operation: Plant-Specific	2.8	2.9
K5.07	Suppression pool clean-up: Plant-Specific	2.3	2.4
K5.08	Pressure measurement	2.7	2.8
K5.09	Hydrogen production mechanisms	2.6	2.9*
K5.10	Hydrogen combustibility versus hydrogen concentration and oxygen concentration	2.9	3.1
K5.11	Temperature measurement	2.7	2.7
K5.12	Hydrogen concentration measurement	2.7	2.8
K5.13	Oxygen concentration measurement: Plant-Specific	2.7	2.8
K5.14	Differential pressure measurement	2.6	2.8*
K5.15	Moisture content measurement: Plant-Specific	2.4	2.6
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES :** (CFR 41.7 / 45.7)		
K6.01	Drywell cooling	3.6	3.8
K6.02	Containment cooling: Mark-III	3.5	3.6
K6.03	Suppression pool makeup: Plant-Specific	2.8	3.1
K6.04	Combustible gas mixing: Plant-Specific	2.8	2.8
K6.05	Hydrogen recombiner: Plant-Specific	3.1	3.3
K6.06	Backup hydrogen purge: Plant-Specific	2.8	3.0
K6.07	Hydrogen igniter system: Plant-Specific	3.0	3.1
K6.08	Containment atmospheric control	3.3	3.4
K6.09	Drywell vacuum relief system	3.4	3.6
K6.10	Containment vacuum relief system: Mark-III	3.0	3.2
K6.11	A.C. electrical distribution	3.0	3.2
K6.12	D.C. electrical distribution	2.7	3.0
K6.13	Applicable plant air system/ nitrogen make-up system.	3.2	3.4
K6.14	RHR/LPCI	3.6	3.8
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES controls including:** (CFR 41.5 / 45.5)		

SYSTEM: 223001 Primary Containment System and Auxiliaries

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.01	Drywell temperature	3.5	3.6
A1.02	Drywell pressure	3.6	3.7
A1.03	Containment pressure: Mark-III	3.6	3.8
A1.04	Containment temperature: Mark-III	3.3	3.4
A1.05	Hydrogen concentration	3.1	3.3
A1.06	Oxygen concentration	3.1	3.3
A1.07	Drywell/suppression chamber differential pressure (drywell to containment building): Plant-Specific	3.2	3.4
A1.08	Suppression pool level	3.5	3.6
A1.09	Suppression pool temperature	3.5	3.6
A1.10	Drywell leak detection system: Plant-Specific	3.4	3.6
A1.11	Reactor building to suppression chamber differential pressure: Plant-Specific	3.1	3.2
A1.12	Moisture concentration	2.5	2.6
A2.	**Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Loss of coolant accident	4.3*	4.4*
A2.02	Steam bypass of suppression pool	3.9	4.1
A2.03	Safety/relief valve leaking or stuck open	4.0	4.2*
A2.04	High containment/drywell hydrogen concentration	3.7	3.8
A2.05	High containment/drywell oxygen concentration	3.5	3.6
A2.06	High containment pressure: Mark-III	4.1*	4.1*
A2.07	High drywell pressure	4.2*	4.3*
A2.08	Compressor trips (loss of air): Plant-Specific	3.1	3.1
A2.09	Vacuum breaker malfunction	3.4	3.6
A2.10	High drywell temperature	3.6	3.8
A2.11	Abnormal suppression pool level	3.6	3.8
A2.12	Abnormal suppression pool temperature	3.7	3.8
A2.13	High containment temperature: Mark-III	3.3	3.4
A2.14	Low containment to annulus pressure: Mark-III	3.4	3.4
A3.	**Ability to monitor automatic operations of the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES including:** (CFR 41.7 / 45.7)		
A3.01	Suppression pool level	3.4	3.5
A3.02	Vacuum breaker/relief valve operation	3.4	3.4
A3.03	System indicating light and alarms	3.4	3.3
A3.04	Containment/drywell response during LOCA	4.2*	4.3
A3.05	Drywell pressure	4.3*	4.3
A3.06	Drywell/suppression chamber differential pressure: Mark-I,II	3.4	3.3

SYSTEM: 223001 Primary Containment System and Auxiliaries

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A3.07	Containment/drywell differential pressure: Mark-III	3.6	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Containment relief valves: Mark-III	3.5	3.5
A4.02	ACAD compressors: Plant-Specific	2.6	2.6
A4.03	Air dilution valves to drywell and suppression pool: Plant-Specific	3.4	3.4
A4.04	Containment/drywell hydrogen concentration	3.5	3.6
A4.05	Containment/drywell oxygen concentration	3.6	3.6
A4.06	Containment pressure: Mark-III	4.0*	4.0*
A4.07	Drywell pressure	4.2*	4.1
A4.08	System indicating lights and alarms	3.4	3.3
A4.09	SPDS/CRIDS/ERIS/GDS: Plant-Specific	2.5	2.9*
A4.10	Drywell nitrogen makeup: Mark-I,II	3.2	3.2
A4.11	Drywell pneumatics	3.1	3.0
A4.12	Drywell coolers/chillers	3.5	3.6
A4.13	Hydrogen recombiners: Plant-Specific	3.4	3.4
A4.14	Hydrogen igniters: Plant-Specific	3.7	3.7

SYSTEM: 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off

TASK: Conduct lineups on the containment system
Monitor the containment system in standby readiness
Perform primary containment isolation valve simulated automatic initiation and closure test
Conduct reactor building isolation logic system functional test
Perform drywell isolation, atmosphere control, and sump drain valves logic system test
Perform drywell isolation valves, atmosphere control valves, sump drain valves simulated auto actuation test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system	3.8	3.9
K1.02	Reactor water cleanup	3.3	3.5
K1.03	Plant ventilation	3.0	3.2
K1.04	High pressure coolant injection: Plant-Specific . . .	3.5	3.8
K1.05	Isolation Condenser: Plant-Specific	3.8	3.8
K1.06	Recirculation system	2.9	3.2
K1.07	Reactor core isolation cooling; Plant-Specific	3.4	3.6
K1.08	Shutdown cooling system/RHR	3.4	3.5
K1.09	Reactor vessel head spray: Plant-Specific	3.0	3.2
K1.10	Containment ventilation	3.1	3.2
K1.11	Containment atmosphere sampling	2.9	3.2
K1.12	Standby gas treatment system	3.1	3.3
K1.13	Traversing in-core probe system	2.7	2.9
K1.14	Containment drainage system	2.8	3.1
K1.15	High pressure core spray : Plant-Specific	3.4	3.4
K1.16	Process computer	2.1*	2.2
K1.17	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.4	2.6
K1.18	Reactor building drainage system: Plant-Specific . . .	2.5	2.6
K1.19	Component cooling water systems	2.7	2.9
K1.20	A.C. distribution: Plant-Specific	2.8	3.0
K1.21	Circulating water: Plant-Specific	2.2*	2.3
K1.22	Containment nitrogen inerting system: Plant-Specific.	2.8	3.0
K1.23	River water makeup: Plant-Specific	2.0*	2.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Logic power supplies	2.4*	2.7

SYSTEM: 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.	**Knowledge of the effect that a loss or malfunction of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.7	3.7
K3.02	Fuel cladding temperature	3.6	3.7
K3.03	†Off-site radioactive release rates	3.6	3.8
K3.04	Reactor building radiation level	3.4	3.6
K3.05	Drainage sump levels	2.7	2.8
K3.06	Turbine building radiation	2.8	2.9
K3.07	Reactor pressure	3.7	3.8
K3.08	Reactor vessel temperature	3.4	3.5
K3.09	Main steam system	3.4	3.6
K3.10	Reactor water cleanup	2.9	3.1
K3.11	Plant ventilation	2.8	2.9
K3.12	High pressure coolant injection: Plant-Specific	3.6	3.6
K3.13	Isolation Condenser: Plant-Specific	3.7	3.7
K3.14	Recirculation system: Plant-Specific	3.0	3.0
K3.15	Reactor core isolation cooling: Plant-Specific	3.4	3.5
K3.16	Shutdown cooling system/RHR	3.2	3.3
K3.17	Reactor vessel head spray: Plant-Specific	2.8	2.9
K3.18	Containment ventilation	3.0	3.1
K3.19	Containment atmosphere sampling	2.8	3.0
K3.20	Standby gas treatment system	3.3	3.4
K3.21	Traversing in-core probe system	2.6	2.7
K3.22	Containment drainage system	2.5	2.6
K3.23	High pressure core spray : Plant-Specific	3.6	3.6
K3.24	Reactor building drainage system	2.4	2.6
K3.25	Component cooling water systems	2.3	2.3
K3.26	A.C. distribution	2.1*	2.2*
K3.27	Circulating water	1.8*	1.8*
K3.28	Containment nitrogen inerting system	2.7	2.8
K3.29	River water makeup	1.8*	1.8*
K4.	**Knowledge of PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Redundancy	3.0	3.2
K4.02	Testability	2.7	2.9
K4.03	Manual initiation capability: Plant-Specific	3.5	3.6
K4.04	†Automatic bypassing of selected isolations during specified plant conditions	3.2	3.6
K4.05	Single failures will not impair the function ability of the system	2.9	3.1

SYSTEM: 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.06	Once initiated, system reset requires deliberate operator action	3.4	3.5
K4.07	Physical separation of system components (to prevent localized environmental factors, electrical faults, and physical events from impairing system response) . .	2.8	2.9
K4.08	†Manual defeating of selected isolations during specified emergency conditions	3.3	3.7
K5.	**Knowledge of the operational implications of the following concepts as they apply to PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF :** (CFR 41.5 / 45.3)		
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution	3.1	3.3
K6.02	D.C. electrical distribution	3.0	3.2
K6.03	Process radiation monitoring system	2.9	3.1
K6.04	Nuclear boiler instrumentation	3.3	3.5
K6.05	Containment instrumentation	3.0	3.3
K6.06	Various process instrumentation	2.8	2.9
K6.07	Essential A.C. power	3.2	3.3
K6.08	Reactor protection system	3.5	3.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF controls including:** (CFR 41.5 / 45.5)		
A1.01	System indicating lights and alarms	3.5	3.5
A1.02	Valve closures	3.7	3.7
A1.03	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5*	2.8*
A1.04	Individual system relay status	2.6	2.8

SYSTEM: 223002 Primary Containment Isolation System/Nuclear Steam Supply Shut-Off

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	A.C. electrical distribution failures	3.2	3.5
A2.02	D.C. electrical distribution failures	2.9	3.2
A2.03	System logic failures	3.0	3.3
A2.04	Process radiation monitoring system failures	2.9	3.2
A2.05	Nuclear boiler instrumentation failures	3.3	3.6
A2.06	Containment instrumentation failures	3.0	3.2
A2.07	Various process instrumentation failures	2.7	2.9
A2.08	†Surveillance testing	2.7	3.1
A2.09	System initiation	3.6	3.7
A2.10	Loss of coolant accidents	3.9	4.2
A2.11	†Standby liquid initiation	3.8	3.9
A3.	**Ability to monitor automatic operations of the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF including:** (CFR 41.7 / 45.7)		
A3.01	System indicating lights and alarms	3.4	3.4
A3.02	Valve closures	3.5	3.5
A3.03	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5*	2.8*
A3.04	Verification of relay operation: Plant-Specific	2.3*	2.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Valve closures	3.6	3.5
A4.02	Manually initiate the system	3.9	3.8
A4.03	Reset system isolations	3.6	3.5
A4.04	System indicating lights and alarms	3.5	3.6
A4.05	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5*	2.8*
A4.06	Confirm initiation to completion	3.6*	3.7

SYSTEM: 290002 Reactor Vessel Internals

TASK: Perform heatup/cooldown of reactor vessel

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR VESSEL INTERNALS and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system	3.2	3.2
K1.02	Recirculation system	3.2	3.2
K1.03	Reactor feedwater system	3.2	3.2
K1.04	HPCI: Plant-Specific	3.4	3.5
K1.05	RHR: Plant-Specific	3.1	3.2
K1.06	HPCS: Plant-Specific	3.1	3.1
K1.07	Isolation condenser: Plant-Specific	3.4	3.4
K1.08	RCIC: Plant-Specific	3.1	3.1
K1.09	LPCI: Plant-Specific	3.2	3.3
K1.10	CRD hydraulic system	3.1	3.1
K1.11	CRD mechanism	2.9	2.9
K1.12	SBLC	3.4	3.5
K1.13	Relief/safety valves	3.4	3.5
K1.14	RWCU	2.9	3.1
K1.15	Nuclear boiler instrumentation	3.4	3.5
K1.16	LPCS	3.2	3.4
K1.17	ADS	3.3	3.4
K1.18	Loss parts monitoring: Plant-Specific	2.1*	2.2*
K1.19	TIP	2.5	2.6
K1.20	Nuclear instrumentation	3.2	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.2	3.3
K3.02	Reactor pressure	2.9	3.0
K3.03	Reactor power	3.3	3.4
K3.04	Plant radiation levels	2.9	3.2
K3.05	Off-site radiation levels	2.9	3.2
K3.06	PCIS/NSSSS	3.1	3.1
K3.07	Nuclear boiler instrumentation	3.1	3.1

SYSTEM: 290002 Reactor Vessel Internals

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.	**Knowledge of REACTOR VESSEL INTERNALS design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	2/3 core coverage following a DBA LOCA	3.7	3.9
K4.02	Separation of fluid flow paths within the vessel	3.1	3.2
K4.03	Core orificing	3.2	3.3
K4.04	Moisture removal from generated steam	2.8	2.8
K4.05	Natural circulation	3.3	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR VESSEL INTERNALS :** (CFR 41.5 / 45.3)		
K5.01	†Thermal limits	3.5	3.9
K5.02	Fission product poisons	2.9	3.1
K5.03	Burnable poisons	2.7	3.0
K5.04	†PCIOMR Plant-Specific	3.1	3.7
K5.05	Brittle fracture	3.1	3.3
K5.06	Heat transfer mechanisms	2.8	3.2
K5.07	†Safety limits	3.9	4.4*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR VESSEL INTERNALS :** (CFR 41.7 / 45.7)		
K6.01	CRD hydraulic system	2.8	2.9
K6.02	CRD mechanism	2.9	2.9
K6.03	Recirculation system	3.1	3.2
K6.04	Reactor feedwater system	3.0	3.1
K6.05	SBLC	3.3	3.4
K6.06	Relief/safety valves	3.0	3.2
K6.07	RWCU	2.6	2.7
K6.08	Nuclear boiler instrumentation	2.9	3.2
K6.09	LPCS	3.2	3.3
K6.10	HPCI: Plant-Specific	3.0	3.3
K6.11	RHR: Plant-Specific	3.1	3.2
K6.12	Isolation condenser: Plant-Specific	3.0	3.2
K6.13	RCIC: Plant-Specific	2.7	2.8
K6.14	LPCI: Plant-Specific	3.1	3.3
K6.15	ADS	3.1	3.4
K6.16	Loss parts monitoring	2.0*	2.0*
K6.17	TIP	2.5	2.5
K6.18	Nuclear instrumentation	3.0	3.1
K6.19	HPCS: Plant-Specific(BWR-5&6)	3.0	3.1
K6.20	Main steam system	2.9	3.1

SYSTEM: 290002 Reactor Vessel Internals

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the REACTOR VESSEL INTERNALS controls including: (CFR 41.5 / 45.5)		
A2.	Ability to (a) predict the impacts of the following on the REACTOR VESSEL INTERNALS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	LOCA	3.7	4.0
A2.02	†Overpressurization transient	3.6	3.9
A2.03	†Control rod drop accident	3.6	3.9
A2.04	Excessive heatup/cooldown rate	3.7	4.1
A2.05	†Exceeding thermal limits	3.7	4.2
A2.06	†Exceeding safety limits	4.0	4.5*
A3.	Ability to monitor automatic operations of the REACTOR VESSEL INTERNALS including: (CFR 41.7 / 45.7)		
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		

SYSTEM: 219000 RHR/LPCI: Torus/Suppression Pool Cooling Mode

TASK: Startup the torus cooling system
Shutdown the torus (cooling system)
Monitor the torus cooling system
Lineup torus/suppression pool cooling system for different modes (cooling, spray)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Suppression pool	3.8	3.9
K1.02	Condensate storage tank	2.4*	2.4
K1.03	LPCI/RHR piping	3.7	3.8
K1.04	LPCI/RHR pumps	3.9	3.9
K1.05	A.C. electrical power	3.5	3.6
K1.06	Keep fill system	3.2	3.3
K1.07	Condensate transfer	2.5	2.6
K1.08	D.C. electrical power	2.6	2.8
K1.09	Nuclear boiler instrumentation	3.3	3.4
K1.10	Reactor building drain system: Plant-Specific	1.9*	1.9*
K1.11	Component cooling water systems	3.0	3.0
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	†Valves	2.5*	2.9*
K2.02	Pumps	3.1*	3.3*
K2.03	Valve control logic: Plant-Specific	2.2*	2.6*
K3.	**Knowledge of the effect that a loss or malfunction of the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE will have on following:** (CFR 41.7 / 45.4)		
K3.01	Suppression pool temperature control	3.9	4.1
K4.	**Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Surveillance for all operable components	3.1	3.4
K4.02	Redundancy	3.5	3.5
K4.03	Unintentional reduction in vessel injection flow during accident conditions: Plant-Specific	3.8	3.8
K4.04	Prevention of piping overpressurization: Plant-Specific	3.3	3.4

SYSTEM: 219000 RHR/LPCI: Torus/Suppression Pool Cooling Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.05	Pump minimum flow protection	3.0	3.2
K4.06	Pump motor cooling: Plant-Specific	2.7	2.7
K4.07	Prevention of water hammer: Plant-Specific	3.0	3.1
K4.08	Adequate pump net positive suction head	2.9	3.0
K4.09	Heat exchanger cooling	3.3	3.4
K4.10	Prevention of leakage to the environment through system heat exchanger: Plant-Specific	3.3	3.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE :** (CFR 41.5 / 45.3)		
K5.01	System venting	2.6	2.7
K5.02	Pump cavitation	2.7	2.8
K5.03	Pressure measurement	2.7*	2.8*
K5.04	Heat exchanger operation	2.9	2.9
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	3.2	3.3
K6.02	D.C. electrical power	2.5*	2.8*
K6.03	Emergency generator	3.5	3.5
K6.04	Keep fill system	2.9*	3.0
K6.05	Condensate storage tank: Plant-Specific	2.2*	2.2*
K6.06	Suppression pool	3.7	3.7
K6.07	Condensate transfer	2.2*	2.2*
K6.08	ECCS room cooling	2.7*	2.7
K6.09	Nuclear boiler instrumentation	3.0	3.1
K6.10	Component cooling water systems	2.9	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE controls including:** (CFR 41.5 / 45.5)		
A1.01	Suppression pool temperature	4.0	4.0
A1.02	System flow	3.5	3.5
A1.03	System pressure	2.9	2.9
A1.04	Suppression pool level	3.2	3.2
A1.05	Condensate storage tank level: Plant-Specific	2.1*	2.1*
A1.06	Motor amps: Plant-Specific	2.3*	2.4*
A1.07	Emergency generator loading	3.2	3.3

SYSTEM: 219000 RHR/LPCI: Torus/Suppression Pool Cooling Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.08	System lineup	3.7	3.6
A1.09	Suppression chamber air temperature: Plant-Specific	3.2	3.3
A1.10	Containment air temperature: Mark-III	3.1	3.1
A2.	Ability to (a) predict the impacts of the following on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Inadequate net positive suction head	3.0	3.1
A2.02	Pumps trips	3.3	3.3
A2.03	Valve closures	3.1	3.2
A2.04	Valve openings	3.1	3.2
A2.05	A.C. electrical failures	3.3	3.5
A2.06	D.C. electrical failures	2.7*	2.9
A2.07	Emergency generator failure	3.5	3.7
A2.08	Pump seal failure	2.8	3.1
A2.09	Inadequate room cooling	2.7	2.9
A2.10	Nuclear boiler instrument failures	3.1	3.2
A2.11	Motor operated valve failures	3.1	3.3
A2.12	Valve logic failure: Plant-Specific	3.0	3.1
A2.13	High suppression pool temperature	3.5	3.7
A2.14	Loss of coolant accident	4.1	4.3
A2.15	Loss of, or inadequate, heat exchanger cooling flow	3.3	3.4
A2.16	High suppression pool level	2.9	3.2
A3.	Ability to monitor automatic operations of the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE including: (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.3	3.3
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pumps	3.8*	3.7
A4.02	Valve lineup	3.7*	3.5
A4.03	Keep fill system	2.9	2.9
A4.04	Minimum flow valves	3.0	2.9
A4.05	Heat exchanger cooling flow	3.4	3.4
A4.06	Valve logic reset following automatic initiation of LPCI/RHR in injection mode	3.9	3.7
A4.07	System flow	3.5	3.4
A4.08	Pump/system discharge pressure: Plant-Specific	2.9	2.9
A4.09	Indicating lights and alarms	3.4	3.3

SYSTEM: 219000 RHR/LPCI: Torus/Suppression Pool Cooling Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A4.10	Condensate storage tank level: Plant-Specific	2.2*	2.2*
A4 11	System venting	2.4	2.4
A4 12	Suppression pool temperature	4.1	4.1
A4.13	Suppression pool level	3.9	3.8
A4.14	The overrides for suppression pool cooling valve logic: Plant-Specific	3.7	3.5

SYSTEM: 226001 RHR/LPCI: Containment Spray System Mode

TASK: Lineup the containment spray system
Manually initiate containment spray
Shutdown the containment spray system
Monitor the containment spray system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Suppression pool	3.4	3.6
K1.02	LPCI/RHR piping	3.5	3.7
K1.03	LPCI/RHR pumps	3.5	3.6
K1.04	A.C. electrical power	3.1	3.3
K1.05	Keep fill system	2.9	2.9
K1.06	Condensate Transfer	2.5	2.5
K1.07	D.C. electrical power	2.4	2.5
K1.08	Nuclear boiler instrumentation	3.2	3.4
K1.09	Drywell (spray penetration): Mark-I-II	3.0	3.1
K1.10	Containment (spray penetration): Mark-III	3.0	3.0
K1.11	Component cooling water systems	2.8	3.0
K1.12	Suppression pool (spray penetration): Plant-Specific.	3.0	3.0
K1.13	Containment instrumentation	3.1	3.2
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	Valves	2.1*	2.3*
K2.02	Pumps	2.9*	2.9*
K2.03	Valve control logic	2.4*	2.5*
K3.	Knowledge of the effect that a loss or malfunction of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE will have on following: (CFR 41.7 / 45.4)		
K3.01	Containment/drywell/suppression chamber pressure	3.6	3.7
K3.02	Containment/drywell/suppression chamber temperature	3.5	3.5
K3.03	Containment/drywell/suppression chamber components, continued operation with elevated pressure and/or temperature and/or level	2.9	3.2
K4.	Knowledge of RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Testability of all operable components	2.6	2.8

SYSTEM: 226001 RHR/LPCI: Containment Spray System Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.02	Redundancy	2.8	2.9
K4.03	Reduction in vessel injection flow during accident conditions	2.9	3.1
K4.04	Prevention of piping overpressurization	2.4	2.6
K4.05	Pump minimum flow protection	2.5	2.5
K4.06	Pump motor cooling	2.2*	2.3
K4.07	Prevention of water hammer	2.6	2.8
K4.08	Adequate pump net positive suction head	2.3	2.4
K4.09	Automatic containment spray initiation: BWR-6	3.2	3.4
K4.10	Spray flow cooling	2.9	3.0
K4.11	Prevention of leakage to the environment through system heat exchanger	2.7	2.9
K4.12	Prevention of inadvertent containment spray activation	2.9	2.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE :** (CFR 41.5 / 45.3)		
K5.01	System venting	2.2*	2.2*
K5.02	Water hammer	2.6	2.7
K5.03	Pump cavitation	2.3	2.5
K5.04	Evaporative cooling	2.1*	2.1*
K5.05	Convective cooling	2.1*	2.1*
K5.06	Vacuum breaker operation	2.6	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	3.0	3.3
K6.02	D.C. electrical power	2.6	2.9
K6.03	Emergency generator	3.4	3.6
K6.04	Keep fill system	2.7	2.7
K6.05	Suppression pool (temperature level and pressure)	3.4	3.6
K6.06	Condensate transfer	2.4	2.4
K6.07	ECCS room cooling	2.4	2.6
K6.08	Nuclear boiler instrumentation	2.7	2.8
K6.09	†Reactor building to suppression chamber vacuum breakers: Plant-Specific	3.3	3.5
K6.10	†Suppression chamber to drywell vacuum breakers: Mark-1-II	3.3	3.5
K6.11	Component cooling water systems	2.8	2.8
K6.12	Containment integrity	3.4	3.5
K6.13	Suction flow path	3.2	3.2

SYSTEM: 226001 RHR/LPCI: Containment Spray System Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE controls including:** (CFR 41.5 / 45.5)		
A1.01	Containment/drywell pressure	3.6	3.8
A1.02	Containment/drywell temperature	3.4	3.5
A1.03	†Suppression chamber pressure: Mark-I-II	3.5	3.8
A1.04	Suppression pool temperature: Mark-I-II	3.3	3.6
A1.05	System lineup	3.1	3.4
A1.06	System flow	3.2	3.2
A1.07	System pressure	3.1	3.1
A1.08	Suppression pool level	3.1	3.4
A1.09	Motor amps	2.1*	2.1*
A1.10	Emergency generator loading	3.0	3.2
A2.	**Ability to (a) predict the impacts of the following on the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Inadequate net positive suction head	2.4	2.6
A2.02	Pumps trips	3.1	3.2
A2.03	Valve closures	3.1	3.1
A2.04	Valve openings	3.0	3.0
A2.05	A.C. electrical failures	3.3	3.4
A2.06	D.C. electrical failures	2.8	2.9
A2.07	Emergency generator failure	3.4	3.6
A2.08	Pump seal failure	2.4	2.5
A2.09	Inadequate room cooling	2.6	2.7
A2.10	Nuclear boiler instrument failures	3.0	3.1
A2.11	Motor operated valve failures	3.0	3.0
A2.12	Pump runout	2.5	2.6
A2.13	Valve logic failure	2.8	2.9
A2.14	High suppression pool level	2.9	3.1
A2.15	High containment / drywell pressure	3.6	3.8
A2.16	Loss of, or inadequate heat exchanger cooling flow	3.1	3.1
A2.17	†High containment / drywell temperature	3.2	3.2
A2.18	†Low (or negative) containment/drywell pressure during system operation	3.3	3.5
A2.19	†Low (or negative) suppression chamber pressure during system operation: Mark-I-II	3.5	3.8
A2.20	†Loss of coolant accident	3.7	4.1
A2.21	Loss of containment/drywell cooling system(s)	3.3	3.4

SYSTEM: 226001 RHR/LPCI: Containment Spray System Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A3.	**Ability to monitor automatic operations of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation: Plant-Specific	3.0	3.0
A3.02	System pressure	2.8	2.8
A3.03	System flow	2.8	2.8
A3.04	Lights and alarms	3.1	3.1
A3.05	Containment pressure	4.0*	4.0
A3.06	Containment temperature	3.5	3.5
A3.07	Pump start	3.5	3.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pumps	3.5	3.4
A4.02	Suction valves	3.1	3.1
A4.03	Spray valves	3.5	3.4
A4.04	Keep fill system	2.8	2.7
A4.05	Minimum flow valves	2.9	2.8
A4.06	Heat exchanger cooling flow	2.9	2.8
A4.07	Valve logic reset/ bypass/ override	3.5	3.5
A4.08	System flow	3.2	3.1
A4.09	Pump discharge pressure	2.8	2.7
A4.10	Indicating lights and alarms	3.3	3.2
A4.11	System venting	2.2*	2.2*
A4.12	Containment/drywell pressure	3.8	3.8
A4.13	Containment/drywell temperature	3.3	3.3
A4.14	Suppression pool temperature	3.3	3.6
A4.15	Suppression chamber pressure: Mark-I-II	3.6	3.6
A4.16	The override for suppression pool spray valve logic	3.5	3.5
A4.17	Manual initiation controls: BWR-6	3.8	3.8
A4.18	Automatic system initiation reset: BWR-6	3.8	3.8
A4.19	Drywell temperature	3.4	3.4
A4.20	Drywell pressure	3.9	3.8

SYSTEM: 230000 RHR/LPCI: Torus/Suppression Pool Spray Mode

TASK: Lineup the torus spray system
Manually initiate torus spray
Monitor the torus spray system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Suppression pool	3.6	3.7
K1.02	Condensate storage and transfer system	2.4*	2.5
K1.03	LPCI/RHR piping	3.3	3.5
K1.04	LPCI/RHR pumps	3.4	3.6
K1.05	A.C. electrical	3.2	3.3
K1.06	Keep fill system	3.0	3.1
K1.07	D.C. electrical	2.4*	2.6*
K1.08	Nuclear boiler instrumentation	3.1	3.2
K1.09	Reactor building drain system	2.3*	2.4
K1.10	Component cooling water systems	2.8	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Valves	2.1*	2.3
K2.02	Pumps	2.8*	2.9
K3.	**Knowledge of the effect that a loss or malfunction of the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE will have on following:** (CFR 41.7 / 45.4)		
K3.01	Suppression chamber pressure	3.7	3.9
K3.02	Suppression pool temperature	3.3	3.5
K3.03	Drywell pressure	3.4	3.6
K3.04	Suppression chamber air temperature	3.7	3.8
K4.	**Knowledge of RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Surveillance for all operable components	3.1	3.3
K4.02	Redundancy	3.1*	3.2
K4.03	Unintentional reduction in vessel injection flow during accident conditions	3.5	3.6
K4.04	Prevention of piping overpressurization	3.0	3.2
K4.05	Pump minimum flow protection	2.8	3.1
K4.06	Pump motor cooling	2.7	2.8

SYSTEM: 230000 RHR/LPCI: Torus/Suppression Pool Spray Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.07	Prevention of water hammer	3.1	3.2
K4.08	Adequate pump net positive suction head	2.9	3.2
K4.09	Spray flow cooling	3.0	3.1
K4.10	Prevention of leakage to the environment through system heat exchanger	3.2	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE :** (CFR 41.5 / 45.3)		
K5.01	System venting	2.6	2.7
K5.02	Pump cavitation	2.4*	2.5
K5.03	Pressure measurement	2.5*	2.6*
K5.04	Evaporative cooling	2.5*	2.5*
K5.05	Convective cooling	2.6*	2.6*
K5.06	Heat exchanger operation	2.5*	2.6
K5.07	Vacuum breaker operation	2.9*	3.1
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical	3.3	3.4
K6.02	D.C. electrica	2.5*	2.8*
K6.03	Emergency generator	3.5	3.6
K6.04	Keep fill system	2.8	2.8
K6.05	Suppression pool	3.3	3.4
K6.06	Condensate storage and transfer system	2.3*	2.4*
K6.07	ECCS room cooling	2.8	3.0
K6.08	Nuclear boiler instrumentation	2.9	3.1
K6.09	Reactor building to suppression pool vacuum breakers	3.5	3.8
K6.10	Component cooling water systems	2.5	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE controls including:** (CFR 41.5 / 45.5)		
A1.01	Suppression chamber pressure	3.8	3.9
A1.02	Suppression pool temperature	3.7	3.8
A1.03	Drywell pressure	3.6	3.8
A1.04	System flow	3.2*	3.3
A1.05	System pressure	2.8*	2.9
A1.06	Suppression pool level	3.3	3.3
A1.07	Condensate storage tank level	2.2*	2.3*

SYSTEM: 230000 RHR/LPCI: Torus/Suppression Pool Spray Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.08	Motor amps	2.4*	2.5*
A1.09	Emergency generator loading	3.3	3.5
A1.10	System lineup	3.7	3.7
A1.11	Suppression chamber air temperature	3.6	3.6
A2.	**Ability to (a) predict the impacts of the following on the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Inadequate net positive suction head	3.0	3.2
A2.02	Pump trips	3 8	8 4
A2.03	Valve closures	2.9	3.2
A2.04	Valve openings	2.8	3.1
A2.05	A.C. electrical failures	3.3	3.6
A2.06	D.C. electrical failures	2.6*	2.9*
A2.07	Emergency generator failure	3.5	3.8
A2.08	Pump seal failure	2.8	3.2
A2.09	Inadequate room cooling	2.8	3.0
A2.10	Nuclear boiler instrument failures	2.8	3.0
A2.11	Motor operated valve failures	3.1	3.3
A2.12	Valve logic failure	3.2	3.3
A2.13	High suppression pool level	2.9	3.2
A2.14	Low (or negative) suppression pool pressure during system operation	3.2	3.5
A2.15	Loss of coolant accident	4.0	4.1
A2.16	Loss of, or inadequate, heat exchanger cooling flow	3.1	3.3
A3.	**Ability to monitor automatic operations of the RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	3.4	3.3
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pumps	3.7*	3.5
A4.02	Spray valves	3.8	3.6
A4.03	Keep fill system	3.1	3.0
A4.04	Minimum flow valves	3.1	2.9
A4.05	Heat exchanger cooling flow	3.2	3.1
A4.06	Valve logic reset following automatic initiation of LPCI/RHR in injection mode	4.0	3.9
A4.07	System flow	3.6	3.4
A4.08	Pump/system discharge pressure	3.0	2.9

SYSTEM: 230000 RHR/LPCI: Torus/Suppression Pool Spray Mode

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.09	Indicating lights and alarms	3.6	3.3
A4.10	Condensate storage tank level	2.4*	2.4
A4.11	System venting	2.5	2.4
A4.12	Suppression pool level	3.8	3.8
A4.13	Suppression chamber pressure	4.0	3.9
A4.14	Suppression pool temperature	3.8	3.8
A4.15	Drywell pressure	3.9	4.0
A4.16	The override for suppression pool spray valve logic . .	3.8	3.8

SYSTEM: 290001 Secondary Containment

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between SECONDARY CONTAINMENT and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor building ventilation: Plant-Specific	3.3	3.5
K1.02	Primary containment system: Plant-Specific	3.4	3.6
K1.03	Radwaste building ventilation: Plant-Specific	2.4	2.7
K1.04	SBGT	3.7	3.9
K1.05	Auxiliary building ventilation: Plant-Specific	3.1	3.3
K1.06	Auxiliary building isolation: BWR-6	3.4	3.6
K1.07	Turbine building ventilation (steam tunnel): Plant-Specific	3.0	3.1
K1.08	Exhaust stack: BWR-2,3,4	3.2	3.3
K1.09	Plant air systems	2.9	2.9
K1.10	Auxiliary boiler system: BWR-2,3,4	1.6*	1.6*
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the SECONDARY CONTAINMENT will have on following:** (CFR 41.7 / 45.4)		
K3.01	†Off-site radioactive release rates	4.0	4.4*
K4.	**Knowledge of SECONDARY CONTAINMENT design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Personnel access without breaching secondary containment: Plant-System	3.5	3.8
K4.02	Protection against over pressurization: Plant-System .	3.4	3.5
K4.03	Fluid leakage collection	2.8	2.9
K4.04	Auxiliary building isolation: BWR-6	3.4	3.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT :** (CFR 41.5 / 45.3)		
K5.01	Vacuum breaker operation: BWR-4	3.3*	3.4
K5.02	Flow measurement: BWR-3	2.2	2.2
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the SECONDARY CONTAINMENT :** (CFR 41.7 / 45.7)		
K6.01	Reactor building ventilation: Plant-Specific	3.5	3.6

SYSTEM: 290001 Secondary Containment

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.02	Radwaste building ventilation: Plant-Specific	2.4	2.6
K6.03	SBGT	3.8	4.0
K6.04	Primary containment system	3.9	4.1
K6.05	Auxiliary building ventilation: Plant-Specific	2.9	3.0
K6.06	Turbine building ventilation: Plant-Specific	2.2*	2.3
K6.07	Auxiliary boiler system: BWR-3,4	1.9*	2.0*
K6.08	Plant air systems	2.7	2.8
K6.09	A.C. power: BWR-6	3.4	3.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the SECONDARY CONTAINMENT controls including:** (CFR 41.5 / 45.5)		
A1.01	System lineups	3.1	3.1
A1.02	High area temperature: BWR-6	3.6	3.6
A2.	**Ability to (a) predict the impacts of the following on the SECONDARY CONTAINMENT ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	†Personnel airlock failure	3.3	3.7
A2.02	†Excessive outleakage	3.5	3.7
A2.03	High area radiation	3.4	3.6
A2.04	High airborne radiation	3.4	3.7
A2.05	High area temperature	3.1	3.3
A2.06	Auxiliary building isolation: BWR-6	3.7	4.0
A3.	**Ability to monitor automatic operations of the SECONDARY CONTAINMENT including:** (CFR 41.7 / 45.7)		
A3.01	Secondary containment isolation	3.9	4.0
A3.02	Normal building differential pressure: Plant-Specific	3.5	3.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Reactor building differential pressure: Plant-Specific	3.3	3.4
A4.02	Reactor building area temperatures: Plant-Specific . .	3.3	3.4
A4.03	Auxiliary building differential pressure: Plant-Specific	2.6*	2.7
A4.04	Auxiliary building area temperature: Plant-Specific . .	2.6*	2.7

SYSTEM: 290001 Secondary Containment

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A4.05	Fuel building differential pressure: Plant-Specific .	3.3	3.5
A4.06	Fuel building area temperature: Plant-Specific	3.3	3.5
A4.07	Radwaste building differential pressure: Plant-Specific	2.3	2.5
A4.08	Radwaste building area temperature: Plant-Specific . .	2.2	2.4
A4.09	System status lights and alarms: Plant-Specific . . .	3.2	3.2
A4.10	System lineups: Plant-Specific	3.4	3.3
A4.11	System reset: Plant-Specific	3.4	3.4
A4.12	Surveillance testing: Plant-Specific	2.8	3.2

3.6 Electrical

262001	A.C. Electrical Distribution
263000	D.C. Electrical Distribution
264000	Emergency Generators (Diesel/Jet)
262002	Uninterruptable Power Supply (A.C. /D.C.)

SYSTEM: 226001 A.C. Electrical Distribution

TASK: Lineup the electrical distribution system (from station power to reserve station power)
Shift auxiliary buses between the unit auxiliary XFMR and the service/startup XFMR
Monitor the A.C. electrical distribution system (monitor the 416V A.C. power distribution system)
Deenergize a motor control center bus from service
Restore a motor control center bus to service
Deenergize an engineering safeguards (4160V vital) bus from service
Restore an engineering safeguards bus
Backfeed unit auxiliary transformer from main transmission switchyard (main turbine generator links removed)
Transfer a vital (120V)/instrument bus power supply
Operate a vital motor-generator set
Perform ground isolation
Lineup the electrical distribution system (from normal power to startup power) (write in)
Perform equipment/bus testing for ground faults
Perform operation of circuit breakers and disconnects
Perform emergency A.C. load sequencing and 4KV emergency systems volt relays instrumentation function tests
Porform circuit or equipment grounding using built-in devices

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between A.C. ELECTRICAL DISTRIBUTION and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Emergency generators (diesel/jet)	3.8	4.3*
K1.02	D.C. electrical distribution	3.3	3.6
K1.03	Off-site power sources	3.4	3.8
K1.04	Uninterruptible power supply	3.1	3.4
K1,05	Main turbine/generator	3.0	3.2
K1.06	Alternate shutdown system: Plant-Specific	3.6	3.9
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Off-site sources of power	3.3	3.6
K3.	**Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following:** (CFR 41.7 / 45.4)		
K3.01	Major system loads	3.5	3.7
K3.02	Emergency generators	3.8	4.2

SYSTEM: 262001 A.C. Electrical Distribution

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.03	D.C. electrical distribution	2.9	3.2
K3.04	Uninterruptible power supply	3.1	3.3
K3.05	Off-site power system	3.2	3.5
K3.06	Reactor protection system	3.8	4.1*
K4.	**Knowledge of A.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Bus lockouts	3.0	3.4
K4.02	Circuit breaker automatic trips	2.9	3.3
K4.03	Interlocks between automatic bus transfer and breakers	3.1	3.4
K4.04	Protective relaying	2.8	3.1
K4.05	Paralleling of A.C. sources (synchroscope)	3.4	3.6
K4.06	Redundant power sources to vital buses	3.6	3.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to A.C. ELECTRICAL DISTRIBUTION:** (CFR 41.5 / 45.3)		
K5.01	Principle involved with paralleling two A.C. sources	3.1	3.4
K5.02	Breaker control	2.6	2.9
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the A.C. ELECTRICAL DISTRIBUTION:** (CFR 41.7 / 45.7)		
K6.01	D.C. power	3.1	3.4
K6.02	Off-site power	3.6	3.9
K6.03	Generator trip	3.5	3.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the A.C. ELECTRICAL DISTRIBUTION controls including:** (CFR 41.5 / 45.5)		
A1.01	Effect on instrumentation and controls of switching power supplies	3.1	3.4
A1.02	Effects of loads when energizing a bus	3.1	3.5
A1.03	Bus voltage	2.9	3.1
A1.04	Load currents	2.7	2.9
A1.05	Breaker lineups	3.2	3.5

SYSTEM: 262001 A.C. Electrical Distribution

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Turbine/generator trip	3.4	3.6
A2.02	Loss of coolant accident	3.6	3.9
A2.03	Loss of off-site power	3.9	4.3*
A2.04	Types of loads that, if deenergized, would degrade or hinder plant operation	3.8	4.2
A2.05	Bus grounds	2.9	3.3
A2.06	Deenergizing a plant bus	2.7	2.9
A2.07	Energizing a dead bus	3.0	3.2
A2.08	Opening a disconnect under load	3.3	3.6
A2.09	Exceeding voltage limitations	3.1	3.4
A2.10	Exceeding current limitations	2.9	3.4
A2.11	Degraded system voltages	3.2	3.6
A3.	**Ability to monitor automatic operations of the A.C. ELECTRICAL DISTRIBUTION including:** (CFR 41.7 / 45.7)		
A3.01	Breaker tripping	3.1	3.2
A3.02	Automatic bus transfer	3.2	3.3
A3.03	Load shedding	3.4	3.5
A3.04	Load sequencing	3.4	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	All breakers and disconnects (including available switch yard): Plant-Specific	3.4	3.7
A4.02	Synchroscope, including understanding of running and incoming voltages	3.4	3.4
A4.03	Local operation of breakers	3.2	3.4
A4.04	Synchronizing and paralleling of different A.C. supplies	3.6	3.7
A4.05	Voltage, current, power, and frequency on A.C. buses	3.3	3.3

SYSTEM: 263000 D.C. Electrical Distribution

TASK: Startup a battery charger
Shift battery chargers
Monitor the D.C. electrical distribution system (battery, chargers, distribution and PWR panels)
Monitor the D.C. electrical distribution system for grounds
Energize D.C. switchboards
Deenergize D.C. switchboards
Energize D.C. equipment
Deenergize D.C. equipment
Secure a battery charger

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	A.C. electrical distribution	3.3	3.5
K1.02	Battery charger and battery	3.2	3.3
K1.03	Battery ventilation	2.6	2.8
K1.04	Ground detection	2.6	2.9
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Major D.C. loads	3.1	3.4
K2.02	Battery room ventilation	2.1*	2.2*
K3.	**Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on following:** (CFR 41.7 / 45.4)		
K3.01	Emergency generators: Plant-Specific	3.4	3.8
K3.02	Components using D.C. control power (i.e. breakers)	3.5	3.8
K3.03	Systems with D.C. components (i.e. valves, motors, solenoids, etc.)	3.4	3.8
K4.	**Knowledge of D.C. ELECTRICAL DISTRIBUTION design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Manual/ automatic transfers of control: Plant-Specific	3.1	3.4
K4.02	Breaker interlocks, permissives, bypasses and cross ties: Plant-Specific	3.1	3.5

SYSTEM: 263000 D.C. Electrical Distribution

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K5.	Knowledge of the operational implications of the following concepts as they apply to D.C. ELECTRICAL DISTRIBUTION : (CFR 41.5 / 45.3)		
K5.01	Hydrogen generation during battery charging.	2.6	2.9
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the D.C. ELECTRICAL DISTRIBUTION : (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution	3.2	3.5
K6.02	Battery ventilation	2.5	2.6
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the D.C. ELECTRICAL DISTRIBUTION controls including: (CFR 41.5 / 45.5)		
A1.01	Battery charging/discharging rate	2.5	2.8
A2.	Ability to (a) predict the impacts of the following on the D.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2. 01	Grounds	2.8	3.2
A2.02	Loss of ventilation during charging	2.6	2.9
A3.	Ability to monitor automatic operations of the D.C. ELECTRICAL DISTRIBUTION including: (CFR 41.7 / 45.7)		
A3.01	Meters, dials, recorders, alarms, and indicating lights	3.2	3.3
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	Major breakers and control power fuses: Plant-Specific	3.3	3.5
A4.02	Battery voltage indicator: Plant-Specific	3.2	3.1
A4.03	Battery discharge rate: Plant-Specific	2.7	2.8
A4.04	Ground detection circuit: Plant-Specific	3.0	3.2

SYSTEM: 264000 Emergency Generators (Diesel/Jet)

TASK: Perform a lineup of the diesel generator system
Start a diesel generator (D/G)
Load the diesel generator (D/G)
Monitor the diesel generator
Unload the diesel generator
Shutdown the diesel generator (D/G)
Transfer fuel oil from main storage tanks to various system tanks
Operate the diesel starting air compressor
Restart a diesel generator (D/G) with an automatic start signal present
Perform emergency diesel generator (EDG) load tests
Perform lineups on the gas turbine generator
Start the gas turbine generator remotely
Monitor gas turbine generator emergency start
Monitor the gas turbine generator during operation
Conduct normal shutdown of the gas turbine generator
Conduct emergency shutdown of the gas turbine generator

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between EMERGENCY GENERATORS (DIESEL/JET) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	A.C. electrical distribution	3.8	4.1
K1.02	D.C. electrical distribution	3.3	3.4
K1.03	Fire protection system	2.9	3.2
K1.04	Emergency generator cooling water system	3.2	3.3
K1.05	Emergency generator fuel oil supply system	3.2	3.3
K1.06	Starting system	3.2	3.2
K1.07	Emergency core cooling systems	3.9	4.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Air compressor	2.2*	2.4*
K2.02	Fuel oil pumps	2.2*	2.4*
K2.03	Turning gear (jet engine): Plant-Specific	2.0*	2.3*
K2.04	Ignition system (jet engine): Plant-Specific	2.3*	2.7*
K2.05	Lube oil pumps	2.3*	2.4*
K2.06	Battery charger	2.2*	2.2*
K2.07	Emergency generator field flash	2.1*	2.3*
K3.	**Knowledge of the effect that a loss or malfunction of the EMERGENCY GENERATORS (DIESEL/JET) will have on following:** (CFR 41.7 / 45.4)		

SYSTEM: 264000 Emergency Generators (Diesel/Jet)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.01	Emergency core cooling systems	4.2*	4.4*
K3.02	A.C. electrical distribution	3.9	4.0
K3.03	Major loads powered from electrical buses fed by the emergency generator(s)	4.1*	4.2*
K4.	**Knowledge of EMERGENCY GENERATORS (DIESEL/JET) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Emergency generator trips (normal)	3.5	3.7
K4.02	Emergency generator trips (emergency/LOCA)	4.0	4.2
K4.03	Speed droop control	2.5	2.7
K4.04	Field flashing	2.6	2.7
K4.05	Load shedding and sequencing	3.2	3.5
K4.06	Governor control	2.6	2.7
K4.07	Local operation and control	3.3	3.4
K4.08	Automatic startup	3.8	3.7
K5.	**Knowledge of the operational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET) :** (CFR 41.5 / 45.3)		
K5.01	Definition of frequency and synchronous frequency . . .	2.0*	2.1*
K5.02	Reactive power control	2.0*	2.1*
K5 03	Real power control	2.4*	2.4*
K5 04	Governor control	2.4	2.5
K5.05	Paralleling A.C. power sources	3.4	3.4
K5.06	Load sequencing	3.4	3.5
K5.07	Speed droop	2.3	2.4
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the EMERGENCY GENERATORS (DIESEL/JET) :** (CFR 41.7 / 45.7)		
K6.01	Starting air	3.8	3.9
K6.02	Fuel oil pumps	3.6	3.6
K6.03	Lube oil pumps	3.5	3.7
K6.04	Turning gear (jet engine): Plant-Specific	2.5	2.5
K6.05	Ignition system (jet engine): Plant-Specific	2.5	3.0
K6.06	Battery charger	2.9	3.1
K6.07	Cooling water system	3.8	3.9
K6.08	A.C. power	3.6	3.7
K6.09	D.C. power	3.3	3.5

SYSTEM: 264000 Emergency Generators (Diesel/Jet)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/JET) controls including: (CFR 41.5 / 45.5)		
A1.01	Lube oil temperature	3.0*	3.0*
A1.02	Fuel consumption rate	2.2*	2.3
A1.03	Operating voltages, currents, and temperatures	2.8	2.9
A1.04	Crank case temperature and pressure	2.6	2.7
A1.05	Cylinder temperature differential	2.4*	2.4*
A1.06	Emergency generator room temperature	2.3	2.4
A1.07	Gas generator temperature: Plant-Specific	2.0*	2.5
A1.08	Gas generator speed: Plant-Specific	2.0*	2.5
A1.09	Maintaining minimum load on emergency generator (to prevent reverse power)	3.0	3.1
A2.	Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Parallel operation of emergency generator	3.5	3.6
A2.02	Unloading prior to securing emergency generator	3.1	3.1
A2.03	Operating unloaded, lightly loaded, and highly loaded.	3.4	3.4
A2.04	Consequences of operating under/over excited	2.9	3.0
A2.05	Synchronization of the emergency generator with other electrical supplies	3.6	3.6
A2.06	Opening normal and/or alternate power to emergency bus	3.4	3.4
A2.07	Loss of off-site power during full-load testing	3.5	3.7
A2.08	Initiation of emergency generator room fire protection system	3.3	3.7
A2.09	Loss of A.C. power	3.7	4.1
A2.10	LOCA	3.9	4.2*
A3.	Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including: (CFR 41.7 / 45.7)		
A3.01	Automatic starting of compressor and emergency generator	3.0	3.1
A3.02	Minimum time for load pick up	3.1	3.1
A3.03	Indicating lights, meters, and recorders	3.4	3.4
A3.04	Operation of the governor control system on frequency and voltage control	3.1	3.1
A3.05	Load shedding and sequencing	3.4	3.5
A3.06	Cooling water system operation	3.1	3.2

SYSTEM: 264000 Emergency Generators (Diesel/Jet)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Adjustment of exciter voltage	3.3	3.4
A4.02	Synchroscope	3.4	3.4
A4.03	Transfer of emergency control between manual and automatic	3.2	3.4
A4.04	Manual start, loading, and stopping of emergency generator: Plant-Specific	3.7	3.7
A4.05	Transfer of emergency generator (with load) to grid	3.6	3.7
A4.06	Droop setting	2.4*	2.8*

SYSTEM: 262002 Uninterruptable Power Supply (A.C./D.C.)

TASK: Operate a static inverter

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Feedwater level control: Plant-Specific	2.8	3.0
K1.02	RFPT control: Plant-Specific	2.8	3.0
K1.03	Rod position information: Plant-Specific	2.7	2.9
K1.04	Reactor manual control: Plant-Specific	2.8	3.0
K1.05	Reactor/turbine pressure control system control unit: Plant-Specific	2.7	2.9
K1.06	Unit computer: Plant-Specific	2.6	2.7
K1.07	Rod worth minimizer: Plant-Specific	2.8	2.9
K1.08	Containment isolation system: Plant-Specific	2.9	3.1
K1.09	Drywell ventilation control: Plant-Specific	2.5	2.7
K1.10	Fire protection system: Plant-Specific	2.6	2.8
K1.11	Control room recorders: Plant-Specific	2.5	2.6
K1.12	Generator hydrogen and stator cooling water controls: Plant-Specific	2.1*	2.3*
K1.13	Recirculation pump speed control: Plant-Specific	2.5	2.6
K1.14	Main steam line radiation monitors: Plant-Specific	2.8	3.0
K1.15	Stack gas monitors: Plant-Specific	2.7	3.0
K1.16	MSIV's: Plant-Specific	3.1	3.2
K1.17	Scram solenoid valves: Plant-Specific	3.1	3.3
K1.18	Process radiation monitoring system: Plant-Specific	2.5	2.7
K1.19	Power range neutron monitoring system: Plant-Specific	2.9*	3.1*
K1.20	Plant communications equipment: Plant-Specific	2.4	2.7
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K3.	Knowledge of the effect that a loss or malfunction of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) will have on following: (CFR 41.7 / 45.4)		
K3.01	Water level control: Plant-Specific	3.1	3.3
K3.02	Recirculation pump speed: Plant-Specific	2.9	2.9
K3.03	RFPT speed: Plant-Specific	3.0	3.1
K3.04	Fire protection system: Plant-Specific	2.5	2.7
K3.05	Rod worth minimizer: Plant-Specific	2.9	3.0
K3.06	Rod position indication: Plant-Specific	2.8	2.9
K3.07	Movement of control rods: Plant-Specific	2.6	2.8
K3.08	Computer operation: Plant-Specific	2.7	2.8

SYSTEM: 262002 Uninterruptable Power Supply (A.C./D.C.)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.09	Drywell ventilation control: Plant-Specific	2.4	2.7
K3.10	Containment isolation: Plant-Specific	2.7	2.8
K3.11	MSIV's: Plant-Specific	2.8	2.9
K3.12	Control rod drive mechanism: Plant-Specific	2.3*	2.5
K3.13	Rx pressure: Plant-Specific	2.7	2.9
K3.14	Rx power: Plant-Specific	2.8	3.1
K3.15	Main turbine operation: Plant-Specific	2.6	2.7
K3.16	Control room recorders: Plant-Specific	2.4	2.6
K3.17	Process monitoring: Plant-Specific	2.9	3.1
K4.	**Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Transfer from preferred power to alternate power supplies	3.1	3.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) :** (CFR 41.5 / 45.3)		
K5.01	General principles of static inverter operation	2.3*	2.3
K5.02	General principles of motor generator operation: Plant-Specific	2.4	2.5
K5.03	General principles of inertia fly wheel operation: Plant-Specific	2.3*	2.4*
K5.04	General principles of static switch operation	2.1*	2.2*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	2.7	2.9
K6.02	D.C. electrical power	2.8	3.1
K6.03	Static inverter	2.7	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) controls including:** (CFR 41.5 / 45.5)		
A1.01	Inverter electrical outputs	2.4	2.6
A1.02	Motor generator outputs	2.5	2.9

SYSTEM: 262002 Uninterruptable Power Supply (A.C./D.C.)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Under voltage	2.6	2.8
A2.02	Over voltage	2.5	2.7
A2.03	Frequency changes in the system	2.4*	2.6
A2.04	Abnormal battery operation: BWR-1	3.2	3.4
A3.	**Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including:** (CFR 41.7 / 45.7)		
A3.01	Transfer from preferred to alternate source	2.8	3.1
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Transfer from alternative source to preferred source .	2.8	3.1

3.7 Instrumentation

215005	Average Power Range Monitor/Local Power Range Monitor
215003	Intermediate Range Monitor System
216000	Nuclear Boiler Instrumentation
272000	Radiation Monitoring System
212000	Reactor Protection System
215002	Rod Block Monitor System
201005	Rod Control and Information System
214000	Rod Position Information System
201004	Rod Sequence Control System (Plant Specific)
201006	Rod Worth Minimizer System (Plant Specific)
215004	Source Range Monitor System
215001	Traversing In-Core Probe

SYSTEM: 215005 Average Power Range Monitor/Local Power Range Monitor System

TASK: Perform lineups of the nuclear instrumentation system
Monitor the nuclear instrumentation system
Startup the nuclear instrumentation system
Place a source range module in/out of service
Place power range instruments in/out of service
Operate the nuclear instrumentation system
Secure the nuclear instrumentation system
Place transversing incore probe in/out of service
Operate range switches on IRM on power increase and decrease (write in)
Conduct average power range meter (APRM) instrument functional test
Conduct intermediate range monitor - average power range monitor instrument range overlap check
Conduct IRM-inoperative functional test and IRM-high flux functional instrument check
Conduct APRM-high flux in start up or refuel functional test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	RPS	4.0	4.0
K1.02	IRM	3.7	3.7
K1.03	RBM: Plant-Specific	3.4	3.5
K1.04	LPRM channels	3.6	3.6
K1.05	Four rod display: Plant-Specific	3.2	3.2
K1.06	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5	2.8*
K1.07	Process computer, performance monitoring system	2.6	2.9
K1.08	Display control system: Plant-Specific	3.0	3.0
K1.09	Reactor recirculation system: BWR-5,6	3.6	3.6
K1.10	Reactor manual control system: Plant-Specific	3.3	3.3
K1.11	Rod control and information system: Plant-Specific	3.4	3.4
K1.12	Full core display	3.2	3.2
K1.13	Traversing incore probe system	2.6	3.0
K1.14	Reactor vessel	2.8	2.9
K1.15	Redundant reactivity control system: Plant-Specific	3.7	4.0
K1.16	Flow converter/comparator network: Plant-Specific	3.3	3.4
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	LPRM channels	2.4	2.6
K2 02	APRM channels	2.6	2.8

SYSTEM: 215005 Average Power Range Monitor/Local Power Range Monitor System

Tasks as noted previously

IMPORTANCE K/A NO.	KNOWLEDGE	RO	SRO
K3.	**Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	RPS	4.0	4.0
K3.02	Reactor recirculation system: BWR-5,6	3.5	3.5
K3.03	Reactor manual control system: Plant-Specific . . .	3.3	3.3
K3.04	Rod control and information system: Plant-Specific .	3.4	3.4
K3.05	Reactor power indication	3.8	3.8
K3.06	IRM: Plant-Specific	3.5	3.6
K3.07	Rod block monitor: Plant-Specific	3.2	3.3
K3.08	†core thermal calculations	3.0	3.4
K4.	**Knowledge of AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Rod withdrawal blocks	3.7	3.7
K4.02	Reactor SCRAM signals	4.1*	4.2
K4.03	Eliminates the necessity of running signal leads from each LPRM channel to the operator's console full core display	2.1?*	2.2?*
K4.04	Individual LPRM detector replacement	2.0*	2.4*
K4.05	Alarm seal-in	2.4	2.4
K4.06	Effects of detector aging on LPRM/APRM readings	2.6	2.8
K4.07	Flow biased trip setpoints	3.7	3.7
K4.08	Sampling of overall core power in each APRM (accomplished through LPRM assignments and symmetrical rod patterns)	2.7	3.1
K5.	**Knowledge of the operational implications of the following concepts as they apply to AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	LPRM detector operation	2.8	2.9
K5.02	Effects of voids on LPRM indication	2.7	2.8

K5.03 3.3	Control rod symmetrical patterns	2.9
K5.04 3.2	LPRM detector location and core symmetry	2.9
K5.05 3.6	Core flow effects on APRM trip setpoints	3.6
K5.06 2.6*	Assignment of LPRM's to specific APRM channels . . .	2.5*

K6. **Knowledge of the effect that a loss or malfunction of the following will have on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM :**
(CFR 41.7 / 45.7)

K6.01 3.8	RPS	3.7

SYSTEM: 215005 Average Power Range Monitor/Local Power Range Monitor System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.02	†Traversing incore probe system	2.4	2.8
K6.03	Detectors	3.1	3.3
K6.04	Trip units	3.1	3.2
K6.05	IRM: Plant-Specific	2.9	3.1
K6.06	Recorder	2.3	2.4
K6.07	Flow converter/comparator network: Plant-Specific	3.2	3.3
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Reactor power indication	4.0	4.0
A1.02	RPS status	3.9	4.0
A1.03	Control rod block status	3.6	3.6
A1.04	SCRAM and rod block trip setpoints	4.1	4.1
A1.05	Lights and alarms	3.3	3.2
A1.06	Recirculation flow control valve position: Plant-Specific	3.1	3.3
A1.07	APRM (gain adjustment factor)	3.0	3.4
A2.	**Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Power supply degraded	2.7	3.1
A2.02	Upscale or downscale trips	3.6	3.7
A2.03	Inoperative trip (all causes)	3.6	3.8
A2.04	SCRAM trip signals	3.8	3.9
A2.05	Loss of recirculation flow signal	3.5	3.6
A2.06	Recirculation flow channels upscale	3.4	3.5
A2.07	Recirculation flow channels flow mismatch	3.2	3.4
A2.08	Faulty or erratic operation of detectors/systems	3.2	3.4
A2.09	Failed recorder	2.4*	2.4
A2.10	Changes in void concentration	2.8	2.9

SYSTEM: 215005 Average Power Range Monitor/Local Power Range Monitor System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A3.	**Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Four rod display: Plant-Specific	3.5	3.5
A3.02	Full core display	3.5	3.5
A3.03	Meters and recorders	3.3	3.3
A3.04	Annunciator and alarm signals	3.2	3.2
A3.05	Flow converter/comparator alarms	3.3	3.3
A3.06	Maximum disagreement between flow comparator channels: Plant-Specific	3.0	3.1
A3.07	RPS status	3.8	3.8
A3.08	Control rod block status	3.7	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	IRM/APRM recorder	3.2	3.1
A4.02	CRT display indicators: Plant-Specific	2.8	2.8
A4.03	APRM back panel switches, meters and indicating lights	3.2	3.3
A4.04	LPRM back panel switches, meters and indicating lights	3.2	3.2
A4.05	Trip bypasses	3.4	3.4
A4.06	Verification of proper functioning/ operability	3.6	3.8

SYSTEM: 215003 Intermediate Range Monitor (IRM) System

TASK: Perform lineups of the nuclear instrumentation system
Monitor the nuclear instrumentation system
Startup the nuclear instrumentation system
Place an intermediate range module in/out of service
Operate the nuclear instrumentation system
Secure the nuclear instrumentation system
Operate range switches on IRM on power increase and decrease (write in)
Conduct source range meter, intermediate range meter detector not in startup rod block functional test
Conduct intermediate range monitor - average power range monitor instrument range overlap check
Conduct IRM-inoperative functional test and IRM-high flux functional instrument check

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between INTERMEDIATE RANGE MONITOR (IRM) SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	RPS	3.9	3.9
K1.02	Reactor manual control	3.6	3.6
K1.03	Rod control and information system: Plant-Specific	3.1	3.1
K1.04	Process computer/ performance monitoring system (SPDS/ERIS/CRIDS/GDS): Plant-Specific	2.5	2.8
K1.05	Display control system: Plant-Specific	3.3	3.3
K1.06	APRM SCRAM signals: Plant-Specific	3.9	4.0
K1.07	Reactor vessel	3.0	3.0
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	IRM channels/detectors	2.5*	2.7
K3.	**Knowledge of the effect that a loss or malfunction of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	RPS	3.9	4.0
K3.02	Reactor manual control	3.6	3.6
K3.03	Rod control and information system: Plant-Specific	3.7	3.7
K3.04	Reactor power indication	3.6	3.6
K3.05	APRM: Plant-Specific	3.7	3.8

SYSTEM: 215003 Intermediate Range Monitor (IRM) System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	Knowledge of INTERMEDIATE RANGE MONITOR (IRM) SYSTEM design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Rod withdrawal blocks	3.7	3.7
K4.02	Reactor SCRAM signals	4.0	4.0
K4.03	Gamma compensation	2.4	2.4
K4.04	Varying system sensitivity levels using range switches	2.9	2.9
K4.05	Changing detector position	2.9	3.0
K4.06	Alarm seal-in	2.6	2.6
K5.	Knowledge of the operational implications of the following concepts as they apply to INTERMEDIATE RANGE MONITOR (IRM) SYSTEM : (CFR 41.5 / 45.3)		
K5.01	Detector operation	2.6	2.7
K5.02	Gamma discrimination	2.2*	2.3
K5.03	Changing detector position	3.0	3.1
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM : (CFR 41.7 / 45.7)		
K6.01	Reactor protection system (power supply): Plant-Specific	3.8	3.8
K6.02	24/48 volt D.C. power: Plant-Specific	3.6	3.8
K6.03	Detector drive motor	2.8	2.9
K6.04	Detectors	3.0	3.0
K6.05	Trip units	3.1	3.2
K6.06	APRM	3.2	3.4
K6.07	Recorder	2.3	2.3
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM controls including: (CFR 41.5 / 45.5)		
A1.01	Detector position	3.4	3.3
A1.02	Reactor power indication response to rod position changes	3.7	3.7
A1.03	RPS status	3.6	3.7
A1.04	Control rod block status	3.4	3.4
A1.05	SCRAM and rod block trip setpoints	3.9	3.9
A1.06	Lights and alarms	3.3	3.2

SYSTEM: 215003 Intermediate Range Monitor (IRM) System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	**Ability to (a) predict the impacts of the following on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Power supply degraded	2.8	3.2
A2.02	IRM inop condition	3.5	3.7
A2.03	Stuck detector	2.9	3.1
A2.04	Up scale or down scale trips	3.7	3.8
A2.05	Faulty or erratic operation of detectors/system	3.3	3.5
A2.06	Faulty range switch	3.0	3.2
A2.07	Failed recorder	2.5	2.7
A3.	**Ability to monitor automatic operations of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Meters and recorders	3.3	3.3
A3.02	Annunciator and alarm signals	3.3	3.3
A3.03	RPS status	3.7	3.6
A3.04	Control rod block status	3.5	3.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	IRM recorder indication	3.3	3.3
A4.02	CRT display indications: Plant-Specific	2.9	2.8
A4.03	IRM range switches	3.6	3.4
A4.04	IRM back panel switches, meters, and indicating lights	3.1	3.3
A4.05	Trip bypasses	3.4	3.4
A4.06	Detector drives	3.0	2.9
A4.07	Verification of proper functioning/ operability	3.6	3.6

SYSTEM: 216000 Nuclear Boiler Instrumentation

TASK: Perform lineups of the non-nuclear instrumentation system
Monitor the non-nuclear instrumentation system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between NUCLEAR BOILER INSTRUMENTATION and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor protection system	3.9	4.1
K1.02	PCIS/NSSSS	3.8	4.0
K1.03	Reactor core isolation cooling system: Plant-Specific	3.4	3.6
K1.04	High pressure core spray system: Plant-Specific	3.9	4.0
K1.05	Residual heat removal: Plant-Specific	3.7	3.9
K1.06	Low pressure core spray	3.9	3.9
K1.07	Automatic depressurization system	3.9	4.1
K1.08	Relief/safety valves	3.7	3.9
K1.09	Redundant reactivity control/ alternate rod insertion; Plant-Specific	3.7	4.0
K1.10	Recirculation flow control system	3.2	3.4
K1.11	MSIV leakage control system: Plant-Specific	2.7	2.8
K1.12	Reactor water level control system	3.6	3.7
K1.13	Feedwater system	3.4	3.5
K1.14	High pressure coolant injection: Plant-Specific	3.8	4.1*
K1.15	Isolation condenser: Plant-Specific	3.9*	4.1*
K1.16	Main turbine	3.0	3.1
K1.17	Emergency generators	3.5	3.7
K1.18	Analog trip system: Plant-Specific	3.0*	3.1
K1.19	Anticipated transient without scram system: Plant-Specific	3.8	3.9
K1.20	Process computer: Plant-Specific	2.6	2.8
K1.21	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.6*	2.9*
K1.22	Reactor vessel	3.6	3.8
K1.23	Recirculation system	3.3	3.4
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Analog trip system: Plant-Specific	2.8	2.8
K3.	**Knowledge of the effect that a loss or malfunction of the NUCLEAR BOILER Instrumentation will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor protection system	4.0	4.3*
K3.02	PCIS/NSSSS	4.0	4.3*

SYSTEM: 216000 Nuclear Boiler Instrumentation

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.03	Reactor core isolation cooling system: Plant-Specific	3.5	3.8
	. . . .	3.8	4.0
K3.04	High pressure core spray system: Plant-Specific	3.8	3.9
K3.05	Residual heat removal: Plant-Specific	3.8	3.9
K3.06	Low pressure core spray	3.9	4.1
K3.07	Automatic depressurization system	3.6	3.7
K3.08	Relief/safety valves		
K3.09	Redundant reactivity control/ alternate rod insertion: Plant-Specific	3.7	4.0
K3.10	Recirculation flow control system	3.2	3.3
K3.11	MSIV leakage control system: Plant-Specific	2.8	2.8
K3.12	Reactor water level control system	3.7	3.8
K3.13	Feedwater system	3.4	3.5
K3.14	High pressure coolant injection: Plant-Specific	3.8	4.2*
K3.15	Isolation condenser: Plant-Specific	3.8	4.2*
K3.16	Main turbine	3.0	3.1
K3.17	Emergency generators	3.5	3.7
K3.18	Analog trip system: Plant-Specific	2.9*	3.0
K3.19	Anticipated transient without scram system: Plant-Specific	3.7	4.0*
K3.20	Process computer: Plant-Specific	2.5	2.6
K3.21	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.6*	2.8*
K3 22	Reactor vessel	3.2	3.3
K3 23	Vessel temperature monitoring	3.1	3.3
K3.24	Vessel level monitoring	3.9	4.1
K3 25	Vessel pressure monitoring	3.9	4.1
K3 26	Core flow monitoring	3.6	3.7
K3.27	Core differential pressure monitoring	2.9	3.1
K3.28	Loose parts detection in the primary system: Plant-Specific	2.0*	2.1*
K3.29	Jet pump flow monitoring: Plant-Specific	3.1	3.2
K3.30	Recirculation system	3.2	3.3
K4.	**Knowledge of NUCLEAR BOILER INSTRUMENTATION design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Reading of nuclear boiler parameters outside the control room	3.6	3.6
K4.02	Physical separation of sensors	3.0	3.2
K4.03	Redundancy of sensors	3.4	3.6
K4 04	Inputs to the reactor protection system	3.7	3.8
K4 05	Initiation of the emergency core cooling systems	3.9	4.1
K4.06	Initiation of the PCIS/NSSSS	3.8	4.0
K4.07	Recirculation pump protection: Plant-Specific	2.9	3.0

SYSTEM: 216000 Nuclear Boiler Instrumentation

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.08	Protection for the main turbine from high moisture carryover	2.9	3.0
K4.09	Protection against filling the main steam lines from the feed system	3.3	3.3
K4.10	Automatic recirculation pump speed control: Plant-Specific	2.9	3.1
K4.11	Inputs to the redundant reactivity control system/alternate rod insertion: Plant-Specific . . .	4.0	4.[illegible]
K4.12	Reactor vessel overpressure protection	3.7	3.9
K4.13	Overpressure protection for various low-pressure systems	3.4	3.4
K4.14	Temperature compensation for reactor water level indication: Plant-Specific	3.3	3.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to NUCLEAR BOILER INSTRUMENTATION :** (CFR 41.5 / 45.3)		
K5.01	Vessel level measurement	3.1	3.2
K5.02	Vessel pressure measurement	3.1	3.2
K5.03	Vessel temperature measurement	3.0	3.2
K5.04	Vessel differential pressure measurement	2.8	2.9
K5.05	Vessel vibration measurement (loose parts monitor) . .	2.3	2.3
K5.06	Rapid vessel depressurization effects on vessel level indications	3.4	3.6
K5.07	Elevated containment temperature effects on level indication	3.6	3.8
K5.08	Steam flow effect on reactor water level	3.1	3.2
K5.09	Recirculation flow effects on level indications: Design-Specific	2.9	2.9
K5.10	Indicated level versus actual vessel level during vessel heatups or cooldowns	3.1	3.3
K5.11	Indicated vessel temperature response during rapid heatups or cooldowns	3.2	3.3
K5.12	Effects on level indication due to rapid changes in void fraction	3.2	3.3
K5.13	Reference leg flashing: Design-Specific	3.5	3.6
K5.14	Density	2.6	2.6
K5.15	Static pressure	2.2*	2.2*
K5.16	Dynamic pressure	2.1*	2.1*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the NUCLEAR BOILER INSTRUMENTATION :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution	3.1	3.3

SYSTEM: 216000 Nuclear Boiler Instrumentation

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.02	D.C. electrical distribution	2.8	3.0
K6.03	Temperature compensation: Plant-Specific	2.8	2.8
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the NUCLEAR BOILER INSTRUMENTATION controls including:** (CFR 41.5 / 45.5)		
A1.01	Recorders and meters	3.4	3.3
A1.02	Removing or returning a sensor (transmitter) to service	2.9*	3.1*
A1.03	Surveillance testing	2.9*	3.2*
A1.04	System venting	2.6*	2.8*
A2.	**Ability to (a) predict the impacts of the following on the NUCLEAR BOILER INSTRUMENTATION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Detector equalizing valve leaks	2.9	3.2
A2.02	Instrument line plugging	2.9	3.0
A2.03	Instrument line leakage	3.0	3.1
A2.04	Detector diaphragm failure or leakage	2.9	3.0
A2.05	Surveillance testing	2.8	3.1
A2.06	Loss of power supply	2.9	3.1
A2.07	Reference leg flashing	3.4	3.5
A2.08	Elevated containment temperature	3.2	3.4
A2.09	Jet pump flow: Design-Specific	3.1	3.2
A2.10	Rapid vessel depressurizations	3.3	3.5
A2.11	Heatup or cooldown of the reactor vessel	3.2	3.3
A2.12	Instrument isolation valve closures	2.8	2.9
A2.13	Instrument isolation valve openings	2.8	3.0
A2.14	Recirculation flow: Design-Specific	2.9	2.9
A3.	**Ability to monitor automatic operations of the NUCLEAR BOILER Instrumentation including:** (CFR 41.7 / 45.7)		
A3.01	Relationship between meter/recorder readings and actual parameter values: Plant-Specific	3.4	3.4
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4. 01	Recorders	3.3	3.1

SYSTEM: 216000 Nuclear Boiler Instrumentation

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.02	Channel select controls	3.3	3.1
A4.03	Process computer: Design-Specific	3.0	3.1

SYSTEM: 272000 Radiation Monitoring System

TASK: Perform lineups of the area radiation monitoring system
Operate area radiation monitors
Monitor area radiation
Perform lineups of process radiation monitoring system
Operate process radiation monitors
Monitor process radiation monitor operation

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RADIATION MONITORING SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system	3.6	3.8
K1.02	Offgas system (augmented offgas): Plant-Specific	3.2	3.5
K1.03	Stack gas: Plant-Specific	3.3	3.6
K1.04	Applicable component cooling water system	2.9	2.9
K1 05	Radwaste system	2.8	3.1
K1.06	Reactor building ventilation system: Plant-Specific	3.2	3.3
K1.07	Isolation condenser: Plant-Specific	3.0	3.2
K1.08	Reactor protection system	3.6	3.9
K1.09	Primary containment isolation system	3.6	3.8
K1.10	Reactor building refuel floor: Plant-Specific	3.4	3.6
K1.11	Reactor building overhead crane; Plant-Specific	2.1*	2.4*
K1.12	Reactor building	3.1	3.2
K1.13	Turbine building	2.9	3.0
K1.14	Radwaste building: Plant-Specific	2.7	2.8
K1.15	Filter building: Plant-Specific	2.8	3.0
K1.16	Process computer	2.2*	2.3*
K1.17	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.4	2.7
K1.18	Primary containment/containment building: Plant-Specific	3.1	3.1
K1.19	Drywell	3.1	3.2
K1.20	†Auxiliary building: Plant-Specific	2.8	3.0
K1.21	Circulating water: Plant-Specific	2.3	2.4
K1.22	Fuel building: mark-III	3.0	3.4
K1.23	Continuous air monitoring: Plant-Specific	3.0	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Main steamline radiation monitors	2.5	2.8
K2.02	Offgas radiation monitoring system	2.5	2.8
K2.03	Stack gas radiation monitoring system	2.5	2.8
K2.04	Process liquid radiation monitoring system	2.3	2.5

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K2.05	Reactor building ventilation monitors: Plant-Specific	2.6	2.9
K2.06	Area radiation monitors	2.1*	2.2*
K2.07	Control room ventilation monitors: Plant-Specific	2.2*	2.4*
K3	**Knowledge of the effect that a loss or malfunction of the RADIATION MONITORING System will have on following:** (CFR 41.5 / 45.3)		
K3.01	†Station liquid effluent release monitoring	3.2	3.8
K3.02	†Station gaseous effluent release monitoring	3.1	3.8
K3.03	Station area radiation monitoring	3.2	3.4
K3.04	Main steam system	3.7	3.8
K3.05	Offgas system	3.5	3.7
K3.06	Reactor building ventilation: Plant-Specific	3.4	3.6
K3.07	Reactor building overhead crane operation: Plant-Specific	2.4*	3.0
K3.08	†Auxiliary building ventilation: Plant-Specific	2.9	3.3
K3.09	Radwaste building ventilation: Plant-Specific	2.8	3.1
K3.10	Control room ventilation: Plant-Specific	2.9	3.3
K4.	**Knowledge of RADIATION MONITORING System design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Redundancy	2.7	2.8
K4.02	Automatic actions to contain the radioactive release in the event that the predetermined release rates are exceeded	3.7	4.1
K4.03	Fail safe tripping of process radiation monitoring logic during conditions of instrument failure	3.6	3.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to RADIATION MONITORING SYSTEM :** (CFR 41.7 / 45.4)		
K5.01	Hydrogen injection operation's effect on process radiation indications: Plant-Specific	3.2	3.5
K6	**Knowledge of the effect that a loss or malfunction of the following will have on the RADIATION MONITORING SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Reactor protection system	3.0	3.2
K6.02	D.C. power	2.5	2.7
K6.03	A.C. power	2.8	3.0

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.04	Process computer	2.0*	2.2*
K6.05	SPDS/ERIS/CRID/GDS: Plant-Specific	2.1*	2.4*
K6.06	Continuous air monitoring: Plant-Specific	2.4	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RADIATION MONITORING SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Lights, alarms, and indications associated with normal operations	3.2	3.2
A1.02	Lights, alarms, and indications associated with surveillance testing	2.9	2.9
A2.	**Ability to (d) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Fuel element failure	3.7	4.1
A2.02	Reactor protection system power failure	3.3	3.6
A2.03	A.C. electrical failure	2.9	3.1
A2.04	D.C. electrical failure	2.7	2.8
A2.05	Loss of dilution steam	2.5	2.6
A2.06	Downscale trips	2.8	2.9
A2.07	Hydrogen injection operation: Plant-Specific	2.6	2.8
A2.08	Offgas system failure	2.9	3.1
A2.09	Low fuel pool level	3.1	3.3
A2.10	Loss of coolant accident	3.9	4.1
A2.11	Leakage and/or breaks from contaminated systems to atmosphere or to other process systems	3.4	3.7
A2.12	†Refuel floor handling accidents/operations	3.3	4.0
A2.13	Low reactor water level during refueling operations	3.3	3.8
A2.14	Loss of, or inadequate, shielding	3.2	3.5
A2.15	Maintenance operations	2.5	2.7
A2.16	Instrument malfunctions	2.7	2.9
A3.	**Ability to monitor automatic operations of the RADIATION MONITORING SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Main steam isolation indications	3.8	3.9
A3.02	Offgas system isolation indications	3.6	3.7
A3.03	Liquid radwaste isolation indications	3.1	3.5
A3.04	Radwaste handing interlocks	2.3	2.8

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A3.05	Refuel floor overhead crane operation interrupt: Plant-Specific	3.0	3.1
A3 06	Ventilation system isolation indications	3.4	3.4
A3 07	Recorder indications	2.8	2.9
A3.08	Meter indications	2.9	2.9
A3.09	Containment isolation indications	3.6	3.5
A3.10	Lights and alarms	3.3	3.2
A3.11	Circulating water system blowdown isolations: Plant-Specific	2.6	2.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Recorder indications	2.9	2.9
A4.02	Meter indications	3.0	3.0
A4 03	Power supply status indicators	2.6	2.6
A4 04	SPDS/ERIS/CRID/GDS	2.5*	2.7*
A4.05	†Convert process radiation monitor readings to offsite release rates: Plant-Specific	2.3*	3.7*
A4.06	†Manually trip process radiation monitor logic	2.9	3.2

SYSTEM: 212000 Reactor Protection System

TASK: Energize the reactor protection system
Place a reactor protection channel in the tripped condition
Bypass a trip condition on a reactor protection channel (bypass an average power range monitor trip)
Deenergize the reactor protection system
Monitor the reactor protection system
Operate the reactor protection system MG sets
Operate the reactor mode switch
Operate the reactor trip breakers
Shift the reactor protection system bus to the alternate power supply
Conduct manual SCRAM functional test
Conduct mode switch in shutdown functional test
Conduct RPS channel test switch functional test

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR PROTECTION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Nuclear instrumentation	3.7	3.9
K1.02	Nuclear boiler instrumentation	3.7	3.9
K1.03	Recirculation system	3.4	3.6
K1.04	A.C. electrical distribution	3.4	3.6
K1.05	Process radiation monitoring system	3.3	3.6
K1.06	Control rod drive hydraulic system	3.5	3.6
K1.07	Relief/safety valves (low-low-set logic): Plant-Specific	3.3	3.5
K1.08	Control rod and drive mechanism	3.0	3.1
K1.09	Process computer	2.3	2.4
K1.10	Main turbine	3.2	3.4
K1.11	Condenser vacuum	3.3	3.5
K1.12	Reactor/turbine pressure control system: Plant-Specific	3.4	3.6
K1.13	Containment pressure	3.5	3.6
K1.14	Main steam system	3.6	3.7
K1.15	SCRAM air header pressure	3.8	3.9
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	RPS motor-generator sets	3.2	3.3
K2.02	Analog trip system logic cabinets	2.7	2.9
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR PROTECTION SYSTEM will have on following:** (CFR 41.7 / 45.4)		

SYSTEM: 212000 Reactor Protection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K3.01	Process radiation monitoring	3.0	3.2
K3.02	Primary containment isolation system/nuclear steam supply shut-off: Plant-Specific	3.7	3.9
K3.03	Local power range monitoring system: Plant-Specific	3.3	3.4
K3.04	Average power range monitoring system: Plant-Specific	3.5	3.6
K3.05	RPS logic channels	3.7	3.8
K3.06	Scram air header solenoid operated valves	4.0	4.1
K3.07	Reactor power (thermal heat flux)	3.8	3.9
K3.08	Reactor coolant primary system integrity	3.6	3.8
K3.09	The magnitude of heat energy that must be absorbed by the containment during accident/transient conditions	3.2	3.6
K3.10	The ability of the core cooling systems to provide adequate core cooling during loss of coolant accidents	3.5	3.9
K3.11	Recirculation system	3.0	3.3
K3.12	Secondary containment integrity	3.2	3.3
K4.	**Knowledge of REACTOR PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	System redundancy and reliability	3.4	3.6
K4.02	The prevention of a reactor SCRAM following a single component failure	3.5	3.7
K4.03	The prevention of supplying power to a given RPS bus from multiple sources simultaneously	3.0*	3.1*
K4.04	The prevention of supplying both RPS buses simultaneously from the alternate power source: Plant-Specific	3.1	3.1
K4.05	Functional testing of the system while maintaining power operation	3.4	3.6
K4.06	Select rod insertion: Plant-Specific	3.0	3.0
K4.07	Manual system activation (trip)	4.1*	4.1
K4.08	Complete control rod insertion following SCRAM signal generation	4.2*	4.2*
K4.09	Control rod insertion following RPS system electrical failure	3.8	3.9
K4.10	Individual rod SCRAM testing	3.3	3.6
K4.11	Operation with shorting links removed: Plant-Specific	3.3	3.5
K4.12	Bypassing of selected SCRAM signals (manually and automatically): Plant-Specific	3.9	4.1

SYSTEM: 212000 Reactor Protection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR PROTECTION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Fuel thermal time constant	2.7	2.9
K5.02	Specific logic arrangements	3.3	3.4
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR PROTECTION SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution	3.6	3.8
K6.02	Nuclear instrumentation	3.7	3.9
K6.03	Nuclear boiler instrumentation	3.5	3.7
K6.04	D.C. electrical distribution	2.8	3.1
K6.05	RPS sensor inputs	3.5	3.8
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the REACTOR PROTECTION SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	RPS motor-generator output voltage	2.8*	2.9
A1.02	RPS motor-generator output amps	2.8*	2.9
A1.03	RPS motor-generator output frequency: Plant-Specific	2.4*	2.5
A1.04	RPS bus voltage: Plant-Specific	2.8*	3.0
A1.05	RPS bus frequency: Plant-Specific	2.6*	2.7
A1.06	Reactor power	4.2*	4.2*
A1.07	Rod position information	3.4	3.4
A1.08	Valve position	3.4	3.4
A1.09	Individual relay status: Plant-Specific	2.7	3.0
A1.10	Process computer	2.2*	2.4*
A1.11	System status lights and alarms	3.4	3.3
A2.	**Ability to (a) predict the impacts of the following on the REACTOR PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	RPS motor-generator set failure	3.7	3.9
A2.02	RPS bus power supply failure	3.7	3.9
A2.03	Surveillance testing	3.3	3.5
A2.04	Nuclear instrument system failure	3.5	3.7
A2.05	Nuclear boiler instrument system failure	3.4	3.7

SYSTEM: 212000 Reactor Protection System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.06	High reactor power	4.1*	4.2*
A2.07	High reactor pressure	4.1*	4.2*
A2.08	Low reactor level	4.1*	4.2*
A2.09	High containment/drywell pressure	4.1*	4.3*
A2.10	Reactor/turbine pressure control system low pressure: Plant-Specific	3.6	3.8
A2.11	Main steamline isolation valve closure	4.0	4.1
A2.12	Main turbine stop control valve closure	4.0	4.1
A2.13	Low condenser vacuum: Plant-Specific	3.8	3.9
A2.14	High SCRAM instrument volume water level	3.9	4.0
A2.15	Load rejection	3.7	3.8
A2.16	Changing mode switch position	4.0	4.1
A2.17	Main steamline high radiation	4.0	4.2*
A2.18	†SCRAM air header low pressure	3.8	3.9
A2.19	Partial system activation (half-SCRAM)	3.8	3.9
A2.20	Full system activation (full-SCRAM)	4.1*	4.2*
A2.21	†Failure of individual relays to reposition: Plant-Specific	3.6	3.9
A3.	**Ability to monitor automatic operations of the REACTOR PROTECTION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Reactor Power	4.4*	4.4*
A3.02	Individual system relay status: Plant-Specific	3.2	3.5
A3.03	Rod position	4.2*	4.2*
A3.04	System status lights and alarms	3.9*	3.8
A3.05	SCRAM instrument volume level	3.9	3.9
A3.06	Main turbine trip: Plant-Specific	4.2*	4.2*
A3.07	SCRAM air header pressure	3.6	3.6
A3.08	Recirculation pump trip	3.7	3.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Provide manual SCRAM signal(s)	4.6*	4.6
A4.02	Perform system functional test(s)	3.6	3.7
A4 03	Provide manual select rod insertion: Plant-Specific	3.9	3.9
A4 04	Bypass SCRAM instrument volume high level SCRAM signal	3.9	3.9
A4.05	Reactor power	4.3*	4.3*
A4.06	Control rod position	4.2*	4.1*
A4.07	System status lights and alarms	4.0*	3.9*
A4.08	Individual system relay status: Plant-Specific	3.4	3.4
A4.09	SCRAM instrument volume level	3.9	3.8
A4.10	Main turbine trip: Plant-Specific	4.1	4.0
A4.11	Scram air header pressure	3.7	3.7

SYSTEM: 212000 Reactor Protection System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A4.12	Close/open SCRAM instrument volume vent and/or drain valves	3.9	3.9
A4.13	†Perform individual control rod SCRAM testing	3.4	3.6
A4.14	Reset system following system activation	3.8	3.8
A4 15	Recirculation pump trip/EOC RPT	3.9	3.8
A4 16	Manually activate anticipated transient without SCRAM circuitry/RRCS: Plant-Specific	4.4*	4.4*
A4.17	Perform alternate reactivity/ shutdown operations . . .	4.1	4.1

SYSTEM: 215002 Rod Block Monitor System

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between ROD BLOCK MONITOR SYSTEM and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	APRM: BWR-3,4,5	2.9	3.0
K1.02	LPRM: BWR-3,4,5	3.2	3.1
K1 03	Reactor manual control: BWR-3,4,5	3.2	3.2
K1 04	Recirculation system: BWR-3,4,5	3.1	3.1
K1.05	Four rod display: BWR-3,4,5	3.0	3.0
K1.06	Control rod selection: BWR-3,4,5	3.0	3.1
K1.07	IRM: BWR-3,4,5	2.0*	2.0*
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	RBM channels: BWR-3,4,5	2.5*	2.8*
K2.02	Recorders: BWR-3,4,5	2.1*	2.1*
K2.03	APRM channels: BWR-3,4,5	2.8	2.9
K3.	Knowledge of the effect that a loss or malfunction of the ROD BLOCK MONITOR SYSTEM will have on following: (CFR 41.7 / 45.4)		
K3.01	Reactor manual control system: BWR-3,4,5	3.3	3.5
K3.02	†Limiting control rod pattern: Plant-Specific	3.1	3.6
K4.	Knowledge of ROD BLOCK MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Prevent control rod withdrawal: BWR-3,4,5	3.4	3.5
K4.02	Allows stepping up of rod block setpoint: BWR-3,4,5	2.9	3.0
K4.03	Initiation point (30%): BWR-3,4,5	2.9	3.0
K5.	Knowledge of the operational implications of the following concepts as they apply to ROD BLOCK MONITOR SYSTEM : (CFR 41.5 / 45.3)		
K5.01	Trip reference selection: Plant-Specific	2.6	2.8
K5.02	Null sequence control: BWR-3,4,5	2.4	2.5
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the ROD BLOCK MONITOR SYSTEM : (CFR 41.7 / 45.7)		
K6.01	RPS: BWR-3,4,5	3.0	3.2

SYSTEM: 215002 Rod Block Monitor System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K6.02	Instrument power: Plant-Specific	2.4	2.5
K6.03	Essential power: Plant-Specific	2.5	2.5
K6.04	APRM reference channel: BWR-3,4,5	2.8	3.0
K6.05	LPRM detectors: BWR-3,4,5	2.8	3.1
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ROD BLOCK MONITOR SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Trip reference: BWR-3,4,5	2.7	2.8
A2.	**Ability to (a) predict the impacts of the following on the ROD BLOCK MONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Withdrawal of control rod in high power region of core: BWR-3,4,5	3.3	3.5
A2.02	Loss or reduction in recirculation system flow (flow comparator): BWR-3,4,5	3-3	3-3
A2.03	Loss of associated reference APRM channel: BWR-3,4,5	3.1	3.3
A2.04	Power supply losses: BWR-3,4,5	2.7	2.8
A2.05	RBM high or inoperable: BWR-3,4,5	3.2	3.3
A3.	**Ability to monitor automatic operations of the ROD BLOCK MONITOR SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Four rod display: BWR-3,4,5	3.1	3.1
A3.02	Meters and recorders: BWR-3,4,5	3.1	3.0
A3.03	Alarm and indicating lights: BWR-3,4,5	3.1	3.1
A3.04	Verification or proper functioning/ operability: BWR-3,4,5	3.6	3.5
A3.05	Back panel meters and indicating lights: BWR-3,4,5	3.2	3.2
A3.06	Transfer to alternate APRM when referenced APRM bypassed: BWR-3,4,5	2.6	2.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	IRM/RBM recorder/switch: BWR-3,4,5	2.8	2.7
A4.02	RBM back panel switches, meters and indicating lights: BWR-3,4,5	2.9	2.9
A4.03	Trip bypasses: BWR-3,4,5	2.8	2.8

SYSTEM: 215002 Rod Block Monitor System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A4.04	"Push to Check" pushbutton: Plant-Specific	2.6	2.5
A4.05	"Setup" pushbutton: Plant-Specific	2.5	2.5
A4.06	Surveillance testing: BWR-3,4,5	2.7*	2.7

SYSTEM: 201005 Rod Control and Information System (RCIS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between ROD CONTROL AND INFORMATION SYSTEM (RCIS) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Neutron monitoring system: BWR-6	3.3	3.3
K1.02	Reactor/turbine pressure control system: BWR-6	3.3	3.5
K1.03	Control rod drive system: BWR-6	3.7	3.7
K1.04	Rod position information system: BWR-6	3.7	3.7
K1.05	Rod action control system: BWR-6	3.5	3.5
K1.06	Rod gang drive system: BWR-6	3.3	3.3
K1.07	Rod interface system: BWR-6	3.3	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	A.C. electrical power: BWR-6	2.4	2.6
K3.	**Knowledge of the effect that a loss or malfunction of the ROD CONTROL AND INFORMATION SYSTEM (RCIS) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Control rod drive system: BWR-6	3.3	3.7
K3.02	Reactor startup: BWR-6	3.5	3.5
K3.03	Reactor shutdown: BWR-6	3.0	3.2
K3.04	†FlUX shaping: BWR-6	3.0	3.3

SYSTEM: 201005 Rod Control and Information System (RCIS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	**Knowledge of ROD CONTROL AND INFORMATION SYSTEM (RCIS) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Limiting the effects of a control Rod accident: BWR-6	3.2	3.2
K4.02	Bank position withdrawal sequence (BPWS): BWR-6	3.3	3.3
K4.03	Rod withdrawal block signals: BWR-6	3.5	3.5
K4.04	Rod insertion block signals: BWR-6	3.5	3.5
K4.05	Rod withdrawal limiter: BWR-6	3.5	3.5
K4.06	Rod pattern controller rod blocks: BWR-6	3.5	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to ROD CONTROL AND INFORMATION SYSTEM (RCIS) :** (CFR 41.5 / 45.3)		
K5.01	†Rod pattern and program development: BWR-6	2.3	3.2
K5.02	Rod pattern controller (RPC): BWR-6	2.8	3.3
K5.03	Rod groups: BWR-6	2.3	2.7
K5.04	†Rod sequences: BWR-6	2.7	3.0
K5.05	Rod density: BWR-6	2.7	3.0
K5.06	Target rod pattern: BWR-6	2.8	2.8
K5.07	Low power alarm point: BWR-6	3.5	3.5
K5.08	Transition zone: BWR-6	3.2	3.5
K5.09	High power setpoints BWR-6	3.5	3,5
K5.10	Rod withdrawal limiter: BWR-6	3.2	3.3
K5.11	Control rod motion: BWR-6	3.3	3.3
K5.12	Command word generation and sequencing (operator follow, scan and test): BWR-6	1.8*	2.2*
K5.13	Position indication probes: BWR-6	2.5	2.7
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the ROD CONTROL AND INFORMATION SYSTEM (RCIS) :** (CFR 41.7 / 45.7)		
K6.01	First stage shell pressure or opening of a bypass valve(s): BWR-6	3.2	3.2
K6.02	Rod position signal: BWR-6	3.2	3.3
K6.03	A.C. electrical power: BWR-6	2.5	2.8
K6.04	IRM channel: BWR-6	3.0	3.2
K6.05	SRM channel: BWR-6	3.0	3.2
K6.06	APRM channel: BWR-6	3.0	3.0

SYSTEM: 201005 Rod Control and Information System (RCIS)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ROD CONTROL AND INFORMATION SYSTEM (RCIS) controls including:** (CFR 41.5 / 45.5)		
A1.01	First stage shell pressure/turbine load: BWR-6 . . .	3.2	3.3
A2.	**Ability to (a) predict the impacts of the following on the ROD CONTROL AND INFORMATION SYSTEM (RCIS) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	High flux (SRM, IRM, APRM): BWR-6	3.5	3.5
A2.02	Position indication probe failure: BWR-6	2.8	3.2
A2.03	Insert block: BWR-6	3.2	3.2
A2.04	Withdraw block: BWR-6	3.2	3.2
A2.05	Insert required: BWR-6	3.2	3.2
A2.06	Insert inhibit: BWR-6	3.2	3.2
A2.07	Withdraw inhibit: BWR-6	3.2	3.2
A2.08	LPRM upscale/down scale: BWR-6	3.2	3.2
A2.09	Test display blinking: BWR-6	2.8	3.0
A2.10	Data fault: BWR-6	2.8	3.0
A2.11	Accumulator fault: BWR-6	3.3	3.5
A2.12	Rod uncoupled: BWR-6	3.7	3.8
A2.13	Rod drift: BWR-6	3.8	3.8
A3.	**Ability to monitor automatic operations of the ROD CONTROL AND INFORMATION System (RCIS) including:** (CFR 41.7 / 45.7)		
A3.01	Operator control module lights: BWR-6	3.5	3.5
A3.02	Rod display module lights: BWR-6	3.5	3.5
A3.03	†Verification of proper functioning/ operability: BWR-6	3.4	3.3
A3.04	Annunciator and alarm signals: BWR-6	3.3	3.3
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Operator control module (lights and push buttons): BWR-6	3.7	3.7
A4.02	Rod display module (lights and push buttons): BWR-6 .	3.7	3.7
A4.03	Back panel indicating lights: BWR-6	3.4	3.3

SYSTEM: 214000 Rod Position Information System

TASK: Startup the rod position indication system
Perform a position indication alignment during a reactor startup
Monitor the rod position indication system
Shutdown the rod position indication system (RPIS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between ROD POSITION INFORMATION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	RWM: Plant-Specific	3.0	3.2
K1.02	RSCS: Plant-Specific	2.9	3.1
K1.03	CRDM	3.0	3.1
K1.04	RMCS: Plant-Specific	3.2	3.2
K1.05	Full core display: Plant-Specific	3.3	3.3
K1.06	RCIS: Plant-Specific	3.4	3.4
K1.07	Process computer	2.7	3.0
K1.08	CRIDS/ERIS/SPDS/GDS: Plant-Specific	2.4	2.6
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the ROD POSITION INFORMATION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	RWM: Plant-Specific	3.0	3.2
K3.02	RSCS: Plant-Specific	3.0	3.1
K3.03	RMCS: Plant-Specific	3.1	3.2
K3.04	RCIS: Plant-Specific	3.3	3.3
K3.05	Process computer	2.3	2.6
K3.06	CRIDS/ERIS/SPDS/GDS: Plant-Specific	2.3*	2.5
K4.	**Knowledge of ROD POSITION INFORMATION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Reed switch locations	3.0	3.1
K4.02	Thermocouple	2.5*	2.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to ROD POSITION INFORMATION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Reed switches	2.7	2.8

SYSTEM: 214000 Rod Position Information System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the ROD POSITION INFORMATION SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	2.5	2.6
K6.02	Position indication probe	2.7	2.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ROD POSITION INFORMATION SYSTEM controls including:** (CFR 41.5 / 45.5)		
A2.	**Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Failed reed switches	3.1	3.3
A2 02	Reactor SCRAM	3.6	3.7
A2 03	Overtravel/in-out	3.6	3.9
A3.	**Ability to monitor automatic operations of the ROD POSITION INFORMATION SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Full core display	3.4	3.3
A3.02	Alarm and indicating lights	3.2	3.1
A3.03	Verification of proper functioning/ operability	3.5	3.7
A3.04	RCIS: Plant-Specific	3.5	3.8
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	RCIS rod action control bypass switches	3.2	3.3
A4.02	Control rod position	3.8*	3.8*
A4.03	Control rod drive temperature	2.8	2.7

SYSTEM: 201004 Rod Sequence Control System (Plant Specific)

TASK: Conduct rod sequence control functional test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor manual control system: BWR-4,5	3.2	3.3
K1.02	Turbine generator system: BWR-4,5	3.1	3.1
K1.03	Rod position information system: BWR-4,5	3.1	3.1
K1.04	Rod worth minimizer: BWR-4,5	2.8	3.0
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor manual control: BWR-4,5	3.3	3.4
K4.	**Knowledge of ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Select blocks: BWR-4,5	3.0	3.1
K4.02	Insert rod blocks: BWR-4,5	3.1	3.2
K4.03	Withdraw rod blocks: BWR-4,5	3.3	3.4
K4.04	RSCS bypass as reactor power increases: BWR-4,5	3.3	3.3
K4.05	Rod movement, direction, and selection information: BWR-4,5	3.2	3.2
K4.06	Group notch control: BWR-4,5	3.3	3.4
K4.07	Minimizing rod worth: BWR-4,5	3.6	3.7
K5.	**Knowledge of the operational implications of the following concepts as they apply to ROD SEQUENCE** (CFR 41.5 / 45.3) **CONTROL SYSTEM (PLANT SPECIFIC) :**		
K5.01	Prevention of clad damage if a control rod drop accident (CRDA) occurs: BWR-4,5	3.6	4.0
K5.02	Sequences and groups: BWR-4,5	3.1	3.3
K5.03	Group notch control limits and rod density: BWR-4,5	3.3	3.5

SYSTEM: 201004 Rod Sequence Control System (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) : (CFR 41.7 / 45.7)		
K6.01	Rod position information: BWR-4,5	3.3	3.3
K6.02	Rod direction information: BWR-4,5	3.1	3.2
K6.03	Rod movement information: BWR-4,5	3.2	3.2
K6.04	Turbine generator (1st stage shell pressure): BWR-4,5	3.3	3.4
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters, associated with operating the ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) controls including: (CFR 41.5 / 45.5)		
A1.01	Reactor manual control system: BWR-4,5	3.3	3.3
A2.	Ability to (a) predict the impacts of the following on the ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Loss of rod position information: BWR-4,5	3.3	3.6
A2.02	Attempting to move a stuck control rod: BWR-4,5 . . .	3.4	3.6
A2.03	Turbine trip: BWR-4,5	3.2	3.2
A3.	Ability to monitor automatic operations of the ROD SEQUENCE CONTROL SYSTEM (PLANT SPECIFIC) including: (CFR 41.7 / 45.7)		
A3.01	Rod select switch light: BWR-4,5	3.2	3.1
A3.02	Rod select bottom lamp dimmer logic: BWR-4,5	3.1*	3.1*
A3.03	Back panel indicators: BWR-4,5	2.8	3.0
A3.04	Annunciator and alarm signals: BWR-4,5	3.2	3.2
A3.05	†Verification of proper function/ operability: BWR-4,5	3.5	3.7
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	†System bypass switches: BWR-4,5	3.4	3 5
A4.02	RSCS console switches and indicators: BWR-4,5	3.5	3.2
A4.03	†Rscs back panel switches and indicators: BWR-4,5 . . .	3.0	3.1

SYSTEM: 201006 Rod Worth Minimizer System (RWM) (Plant Specific)

TASK: Conduct rod worth minimizer functional test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	Knowledge of the physical connections and/or cause-effect relationships between ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor manual control: P-Spec(Not-BWR6)	3.4	3.4
K1.02	Rod position indication system: P-Spec(Not-BWR6)	3.4	3.4
K1.03	Reactor water level control (feed flow): P-Spec(Not-BWR6)	3.1	3.2
K1.04	Steam flow/reactor power: P-Spec(Not-BWR6)	3.1	3.2
K1.05	Control rod drop accident: P-Spec(Not-BWR6)	3.5	3.8
K1.06	Rod sequence control system: P-Spec(Not-BWR6)	3.3	3.4
K1.07	Process computer: P-Spec(Not-BWR6)	2.8	2.9
K1.08	Reactor power (turbine first stage pressure): P-Spec(Not-BWR6)	3.2	3.3
K2.	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	Rod worth minimizer: P-Spec(Not-BWR6)	2.2*	2.5*
K3.	Knowledge of the effect that a loss or malfunction of the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) will have on following: (CFR 41.7 / 45.4)		
K3.01	Reactor manual control system: P-Spec(Not-BWR6)	3.2	3.5
K4.	Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following: (CFR 41.7)		
K4.01	Insert blocks/errors: P-Spec(Not-BWR6)	3.4	3.5
K4.02	Withdraw blocks/errors: P-Spec(Not-BWR6)	3.5	3.5
K4.03	Select blocks/errors: P-Spec(Not-BWR6)	3.3	3.4
K4.04	System bypass: P-Spec(Not-BWR6)	3.4	3.5
K4.05	Substitute rod position data: P-Spec(Not-BWR6)	2.8	3.0
K4.06	Correction of out of sequence rod positions: P-Spec(Not-BWR6)	3.2	3.4
K4.07	Display of out of position control rods without rod blocks (transition zone): P-Spec(Not-BWR6)	3.1	3.2
K4.08	System testing: P-Spec(Not-BWR6)	2.8	2.8
K4.09	System initialization: P-Spec(Not-BWR6)	3.2	3.2

SYSTEM: 201006 Rod Worth Minimizer System (RWM) (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) :** (CFR 41.5 / 45.3)		
K5.01	Minimize clad damage if a control rod drop accident (CRDA) occurs: P-Spec(Not-BWR6)	3.3	3.7
K5.02	Low power set point: P-Spec(Not-BWR6)	2.9	3.0
K5.03	Low power alarm point (LPAP): P-Spec(Not-BWR6)	2.8	2.9
K5.04	Transition zone: P-Spec(Not-BWR6)	2.8	2.8
K5.05	High power set point: P-Spec(Not-BWR6)	2.9	3.0
K5.06	Rod groups and steps: P-Spec(Not-BWR6)	2.8	3.0
K5.07	Latch groups: P-Spec(Not-BWR6)	2.8	2.9
K5.08	Operating sequence: P-Spec(Not-BWR6)	2.9	2.9
K5.09	Select error: P-Spec(Not-BWR6)	3.2	3.2
K5.10	Withdraw error: P-Spec(Not-BWR6)	3.2	3.3
K5.11	Insert error: P-Spec(Not-BWR6)	3.2	3.3
K5.12	Withdraw block: P-Spec(Not-BWR6)	3.5	3.5
K5.13	Insert block: P-Spec(Not-BWR6)	3.5	3.5
K5.14	Alternate withdraw and insert limits: P-Spec(Not-BWR6)	3.0	3.0
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) :** (CFR 41.7 / 45.7)		
K6.01	RWM power supply: P-Spec(Not-BWR6)	2.8	3.2
K6.02	Reactor water level control input: P-Spec(Not-BWR6)	2.9	2.9
K6.03	Rod position indication: P-Spec(Not-BWR6)	2.9	2.9
K6.04	Process computer: P-Spec(Not-BWR6)	2.7	2.8
K6.05	Steam flow input: P-Spec(Not-BWR6)	2.7	2.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) controls including:** (CFR 41.5 / 45.5)		
A1.01	Rod position: P-Spec(Not-BWR6)	3.2	3.3
A1.02	Status of control rod movement blocks; P-Spec(Not-BWR6)	3.4	3.5
A1.03	Latched group indication: P-Spec(Not-BWR6)	2.9	3.0

SYSTEM; 201006 Rod Worth Minimizer System (RWM) (Plant Specific)

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A2.	Ability to (a) predict the impacts of the following on the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Power supply loss: P-Spec(Not-BWR6)	2.5	2.8
A2.02	Loss of steam flow input: P-Spec(Not-BWR6)	2.6	2.9
A2.03	Rod drift: P-Spec(Not-BWR6)	3.0	3.2
A2.04	Stuck rod: P-Spec(Not-BWR6)	3.0	3.3
A2.05	Out of sequence rod movement; P-Spec(Not-BWR6)	3.1	3.5
A2.06	Loss of reactor water level control input: P-Spec(Not-BWR6)	2.9	3.3
A2.07	RWM hardware/software failure: P-Spec(Not-BWR6) . . .	2.5	2.8
A3.	Ability to monitor automatic operations of the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) including: (CFR 41.7 / 45.7)		
A3.01	System window and light indication: P-Spec(Not-BWR6).	3.2	3.1
A3.02	Verification of proper functioning/ operability: P-Spec(Not-BWR6)	3.5	3.4
A3.03	Annunciator and alarm signals: P-Spec(Not-BWR6) . . .	3.1	3.0
A3.04	Control rod movement blocks: P-Spec(Not-BWR6)	3.5	3.4
A3.05	Latched group indication: P-Spec(Not-BWR6)	3.0	3.1
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	System bypass switch: P-Spec(Not-BWR6)	3.2	3.4
A4.02	Pushbutton indicating switches: P-Spec(Not-BWR6) . . .	2.9	2.9
A4.03	Latched group indication: P-Spec(Not-BWR6)	3.0	3.0
A4.04	Rod withdrawal error indication: P-Spec(Not-BWR6) . .	3.3	3.2
A4.05	Rod insert error indication: P-Spec(Not-BWR6)	3.2	3.2
A4.06	Selected rod position indication: P-Spec(Not-BWR6) . .	3.2	3.2

SYSTEM: 215004 Source Range Monitor (SRM) System

TASK: Perform lineups of the nuclear instrumentation system
Monitor the nuclear instrumentation system
Startup the nuclear instrumentation system
Place a source range module in/out of service
Operate the nuclear instrumentation system
Secure the nuclear instrumentation system
Conduct source range meter, intermediate range meter detector not in startup rod block functional test
Conduct SRM functional test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between SOURCE RANGE MONITOR (SRM) SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor protection system	3.6	3.7
K1.02	Reactor manual control	3.4	3.4
K1.03	Rod control and information system: Plant-Specific	3.0	3.0
K1.04	Process computer/ performance monitoring system (SPDS/ERIS/CRIDS/GDS): Plant-Specific	2.4	2.6*
K1.05	Display control system: Plant-Specific	2.8	3.0
K1.06	Reactor vessel	2.8	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	SRM channels/detectors	2.6	2.8
K2.02	Detector drive modules	2.1*	2.3*
K2.03	Detector drive module control	2.0*	2.1*
K3.	**Knowledge of the effect that a loss or malfunction of the SOURCE RANGE MONITOR (SRM) SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	RPS	3.4	3.4
K3.02	Reactor manual control: Plant-Specific	3.4	3.4
K3.03	Rod control and information system: Plant-Specific	3.3	3.3
K3.04	Reactor power and indication	3.7	3.7
K4.	**Knowledge of SOURCE RANGE MONITOR (SRM) SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Rod withdrawal blocks	3.7	3.7
K4.02	Reactor SCRAM signals	3.4	3.5
K4.03	Gamma compensation	2.4	2.4

SYSTEM: 215004 Source Range Monitor (SRM) System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.04	Changing detector position	2.8	2.9
K4.05	Alarm seal-in	2.5	2.5
K4.06	IRM/SRM interlock	3.2	3.2
K5.	**Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Detector operation	2.6	2.6
K5.02	Gamma discrimination	2.2*	2.2*
K5.03	Changing detector position	2.8	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the SOURCE RANGE MONITOR (SRM) SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	RPS	3.2	3.3
K6.02	24/48 volt D.C. power	3.1	3.3
K6.03	Detector drive motor	2.4	2.4
K6.04	Detectors	2.9	2.9
K6.05	Trip units	2.6	2.8
K6.06	Recorder	2.2*	2.2*
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the SOURCE RANGE MONITOR (SRM) SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Detector position	3.0	3.1
A1.02	Reactor power indication	3.6	3.7
A1.03	RPS status	3.4	3 5
A1.04	Control rod block status	3.5	3.5
A1.05	SCRAM, rod block, and period alarm trip setpoints . . .	3.6	3.8
A1.06	Lights and alarms	3.1	3.1
A2.	**Ability to (a) predict the impacts of the following on the SOURCE RANGE MONITOR (SRM) SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Power supply degraded	2.7	2.9
A2.02	SRM inop condition	3.4	3.7
A2 03	Stuck detector	3.0	3.3
A2 04	Up scale and downscale trips	3.5	3.7

SYSTEM: 215004 Source Range Monitor (SRM) System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	SRO
A2.05	Faulty or erratic operation of detectors/system	3.3	3.5
A2.06	Failed recorder	2.4*	2.5
A3.	**Ability to monitor automatic operations of the SOURCE RANGE MONITOR (SRM) SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Meters and recorders	3.2	3.2
A3.02	Annunciator and alarm signals	3.4	3.3
A3.03	RPS status	3.6	3.5
A3.04	Control rod block status	3.6	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	SRM count rate and period	3.9	3.8
A4.02	SRM recorder	3.0	3.1
A4.03	CRT displays: Plant-Specific	2.9	2.7
A4.04	SRM drive control switches	3.2	3.2
A4.05	SRM back panel switches, meters, and indicating lights	3.1	3.2
A4.06	Alarms and lights	3.2	3.1
A4.07	Verification of proper functioning/ operability	3.4	3.6

System: 215001 Traversing In-Core Probe

TASK: Perform lineups of the nuclear instrumentation system
Monitor the nuclear instrumentation system
Startup the nuclear instrumentation system
Operate the nuclear instrumentation system
Secure the nuclear instrumentation system
Place transversing in-core probe in/out of service

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between TRAVERSING IN-CORE PROBE and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Local power range monitors: (Not-BWR1)	2.5	2.8
K1.02	Process computer: (Not-BWR1)	2.5	3.1
K1.03	Nitrogen purge system: P-Spec(Not-BWR1)	2.1*	2.3
K1.04	Plant air systems: P-Spec(Not-BWR1)	1.8*	2.0*
K1.05	Primary containment isolation system: (Not-BWR1) . . .	3.3	3.4
K1.06	D.C. electrical: (Not-BWR1)	1.8*	1.9*
K1.07	A.C. electrical: (Not-BWR1)	1.8*	1.9*
K1.08	Reactor pressure vessel: (Not-BWR1)	2.5	2.6
K1.09	Primary containment: (Not-BWR1)	2.6	2.7
K1.10	Area radiation monitoring system: (Not-BWR1)	2.6	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Shear valves: Mark-I&II(Not-BWR1)	1.9*	2.1*
K3.	**Knowledge of the effect that a loss or malfunction of the TRAVERSING IN-CORE PROBE will have on following:** (CFR 41.7 / 45.4)		
K3.01	Local power range monitor's calibration: (Not-BWR1) .	2.3	2.8
K4.	**Knowledge of TRAVERSING IN-CORE PROBE design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Primary containment isolation: Mark-I&II(Not-BWR1) . .	3.4	3.5
K4.02	Corrosion prevention: (Not-BWR1)	1.9*	2.1*
K4.03	Radiation shielding: (Not-BWR1)	2.4	2.7
K5.	**Knowledge of the operational implications of the following concepts as they apply to TRAVERSING IN-CORE PROBE:** (CFR 41.5 / 45.3)		
K5.01	Neutron flux detection: (Not-BWR1)	2.2*	2.5

SYSTEM: 215001 Traversing In-Core Probe

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the TRAVERSING IN-CORE PROBE : (CFR 41.7 / 45.7)		
K6.01	D.C. electrical power: (Not-BWR1)	1.9*	2.1*
K6.02	A.C. electrical power: (Not-BWR1)	1.9*	2.1*
K6.03	Process computer: BWR-2,3,4,5,6	2.3	2.7
K6.04	Primary containment isolation system: Mark-I&II(Not-BWR1)	3.1	3.4
K6.05	Plant air systems: P-Spec(Not-BWR1)	1.8*	2.1*
K6.06	Nitrogen purge: P-Spec(Not-BWR1)	2.0*	2.2
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the TRAVERSING IN-CORE PROBE controls including: (CFR 41.5 / 45.5)		
A1.01	Radiation levels: (Not-BWR1)	2.8	2.9
A1.02	Detector position: (Not-BWR1)	2.5	2.4
A1.03	Valve status: Mark-I&II(Not-BWR1)	2.6*	2.8
A1.04	Drive speed: (Not-BWR1)	2.0*	2.2*
A1.05	Detector output: (Not-BWR1)	2.0*	2.3*
A1.06	Radiation alarms: (Not-BWR1)	2.9	2.8
A2.	Ability to (a) predict the impacts of the following on the TRAVERSING IN-CORE PROBE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Low reactor water level: Mark-I&II(Not-BWR1)	2.7	2.9
A2.02	High primary containment pressure: Mark-I&II(Not-BWR1)	2.9	3.0
A2.03	Drive mechanism failure: (Not-BWR1)	2.1*	2.4
A2.04	A.C. failure: (Not-BWR1)	1.8*	2.0*
A2.05	D.C. failure: (Not-BWR1)	1.8*	2.0*
A2.06	Valve closures: Mark-I&II(Not-BWR1)	2.4*	2.6
A2.07	†Failure to retract during accident conditions: Mark-I&II(Not-BWR1)	3.4	3.7
A2.08	Failure to retract to shield: (Not-BWR1)	2.7*	2.9
A3.	Ability to monitor automatic operations of the TRAVERSING IN-CORE PROBE including: (CFR 41.7 / 45.7)		
A3.01	Detector position: P-Spec(Not-BWR1)	2.3*	2.5*

SYSTEM: 215001 Traversing In-Core Probe

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A3.02	Detector drive speed: P-Spec(Not-BWR1)	1.9*	2.2*
A3.03	Valve operation: Not-BWR1	2.5*	2.6*
A3.04	Indicating lights: P-Spec(Not-BWR1)	2.2*	2.4*
A3.05	Detector output: P-Spec(Not-BWR1)	1.9*	2.2*
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Detector drive speed: P-Spec(Not-BWR1)	2.0*	2.2*
A4.02	Detector position: P-Spec(Not-BWR1)	2.4*	2.6*
A4.03	Isolation valves: Mark-I&II(Not-BWR1)	3.0	3.1
A4.04	Detector output: P-Spec(Not-BWR1)	2.0*	2.3*
A4.05	Indicating lights: P-Spec(Not-BWR1)	2.3*	2.5

3.8 Plant Service Systems

286000	Fire Protection System
234000	Fuel Handling
300000	Instrument Air System
400000	Component Cooling Water System

SYSTEM: 286000 Fire Protection System

TASK: Perform lineups of the fire protection system (CO2, deluge, freon/halon 1301, foam)
Place the fire protection system in standby
Operate fire protection equipment to combat a fire
Monitor the fire protection system
Operate the fire detection/alarm equipments
Shut down the fire protection system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between FIRE PROTECTION SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Component cooling water systems	2.7	2.8
K1.02	Isolation condenser: Plant-Specific	3.8	3.8
K1.03	Reactor water level: Plant-Specific	2.9	3.0
K1.04	D.C. electrical distribution: Plant-Specific	2.6	2.6
K1.05	Main generator hydrogen system: Plant-Specific	3.1	3.1
K1.06	Auxiliary (boiler) steam system: Plant-Specific	2.2*	2.3*
K1.07	A.C. power supplies	2.8	2.9
K1.08	Intake canals: Plant-Specific	3.0	3.0
K1.09	Emergency generator rooms: Plant-Specific	3.2	3.3
K1.10	Main generator exciter: Plant-Specific	2.8	2.8
K1.11	Screen wash system: Plant-Specific	2.5	2.5
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Fire protection supervisory circuits: Plant-Specific.	2.3*	2.5*
K2 02	Pumps	2.9	3.1
K2 03	Fire detection system: Plant-Specific	2.5*	2.7*
K3.	**Knowledge of the effect that a loss or malfunction of the FIRE PROTECTION SYSTEM will have on following:** (CFR 41.7 / 45.4)		
K3.01	The ability to detect fires	3.2	3.4
K3.02	Personnel protection	3.2	3.4
K3.C3	Plant protection	3.6	3.8
K4.	**Knowledge of FIRE PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7) (CFR 41.5 / 45.3) (CFR 41.7 / 45.7) (CFR 41.5 / 45.5) (CFR 41.5 / 45.6) (CFR 41.7 / 45.7) (CFR 41.7 / 45.5 to 45.8)		
K4.01	Adequate supply of water for the fire protection system	3.4	3.6
K4.02	Automatic system initiation	3.3	3.5
K4.03	Maintenance of fire header pressure	3.3	3.4

SYSTEM: 286000 Fire Protection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.04	Personnel safety during halon and/or carbon dioxide system actuation	3.6	3.7
K4.05	Fire protection capability during loss of off-site power	3.7	3.8
K4.06	Fire suppression capability that does not rely on the displacement of oxygen (Halon): Plant-Specific	3.4	3.4
K4.07	Diesel engine protection	3.3	3.3
K5.	**Knowledge of the operational implications of the following concepts as they apply to FIRE PROTECTION SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Effect of carbon dioxide on fires	2.6	2.7
K5.02	Effect of Halon on fires: Plant-Specific	2.6	2.6
K5.03	Effect of water spray on electrical components	3.3	3.4
K5.04	Valve operation	2.9	2.9
K5.05	Diesel operations	3.0*	3.1*
K5.06	Heat detection	2.6	2.7
K5.07	Smoke detection	2.6	2.7
K5.08	Gas refrigeration: Plant-Specific	2.4*	2.5*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the FIRE PROTECTION SYSTEM** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution: Plant-Specific	3.1	3.1
K6.02	D. C . electrical distribution	2.8*	2.9
K6.03	Applicable component cooling water system: Plant-Specific	2.4*	2.5
K6.04	Diesel fuel transfer system: Plant-Specific	2.8	3.0
K6.05	Screen wash system: Plant-Specific	2.6	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the FIRE PROTECTION SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	System pressure	2.9	2.9
A1.02	System flow	2.4*	2.5*
A1.03	Fire doors	2.8	3.1
A1.04	Fire dampers	2.8	3.1
A1.05	System lineups	3.2	3.2
A1.06	Tank pressure: Plant-Specific	2.9	3.0

SYSTEM: 286000 Fire Protection System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A2.	Ability to (a) predict the impacts of the following on the FIRE PROTECTION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	†System logic failure: Plant-Specific	2.7	2.9
A2.02	D.C. distribution failure: Plant-Specific	2.6*	2.7*
A2.03	A.C. distribution failure: Plant-Specific	2.9	3.0
A2.04	Applicable component cooling water system failure: Plant-Specific	2.3*	2.4*
A2.05	Fire protection diesel trips	3.1	3.3
A2.06	Low fire main pressure: Plant-Specific	3.1	3.2
A2.07	Inadvertent system initiation	2.9	2.9
A2.08	Failure to actuate when required	3.2	3.3
A2.09	Valve closures: Plant-Specific	2.7	2.8
A2.10	Valve openings: Plant-Specific	2.6*	2.7
A2.11	Pump trips: Plant-Specific	3.1	3.2
A2.12	Low diesel fuel supply: Plant-Specific	3.1	3.3
A3.	Ability to monitor automatic operations of the FIRE PROTECTION SYSTEM including: (CFR 41.7 / 45.7)		
A3.01	Fire water pump start	3.4	3.4
A3.02	Fire main pressure	3.1	3.2
A3.03	Actuation of fire detectors	3.3	3.3
A3.04	System initiation	3.2	3.3
A3.05	Fire doors	3.0	3.1
A3.06	Fire dampers	3.0	3.1
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	System alarms and indicating lights	3.3	3.2
A4.02	Applicable component cooling water system: Plant-Specific	2.5*	2.5*
A4.03	Applicable component cooling water pressure	2.5*	2.5*
A4.04	Fire main pressure: Plant-Specific	2.8	2.8
A4.05	Fire pump	3.3	3.3
A4.06	Fire diesel	3.4	3.4

SYSTEM: 234000 Fuel Handling Equipment

TASK: Operate the spent fuel handling machine/bridge
Operate the refueling machine/main fuel handling bridge (fuel element change)
Operate the control rod change machine/main fuel handling bridge (control rod change)
Operate the fuel transfer system/fuel transfer carriages and upenders

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between FUEL HANDLING EQUIPMENT and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	†Fuel	3.2	3.7
K1.02	†Core components	2.9	3.3
K1.03	Spent fuel cask	2.7*	2.9
K1.04	†Reactor manual control system: Plant-Specific	3.3	3.6
K1.05	Reactor vessel components: Plant-Specific	2.9	3.3
K1.06	RC & IS: Plant-Specific	3.0	3.2
K1.07	Fuel transfer tube system: Mark-III	3.0	3.4
K1.08	Fuel pools configuration: Mark-III	2.7	3.0
K1.09	Fuel pool ventilation: Plant-Specific	2.8	2.9
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the FUEL HANDLING EQUIPMENT will have on following:** (CFR 41.7 / 45.4)		
K3.01	†Reactor manual control system: Plant-Specific	2.9	3.3
K3.02	RC & IS: Plant-Specific	3.0	3.0
3. 03	†Fuel handling operations	3.1	3.8
K3.04	†core modifications/alterations	2.9	3.8
K4.	**Knowledge of FUEL HANDLING EQUIPMENT design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	†Prevention of core alterations during control rod movements	3.3	4.1
K4.02	†Prevention of control rod movement during core alterations	3.3	4.1
K4.03	†Protection against inadvertently lifting radioactive components out of the water	3.4	4.2
K4.04	†Movement of the spent fuel cask only over designated areas: Plant-Specific	2.8	3.3
K4.05	†Movement of fuel via fuel transfer tube: Mark-III	3.0	3.8

SYSTEM: 234000 Fuel Handling Equipment

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K5.	**Knowledge of the operational implications of the following concepts as they apply to FUEL HANDLING EQUIPMENT :** (CFR 41.5 / 45.3)		
K5.01	†Crane/hoist operation	2.9	3.4
K5.02	†Fuel handling equipment interlocks	3.1	3.7
K5.03	†Water as a shield against radiation	2.9	3.4
K5.04	Spent fuel pool design	2.6	3.1
K5.05	†Fuel orientation	3.0	3.7
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the FUEL HANDLING EQUIPMENT** (CFR 41.7 / 45.7)		
K6.01	†Electrical power	2.7	3.2
K6.02	Reactor manual control system: Plant-Specific	2.8	3.5
K6.03	RC & IS: Plant-Specific	3.0	3.6
K6.04	†Refueling platform air system: Plant-Specific	2.9	3.7
K6.05	Upper fuel pool water inventory: Mark-III	3.2	3.3
K6.06	Fuel transfer tube interlocks: Mark-III	3.0	3.6
K6.07	†Fuel pool ventilation: Plant-Specific	2.9	3.4
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the FUEL HANDLING EQUIPMENT controls including:** (CFR 41.5 / 45.5)		
A1.01	Spent fuel pool level	3.1	3.4
A1.02	†Refuel floor radiation levels/ airborne levels	3.3	3.8
A1.03	†core reactivity level	3.4	3.9
A2.	**Ability to (a) predict the impacts of the following on the FUEL HANDLING EQUIPMENT ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	†Interlock failure	3.3	3.7
A2.02	†Loss of refueling platform air system	3.1	3.6
A2.03	†Loss of electrical power	2.8	3.1
A3.	**Ability to monitor automatic operations of the FUEL HANDLING EQUIPMENT including:** (CFR 41.7 / 45.7)		
A3.01	†Crane/refuel bridge movement: Plant-Specific	2.6	3.6

SYSTEM: 234000 Fuel Handling Equipment

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A3.02	†Interlock operation	3.1	3.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	†Neutron monitoring system	3.7	3.9
A4.02	Control rod drive system	3.4	3.7

SYSTEM: 300000 Instrument Air System (IAS)

Task: Perform lineups of the IAS
Start up the IAS
Monitor the IAS
Shift instrument air compressors
Operate instrument air compressors
Operate system air dryers
Perform testing of automatic operation of the IAS

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1	Knowledge of the connections and / or cause effect relationships between INSTRUMENT AIR SYSTEM and the following: (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Sensor air	2.4	2.7
K1.02	Service air	2.7	2.8
K1.03	Containment air	2.8	2.9
K1.04	Cooling water to compressor	2.8	2.9
K1.05	Main Steam Isolation Valve air	3.1	3.2
K2	Knowledge of electrical power supplies to the following: (CFR 41.7)		
K2.01	Instrument air compressor	2.8	2.8
K2.02	Emergency air compressor	3.0	3.0
K3.	Knowledge of the effect that a loss or malfunction of the (INSTRUMENT AIR SYSTEM) will have on the following: (CFR 41.7 / 45.6)		
K3.01	Containment air system	2.7	2.9
K3.02	Systems having pneumatic valves and controls	3.3	3.4
K3.03	Cross-tied units	2.9	3.0
K4.	Knowledge of (INSTRUMENT AIR SYSTEM) design feature(s) and or interlocks which provide for the following: (CFR 41.7)		
K4.01	Manual/automatic transfers of control	2.8	2.9
K4.02	Cross-over to other air systems	3.0	3.0
K4.03	Securing of IAS upon loss of cooling water	2.8	2.8
K5.	Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM: (CFR 41.5 / 45.3)		
K5.01	Air compressors	2.5	2.5
K5.02	Pressure gauges	2.3	2.2
K5.03	Temperature indicators	2.1	2.1
K5.04	Service air refusal valve	2.3	2.3
K5.06	Air dryers	2.4	2.5
K5.07	Valves	2.4	2.3
K5.08	Sensors and detectors	2.3	2.5
K5.09	Controllers and positioners	2.0	2.1
K5.10	Motors	2.1	2.2
K5.11	Heat exchangers and condensers	2.2	2.2
K5.12	Breakers, relays and disconnects	2.2	2.2
K5.13	Filters	2.9	2.9

SYSTEM: 300000 Instrument Air System (IAS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6	Knowledge of the effect that a loss or malfunction of the following will have on the INSTRUMENT AIR SYSTEM: (CFR 41.7 / 45.7)		
K6.01	Air compressors	2.2	2.2
K6.02	Pressure gauges	2.4	2.4
K6.03	Temperature indicators	2.7	2.7
K6.04	Service ai; refusal valve	2.6	2.5
K6.06	Air dryers	2.3	2.3
K6.07	Valves	2.5	2.6
K6.08	Sensors and detectors	2.3	2.3
K6.09	Controllers and positioners	2.3	2.3
K6.10	Motors	2.3	2.4
K6.11	Heat exchangers and condensers	2.3	2.3
K6.12	Breakers, relays and disconnects	2.9	2.9
K6.13	Filters	2.8	2.3
No.	**ABILITY**		
A1.	Ability to predict and / or monitor changes in parameters associated with operating the INSTRUMENT AIR SYSTEM controls including: (CFR 41.5 / 45.5)		
A2.	Ability to (a) predict the impacts of the following on the INSTRUMENT AIR SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: (CFR 41.5 / 45.6)		
A2.01	Air dryer and filter malfunctions	2.9	2.8
A3.	Ability to monitor automatic operations of the INSTRUMENT AIR SYSTEM including: (CFR 41.7 / 45.7)		
A3.01	Air pressure	2.3	2.1
A3.02	Air temperature	2.9	2.7
A4.	Ability to manually operate and / or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	Pressure gauges	2.6	2.7

SYSTEM: 400000 Component Cooling Water System (CCWS)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
Task:	Perform CCWS component operability test Perform CCWS flow path verification Perform CCWS pump test Perform CCW flow balance Determine CCWS leak rate from RCS		
K1.	**Knowledge of the physical connections and / or cause-effect relationships between CCWS and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Service water system	3.2	3.3
K1.02	Loads cooled by CCWS	3.2	3.4
K1.03	Radiation monitoring systems	2.7	3.0
K1.04	Reactor coolant system, in order to determine source (s) of RCS leakage into CCWS	2.9	3.1
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	CCW pumps	2.9	3.0
K2.02	CCW valves	2.9	2.9
K3.	**Knowledge of the effect that a loss or malfunction of the CCWS will have on the following:** (CFR 41.7 / 45.6)		
K3.01	Loads cooled by CCWS	2.9	3.3
K4.	**Knowledge of CCWS design feature(s) and or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic start of standby pump	3.4	3.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to the CCWS:** (CFR 41.5 / 45.3)		
K5.01	Chemistry control	1.9	2.0

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6	**Knowledge of the effect that a loss or malfunction of the following will have on the CCWS:** (CFR 41.7 / 45.7)		
K6.01	Valves	2.7	2.8
K6.02	Sensors and detectors	2.3	2.4
K6.03	Controllers and positioners	2.4	2.6
K6.05	Pumps	3.0	3.1
K6.05	Motors	2.8	2.9
K6.06	Heat exchangers and condensers	2.9	2.9
K6.07	Breakers, relays, and disconnects	2.7	2.8
No.	**ABILITY**		
A1.	**Ability to predict and / or monitor changes in parameters associated with operating the CCWS controls including:** (CFR 41.5 / 45.5)		
A1.01	CCW flow rate	2.8	2.8
A1.02	CCW temperature	2.8	2.8
A1.03	CCW Pressure	2.7	2.7
A1.04	Surge Tank Level	2.8	2.8
A2.	**Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation:** (CFR 41.5 / 45.6)		
A2.01	Loss of CCW pump	3.3	3.4
A2.02	High/low surge tank level	2.8	3.0
A2.03	High/low CCW temperature	2.9	3.0
A2.04	Radiation monitoring system alarm	2.9	3.0
A3.	**Ability to monitor automatic operations of the CCWS including:** (CFR 41.7 / 45.7)		
A3.01	Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS . .	3.0	3.0
A4.	**Ability to manually operate and / or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	CCW indications and control	3.1	3.0

3.9 Radioactivity Release

239003	Main Steam Isolation Valve Leakage Control System
271000	Offgas System
288000	Plant Ventilation Systems
272000	Radiation Monitoring System
268000	Radwaste
290002	Reactor Vessel Internals
233000	Fuel Pool Cooling and Clean-up
261000	Standby Gas Treatment System
290003	Control Room Heating, Ventilation and Air Conditioning

SYSTEM: 239003 MSIV Leakage Control System

TASK: Perform one train MSLCS inoperable surveillance
Perform main steam leakage control system operational test (write in
Perform one train main steam leakage control system operability surveillance (write in)
Perform monthly main steam leakage control system DIV 1 and DIV 2 fan and heater tests (write in)

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between MSIV LEAKAGE CONTROL SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system: BWR-4,5,6(P-Spec)	3.3	3.4
K1 02	Standby gas treatment system: BWR-4,5,6(P-Spec) . . .	2.9	3.0
K1 03	Main steam line pressure instrumentation: BWR-4,5,6(P-Spec)	3.1	3.1
K1.04	A.C. electrical distribution: BWR-4,5,6(P-Spec) . . .	2.7	2.8
K1.05	Steam tunnel: BWR-4,5,6(P-Spec)	2.9	2.9
K1.06	Radwaste system: BWR-4,5,6(P-Spec)	2.4	2.4
K1.07	Floor drainage system: BWR-4,5,6(P-Spec)	1.9*	1.9*
K1.08	Nuclear boiler instrumentation: BWR-4,5,6(P-Spec) . .	2.8	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Motor operated valves: BWR-4,5,6(P-Spec)	2.3*	2.3*
K2.02	Leakage control system blowers: BWR-4,5,6(P-Spec) . .	1.9*	2.0*
K2.03	Leakage control system heaters: BWR-4.5,6(P-Spec) . .	1.9*	2.0*
K3.	**Knowledge of the effect that a loss or malfunction of the MSIV LEAKAGE CONTROL SYSTEM will have on following:** (CFR 41.5 / 45.3)		
K3.01	†Radiation release to the environment: BWR-4,5,6(P-Spec)	3.3	4.0
K4.	**Knowledge of MSIV LEAKAGE CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Performance of its safety function following a loss of offsite power: BWR-4,5,6(P-Spec)	3.2	3.5
K4.02	Performance of intended safety function following any single active component failure: BWR-4,5,6(P-Spec) . .	3.0	3.4
K4.03	The prevention of inadvertent system operation: BWR-4,5,6(P-Spec)	2.9	3.2

SYSTEM: 239003 MSIV Leakage Control System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.04	Surveillance for system operability: BWR-4,5,6 . . .	2.4	2.8
K4.05	Assurance that any MSIV leakage will pass through the system and into standby gas treatment prior to release to the atmosphere: BWR-4,5,6(P-Spec)	2.4*	2.8*
K4.06	The depressurization of main steam piping prior to routing leakage through system: BWR-4,5,6	3.1	3.3
K4.07	The reduction of MSIV leakage temperature: BWR-4,5,6(P-Spec)	2.4	2.4
K4.08	Prevention of collected condensate in system bleed lines: BWR-4,5,6(P-Spec)	2.3	2.4
K4.09	The dilution of MSIV leakage: BWR-4,5,6(P-Spec) . . .	2.4	2.4
K5.	**Knowledge of the operational implications of the following concepts as they apply to MSIV LEAKAGE CONTROL SYSTEM :** (CFR 41.7 / 45.4)		
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the MSIV LEAKAGE CONTROL SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution: BWR-4,5,6(P-Spec) . . .	2.8	3.0
K6.02	Standby gas treatment system: BWR-4,5,6(P-Spec) . . .	2.8	3.0
K6.03	Nuclear boiler instrumentation: BWR-4,5,6(P-Spec) . .	2.6	2.9
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the MSIV LEAKAGE CONTROL SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Main steam line pressure: BWR-4,5,6	3.1	3.1
A1.02	Heater operation: BWR-4,5,6(P-Spec)	2.6	2.6
A1.03	Dilution air flow: BWR-4,5,6(P-Spec)	2.4	2.6
A1.04	Status indicating lights and alarms: BWR-4,5,6	2.9	2.8
A1.05	System lineup: BWR-4,5,6	3.0	2.9
A1.06	MSIV leakage flow: BWR-4,5,6	2.6	2.6
A1.07	Reactor building temperature: BWR-4,5,6(P-Spec) . . .	2.7	2.7
A2.	**Ability to (a) predict the impacts of the following on the MSIV LEAKAGE CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Inboard MSIV valve leakage: BWR-4,5,6	2.8	3.2

SYSTEM: 239003 MSIV Leakage Control System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A2.02	Outboard MSIV valves leakage: BWR-4,5,6	2.9	3.3
A2.03	Low dilution air flow (inboard and/or outboard): BWR-4,5,6(P-Spec)	2.6	2.7
A2.04	Outboard system logic failure: BWR-4,5,6	2.7	3.0
A2.05	Inboard system logic failure: BWR-4,5,6	2.7	3.0
A2.06	Blower failure: BWR-4,5,6(P-Spec)	2.6	2.6
A2.07	Heater failure: BWR-4,5,6(P-Spec)	2.4	2.4
A2.08	Motor operator valve failure(s): BWR-4,5,6	2.8	3.0
A2.09	Outboard main steamline high pressure: BWR-4,5,6(P-Spec)	2.8	3.0
A2.10	A.C. distribution power failures: BWR-4,5,6	2.8	3.0
A2.11	High reactor pressure: BWR-4,5,6	3.1	3.3
A2.12	MSIV valve failure to close: BWR-4,5,6	3.5	3.8
A3.	**Ability to monitor automatic operations of the MSIV LEAKAGE CONTROL SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	System logic initiation: BWR-4,5,6(P-Spec)	3.0	2.8
A3.02	Main steamline pressures: BWR-4,5,6	3.1	2.8
A3.03	Dilution air flaws: BWR-4,5,6(P-Spec)	2.4	2.3
A3.04	MSIV leakage flows: BWR-4,5,6(P-Spec)	2.8	2.6
A3.05	Heater operation: BWR-4,5,6(P-Spec)	2.3	2.2
A3.06	System status lights and alarms: BWR-4,5,6	2.8	2.8
A3.07	System lineups: BWR-4,5,6	3.1	2.9
A3.08	Blower operation: BWR-4,5,6(P-Spec)	2.4	2.3
A3.09	Reactor building temperature: BWR-4,5,6(P-Spec)	2.6	2.5
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Manually initiate system operation: BWR-4,5,6(P-Spec)	3.2	3.2
A4.02	†Surveillance testing: BWR-4,5,6(P-Spec)	2.5	2.8
A4.03	Main steamline pressures: BWR-4,5,6	3.3	3.2
A4.04	Dilution air flows: BWR-4,5,6(P-Spec)	2.5	2.4
A4.05	MSIV leakage flows: BWR-4,5,6(P-Spec)	2.8	2.7
A4.06	Heater operation: BWR-4,5,6(P-Spec)	2.4	2.3
A4.07	System status lights and alarms: BWR-4,5,6(P-Spec)	2.8	2.7
A4.08	System lineups: BWR-4,5,6(P-Spec)	[illegible]	2.9
A4.09	System reset: BWR-4,5,6(P-Spec)	3.0	2.8

SYSTEM: 271000 Offgas System

TASK: Conduct lineups on the offgas system
Startup the offgas system
Monitor the offgas system
Operate the recombiner Operate
XE-KR removal equipment
Secure the offgas system
Conduct offgas line isolation logic system functional test
Conduct offgas system automatic isolation and closure test
Conduct offgas process radiation monitor instrument functional test
Conduct steam jet air ejector offgas line isolation logic system functional test

		IMPORTANCE	
K/A NO.	**KNOWLEDGE**	**RO**	**SRO**
K1.	**Knowledge of the physical connections and/or cause-effect relationships between OFFGAS SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condenser air removal system	3.1	3.1
K1.02	Process radiation monitoring system	3.1	3.3
K1.03	Elevated release point	2.7	3.0
K1.04	Condensate system	2.7	2.7
K1.05	Radwaste system	2.3	2.5
K1.06	Main steam system	2.8	2.9
K1.07	Plant air systems	2.7	2.7
K1.08	Oxygen injection system: Plant-Specific	2.3	2.3
K1.09	Component cooling water systems	2.6	2.6
K1.10	Condenser vacuum	3.2	3.3
K1.11	†Station radioactive release rate	3.1	3.6
K1.12	A.C. electrical distribution	2.3	2.4
K1.13	Process sampling system	2.6	2.8
K1.14	Radwaste sparging air: Design-Specific	2.0*	2.5
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Glycol pumps	1.5*	1.5*
K3.	**Knowledge of the effect that a loss or malfunctior of the OFFGAS SYSTEM will have on following:** (CFR 41.5 / 45.3)		
K3.01	Condenser vacuum	3.5	3.5
K3.02	†Off-site radioactive release rate	3.3	3.9
K4.	**Knowledge of OFFGAS SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		

SYSTEM: 271000 Offgas System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.01	Dilution of hydrogen gas concentration	2.9	3.3
K4.02	Prevention of the poisoning of the recombiner catalyst by the presence of water	2.6	2.7
K4.03	Maintenance of sufficient oxygen gas inventory to allow for complete hydrogen recombination: Plant-Specific	2.4	¿2.8
K4.04	The prevention of hydrogen explosions and/or fires	3.3	3.6
K4.05	Redundancy	2.6	2.6
K4.06	Decay of fission product gases to particulate daughters	2.7	2.9
K4.07	Maximizing charcoal bed efficiency	2.6	2.7
K4.08	Automatic system isolation	3.1	3.3
K4.09	Filtration of radioactive particulate	2.8	3.1
K5.	**Knowledge of the operational implications of the following concepts as they apply to OFFGAS SYSTEM :** (CFR 41.7 / 45.4)		
K5.01	Air operated valve operation	2.3	2.3
K5.02	Heat removal mechanisms	2.2	2.2
K5.03	Heat addition mechanisms	2.2*	2.2
K5.04	Hydrogen concentration measurement	2.9	3.1
K5.05	Oxygen concentration measurement	2.8	2.9
K5.06	Catalytic recombination	2.7	2.7
K5.07	Radioactive decay	2.7	2.9
K5.08	Charcoal absorption of fission product gases	2.5	2.6
K5.09	Hydrogen and oxygen recombination	2.6	2.8
K5.10	Decontamination factors	2.0*	2.3*
K5.11	Explain the necessity of reducing relative humidity for carbon bed filters.	2.6	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the OFFGAS SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Plant air systems	2.7	2.8
K6.02	Process radiation monitoring system	3.0	3.2
K6.03	Component cooling water systems	2.4	2.4
K6.04	Dilution steam	2.8	2.8
K6.05	Heating steam: Design-Specific	2.4	2.4
K6.06	Oxygen injection system: Plant-Specific	2.5	2.5
K6.07	A.C. electrical distribution	2.4	2.5
K6.08	Condenser air removal system	2.9	3.0
K6.09	Fuel cladding integrity	3.4	3.6
K6.10	Condensate system flow	2.7	2.8
K6.11	Condenser vacuum	3.2	3.3
K6.12	Glycol system	2.1*	2.2*
K6.13	Plant exhaust: BWR-1	3.0	3.4

SYSTEM: 271000 Offgas System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the OFFGAS SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Condenser vacuum	3.3	3.2
A1.02	Station radioactive release rate	3.0	3.6
A1.03	Preheater discharge temperature	2.2*	2.3
A1.04	Recombiner catalyst temperature	2.2*	2.4
A1.05	Cooler condenser discharge temperature	2.2*	2.4
A1.06	Filter differential pressure	2.4*	2.5
A1.07	Charcoal bed humidity	2.4*	2.5
A1.08	System flow	3.1	3.1
A1.09	Charcoal bed temperature	2.1*	2.4
A1.10	Charcoal vault temperature	2.3	2.5
A1.11	Offgas condenser temperatures	2.3	2.4
A1.12	Process radiation monitoring indications	3.1	3.5
A1.13	Hydrogen gas concentration	3.2	3.7
A1.14	Oxygen gas concentration	2.7	3.0
A1.15	Steam supply pressures	2.7	2.8
A2.	**Ability to (a) predict the impacts of the following on the OFFGAS SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Low condenser vacuum	3.1	3.3
A2.02	Low dilution steam flow	2.9	3.1
A2.03	Main steamline high radiation	3.5	3.8
A2.04	Offgas system high radiation	3.7	4.1
A2.05	High charcoal bed humidity	2.5	2.9
A2.06	Offgas system holdup volume explosion/ fire	3.5	3.9
A2.07	Low oxygen injection flow: Plant-Specific	2.7	3.3
A2.08	A.C. distribution failures	2.5	2.7
A2.09	Valve closures	2.6	2.8
A2.10	Offgas system high flow	3.1	3.3
A2.11	Offgas system low flow	2.8	2.9
A2.12	Recombiner high temperature	2.7	2.9
A2.13	Recombiner low temperature	2.4	2.8
A2.14	Offgas filter high differential pressure	2.6	2.8
A2.15	Air intrusion	2.7	2.9
A2.16	Loss of offgas system loop seals	2.9	3.2
A2.17	Reactor power changes	2.9	3.1

SYSTEM: 271000 Offgas System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A3.	**Ability to monitor automatic operations of the OFFGAS SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Automatic system isolations	3.3	3.3
A3.02	System flows	2.9	2.8
A3.03	System temperatures	2.8	2.8
A3.04	†Station radioactive release rate: Plant-Specific	3.0	3.8
A3.05	System indicating lights and alarms	2.9	2.9
A3.06	System differential pressures	2.5	2.5
A3.07	†Process radiation monitoring system indications	3.4	3.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Reset system isolations	2.8	2.8
A4.02	System flows	2.9	2.9
A4.03	System temperatures	2.8	2.8
A4.04	Condenser vacuum	3.4	3.5
A4.05	Station radioactive release rate	3.2	3.9
A4.06	System indicating lights and alarms	3.3	3.2
A4.07	System differential pressures	2.4	2.5
A4.08	Process radiation monitoring system	3.2	3.6
A4.09	Offgas system controls/components	3.3	3.2

SYSTEM: 288000 Plant Ventilation Systems

TASK: Shift ventilation lineups for various modes
Place charcoal filters in service
Remove charcoal filters from service
Operate ventilation fans
Operate air conditioning chiller units
Operate ventilation heating units
Monitor operation of heating, ventilation and air conditioning units
Perform main control room emergency fan and damper operability test (write in)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between PLANT VENTILATION SYSTEMS and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	A.C. electrical	2.6	2.6
K1.02	Secondary containment	3.4	3.4
K1.03	Standby gas treatment	3.7	3.7
K1.04	Applicable component cooling water system: Plant-Specific	2.6	2.6
K1.05	Process radiation monitoring system	3.3	3.6
K1.06	Plant air systems	2.7	2.7
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Reactor building supply and exhaust fans: Plant-Specific	2.4	2.4
K2.02	Auxiliary building supply and exhaust fans (turbine building/ radwaste building): Plant-Specific	1.8*	1.9*
K3.	**Knowledge of the effect that a loss or malfunction of the PLANT VENTILATION SYSTEMS will have on following:** (CFR 41.5 / 45.3)		
K3.01	Secondary containment temperature: Plant-Specific	2.8	3.0
K3.02	Reactor building temperature: Plant-Specific	2.9	3.1
K3.03	Auxiliary building temperature: Plant-Specific	2.5	2.5
K3.04	Secondary containment pressure: Plant-Specific	3.2	3.3
K3.05	Reactor building pressure: Plant-Specific	3.1	3.3
K3.06	Auxiliary building pressure: Plant-Specific	2.4*	2.4
K4.	**Knowledge of PLANT VENTILATION SYSTEMS design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic initiation of standby gas treatment system	3.7	3.9

SYSTEM: 288000 Plant Ventilation Systems

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.02	Secondary containment isolation	3.7	3.8
K4.03	Automatic starting and stopping of fans	2.8	2.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to PLANT VENTILATION SYSTEMS :** (CFR 41.7 / 45.4)		
K5.01	Airborne contamination control	3.1	3.2
K5.02	Differential pressure control	3.2	3.4
K5.03	Temperature control	2.5	2.6
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the PLANT VENTILATION SYSTEMS :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical	2.7	2.7
K6.02	Applicable component cooling water system: Plant-Specific	2.5	2.5
K6.03	Plant air systems	2.7	2.7
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the PLANT VENTILATION SYSTEMS controls including:** (CFR 41.5 / 45.5)		
A1.01	Filter differential pressure	2.2*	2.2*
A1.02	Fan differential pressure	2.2*	2.2*
A1.03	Area temperatures	2.4	2.4
A2.	**Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	High drywell pressure: Plant-Specific	3.3	3.4
A2.02	Low reactor water level: Plant-Specific	3.4	3.6
A2.03	Loss of coolant accident: Plant-Specific	3.5	3.7
A2.04	High radiation: Plant-Specific	3.7	3.8
A2.05	Extreme outside weather conditions: Plant-Specific .	2.6	2.7
A3.	**Ability to monitor automatic operations of the PLANT VENTILATION SYSTEMS including:** (CFR 41.7 / 45.7)		
A3.01	Isolation/initiation signals	3.8	3.8

SYSTEM: 288000 Plant Ventilation Systems

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.	Ability to manually operate and/or monitor in the control room:		
A4.01	Start and stop fans	3.1	2.9
A4.02	Area temperature	2.8	2.8

SYSTEM: 272000 Radiation Monitoring System

TASK: Perform lineups of the area radiation monitoring system
Operate area radiation monitors
Monitor area radiation
Perform lineups of process radiation monitoring system
Operate process radiation monitors
Monitor process radiation monitor operation

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RADIATION MONITORING SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system	3.6	3.8
K1.02	Offgas system (augmented offgas): Plant-Specific	3.2	3.5
K1.03	Stack gas: Plant-Specific	3.3	3.6
K1.04	Applicable component cooling water system	2.9	2.9
K1 05	Radwaste system	2.8	3.1
K1.06	Reactor building ventilation system: Plant-Specific	3.2	3.3
K1.07	Isolation condenser: Plant-Specific	3.0	3.2
K1.08	Reactor protection system	3.6	3.9
K1.09	Primary containment isolation system	3.6	3.8
K1.10	Reactor building refuel floor: Plant-Specific	3.4	3.6
K1.11	Reactor building overhead crane; Plant-Specific	2.1*	2.4*
K1.12	Reactor building	3.1	3.2
K1.13	Turbine building	2.9	3.0
K1.14	Radwaste building: Plant-Specific	2.7	2.8
K1.15	Filter building: Plant-Specific	2.8	3.0
K1.16	Process computer	2.2*	2.3*
K1.17	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.4	2.7
K1.18	Primary containment/containment building: Plant-Specific	3.1	3.1
K1.19	Drywell	3.1	3.2
K1.20	†Auxiliary building: Plant-Specific	2.8	3.0
K1.21	Circulating water: Plant-Specific	2.3	2.4
K1.22	Fuel building: mark-III	3.0	3.4
K1.23	Continuous air monitoring: Plant-Specific	3.0	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Main steamline radiation monitors	2.5	2.8
K2.02	Offgas radiation monitoring system	2.5	2.8
K2.03	Stack gas radiation monitoring system	2.5	2.8
K2.04	Process liquid radiation monitoring system	2.3	2.5

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K2.05	Reactor building ventilation monitors: Plant-Specific	2.6	2.9
K2.06	Area radiation monitors	2.1*	2.2*
K2.07	Control room ventilation monitors: Plant-Specific	2.2*	2.4*
K3	**Knowledge of the effect that a loss or malfunction of the RADIATION MONITORING System will have on following:** (CFR 41.5 / 45.3)		
K3.01	†Station liquid effluent release monitoring	3.2	3.8
K3.02	†Station gaseous effluent release monitoring	3.1	3.8
K3.03	Station area radiation monitoring	3.2	3.4
K3.04	Main steam system	3.7	3.8
K3.05	Offgas system	3.5	3.7
K3.06	Reactor building ventilation: Plant-Specific	3.4	3.6
K3.07	Reactor building overhead crane operation: Plant-Specific	2.4*	3.0
K3.08	†Auxiliary building ventilation: Plant-Specific	2.9	3.3
K3.09	Radwaste building ventilation: Plant-Specific	2.8	3.1
K3.10	Control room ventilation: Plant-Specific	2.9	3.3
K4.	**Knowledge of RADIATION MONITORING System design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Redundancy	2.7	2.8
K4.02	Automatic actions to contain the radioactive release in the event that the predetermined release rates are exceeded	3.7	4.1
K4.03	Fail safe tripping of process radiation monitoring logic during conditions of instrument failure	3.6	3.9
K5.	**Knowledge of the operational implications of the following concepts as they apply to RADIATION MONITORING SYSTEM :** (CFR 41.7 / 45.4)		
K5.01	Hydrogen injection operation's effect on process radiation indications: Plant-Specific	3.2	3.5
K6	**Knowledge of the effect that a loss or malfunction of the following will have on the RADIATION MONITORING SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	Reactor protection system	3.0	3.2
K6.02	D.C. power	2.5	2.7
K6.03	A.C. power	2.8	3.0

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.04	Process computer	2.0*	2.2*
K6.05	SPDS/ERIS/CRID/GDS: Plant-Specific	2.1*	2.4*
K6.06	Continuous air monitoring: Plant-Specific	2.4	2.6
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RADIATION MONITORING SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	Lights, alarms, and indications associated with normal operations	3.2	3.2
A1.02	Lights, alarms, and indications associated with surveillance testing	2.9	2.9
A2.	**Ability to (d) predict the impacts of the following on the RADIATION MONITORING SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Fuel element failure	3.7	4.1
A2.02	Reactor protection system power failure	3.3	3.6
A2.03	A.C. electrical failure	2.9	3.1
A2.04	D.C. electrical failure	2.7	2.8
A2.05	Loss of dilution steam	2.5	2.6
A2.06	Downscale trips	2.8	2.9
A2.07	Hydrogen injection operation: Plant-Specific	2.6	2.8
A2.08	Offgas system failure	2.9	3.1
A2.09	Low fuel pool level	3.1	3.3
A2.10	Loss of coolant accident	3.9	4.1
A2.11	Leakage and/or breaks from contaminated systems to atmosphere or to other process systems	3.4	3.7
A2.12	†Refuel floor handling accidents/operations	3.3	4.0
A2.13	Low reactor water level during refueling operations	3.3	3.8
A2.14	Loss of, or inadequate, shielding	3.2	3.5
A2.15	Maintenance operations	2.5	2.7
A2.16	Instrument malfunctions	2.7	2.9
A3.	**Ability to monitor automatic operations of the RADIATION MONITORING SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	Main steam isolation indications	3.8	3.9
A3.02	Offgas system isolation indications	3.6	3.7
A3.03	Liquid radwaste isolation indications	3.1	3.5
A3.04	Radwaste handing interlocks	2.3	2.8

SYSTEM: 272000 Radiation Monitoring System

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A3.05	Refuel floor overhead crane operation interrupt: Plant-Specific	3.0	3.1
A3 06	Ventilation system isolation indications	3.4	3.4
A3 07	Recorder indications	2.8	2.9
A3.08	Meter indications	2.9	2.9
A3.09	Containment isolation indications	3.6	3.5
A3.10	Lights and alarms	3.3	3.2
A3.11	Circulating water system blowdown isolations: Plant-Specific	2.6	2.7
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Recorder indications	2.9	2.9
A4.02	Meter indications	3.0	3.0
A4 03	Power supply status indicators	2.6	2.6
A4 04	SPDS/ERIS/CRID/GDS	2.5*	2.7*
A4.05	†Convert process radiation monitor readings to offsite release rates: Plant-Specific	2.3*	3.7*
A4.06	†Manually trip process radiation monitor logic	2.9	3.2

SYSTEM: 268000 Radwaste

TASK: Monitor the liquid radwaste system (write in)
Operate the discharge water floor drain system (write in)
Operate the drywell equipment drain pump (write in)
Monitor the liquid radwaste system (waste collection) (write in)
Startup a concentrator/evaporator
Secure a concentrator/evaporator
Perform lineups on the solid radwaste system

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between RADWASTE and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Condensate system	2.2	2.6
K1.02	Plant air systems	2.1*	2.4
K1.03	Reactor building equipment drains: Plant-Specific	2.6	2.9
K1.04	Reactor building floor drains: Plant-Specific	2.7	2.9
K1.05	Drywell equipment drains	2.9	3.2
K1.06	Drywell floor drains	2.9	3.2
K1.07	Reactor water cleanup	2.8	2.9
K1.08	Fuel pool	2.7	2.8
K1.09	ECCS systems	2.6	2.8
K1.10	Auxiliary steam: Plant-Specific	2.2	2.4
K1.11	Applicable component cooling water system	2.2	2.4
K1.12	Suppression pool	2.3	2.5
K1.13	Auxiliary building floor drains: Plant-Specific	2.2	2.4
K1.14	Auxiliary building equipment drains: Plant-Specific	2.0*	2.2
K1.15	Offgas system	2.3	2.5
K1.16	Circulating water system: Plant-Specific	2.3	2.5
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the RADWASTE will have on following:** (CFR 41.5 / 45.3)		
K3.01	RWCU system	2.4	2.5
K3.02	Condensate system	2.2	2.4
K3.03	ECCS systems	2.2*	2.4
K3.04	Drain sumps	2.7	2.8
K3.05	Fuel pools: Plant-Specific	2.1	2.4

SYSTEM: 268000 Radwaste

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K4.	**Knowledge of RADWASTE design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K5.	**Knowledge of the operational implications of the following concepts as they apply to RADWASTE :** (CFR 41.5 / 45.3)		
K5.01	Units of radiation, dose and dose rate	2.7	3.0
K5.02	Radiation hazards and ALARA concept	3.1	3.6*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the RADWASTE :** (CFR 41.7)		
K6.01	Applicable component cooling water system	2.2	2.5
K6.02	Plant air systems	2.3	2.6
K6.03	Building ventilation	2.4	2.7
K6.04	Circulating water	2.1*	2.3
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the RADWASTE controls including:** (CFR 41.5 / 45.5)		
A1.01	Radiation level	2.7*	3.1*
A1.02	Off-site release	2.6*	3.6*
A2.	**Ability to (a) predict the impacts of the following on the RADWASTE ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	System rupture	2.9	3.5
A2.02	High turbidity water	2.3	2.7
A2.03	Loss of steam supply	2.0*	2.3
A3.	**Ability to monitor automatic operations of the RADWASTE including:** (CFR 41.7 / 45.7)		
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	Sump integrators	3.4	3.6

SYSTEM: 290002 Reactor Vessel Internals

TASK: Perform heatup/cooldown of reactor vessel

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between REACTOR VESSEL INTERNALS and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Main steam system	3.2	3.2
K1.02	Recirculation system	3.2	3.2
K1.03	Reactor feedwater system	3.2	3.2
K1.04	HPCI: Plant-Specific	3.4	3.5
K1.05	RHR: Plant-Specific	3.1	3.2
K1.06	HPCS: Plant-Specific	3.1	3.1
K1.07	Isolation condenser: Plant-Specific	3.4	3.4
K1.08	RCIC: Plant-Specific	3.1	3.1
K1.09	LPCI: Plant-Specific	3.2	3.3
K1.10	CRD hydraulic system	3.1	3.1
K1.11	CRD mechanism	2.9	2.9
K1.12	SBLC	3.4	3.5
K1.13	Relief/safety valves	3.4	3.5
K1.14	RWCU	2.9	3.1
K1.15	Nuclear boiler instrumentation	3.4	3.5
K1.16	LPCS	3.2	3.4
K1.17	ADS	3.3	3.4
K1.18	Loss parts monitoring: Plant-Specific	2.1*	2.2*
K1.19	TIP	2.5	2.6
K1.20	Nuclear instrumentation	3.2	3.3
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K3.	**Knowledge of the effect that a loss or malfunction of the REACTOR VESSEL INTERNALS will have on following:** (CFR 41.7 / 45.4)		
K3.01	Reactor water level	3.2	3.3
K3.02	Reactor pressure	2.9	3.0
K3.03	Reactor power	3.3	3.4
K3.04	Plant radiation levels	2.9	3.2
K3.05	Off-site radiation levels	2.9	3.2
K3.06	PCIS/NSSSS	3.1	3.1
K3.07	Nuclear boiler instrumentation	3.1	3.1

SYSTEM: 290002 Reactor Vessel Internals

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.	**Knowledge of REACTOR VESSEL INTERNALS design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	2/3 core coverage following a DBA LOCA	3.7	3.9
K4.02	Separation of fluid flow paths within the vessel	3.1	3.2
K4.03	Core orificing	3.2	3.3
K4.04	Moisture removal from generated steam	2.8	2.8
K4.05	Natural circulation	3.3	3.5
K5.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR VESSEL INTERNALS :** (CFR 41.5 / 45.3)		
K5.01	†Thermal limits	3.5	3.9
K5.02	Fission product poisons	2.9	3.1
K5.03	Burnable poisons	2.7	3.0
K5.04	†PCIOMR Plant-Specific	3.1	3.7
K5.05	Brittle fracture	3.1	3.3
K5.06	Heat transfer mechanisms	2.8	3.2
K5.07	†Safety limits	3.9	4.4*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR VESSEL INTERNALS :** (CFR 41.7 / 45.7)		
K6.01	CRD hydraulic system	2.8	2.9
K6.02	CRD mechanism	2.9	2.9
K6.03	Recirculation system	3.1	3.2
K6.04	Reactor feedwater system	3.0	3.1
K6.05	SBLC	3.3	3.4
K6.06	Relief/safety valves	3.0	3.2
K6.07	RWCU	2.6	2.7
K6.08	Nuclear boiler instrumentation	2.9	3.2
K6.09	LPCS	3.2	3.3
K6.10	HPCI: Plant-Specific	3.0	3.3
K6.11	RHR: Plant-Specific	3.1	3.2
K6.12	Isolation condenser: Plant-Specific	3.0	3.2
K6.13	RCIC: Plant-Specific	2.7	2.8
K6.14	LPCI: Plant-Specific	3.1	3.3
K6.15	ADS	3.1	3.4
K6.16	Loss parts monitoring	2.0*	2.0*
K6.17	TIP	2.5	2.5
K6.18	Nuclear instrumentation	3.0	3.1
K6.19	HPCS: Plant-Specific(BWR-5&6)	3.0	3.1
K6.20	Main steam system	2.9	3.1

SYSTEM: 290002 Reactor Vessel Internals

Tasks as noted previously

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
A1.	Ability to predict and/or monitor changes in parameters associated with operating the REACTOR VESSEL INTERNALS controls including: (CFR 41.5 / 45.5)		
A2.	Ability to (a) predict the impacts of the following on the REACTOR VESSEL INTERNALS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	LOCA	3.7	4.0
A2.02	†Overpressurization transient	3.6	3.9
A2.03	†Control rod drop accident	3.6	3.9
A2.04	Excessive heatup/cooldown rate	3.7	4.1
A2.05	†Exceeding thermal limits	3.7	4.2
A2.06	†Exceeding safety limits	4.0	4.5*
A3.	Ability to monitor automatic operations of the REACTOR VESSEL INTERNALS including: (CFR 41.7 / 45.7)		
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		

SYSTEM: 233000 Fuel Pool Cooling and Clean-up

TASK: Lineup residual heat removal supplemental fuel pool cooling
Monitor residual heat removal supplemental fuel pool cooling
Startup the torus/suppression pool cleanup system (write in)
Stop residual heat removal supplemental fuel pool cooling
Shutdown the torus/suppression pool cleanup system (write in)
Monitor RHR supplemental fuel pool cooling (write in)
Perform lineups on spent fuel pool cooling system
Fill the spent fuel pools
Startup the spent fuel pool cooling system in different pump/heat exchanger combinations
Perform spent fuel pool purification using filter
Perform spent fuel pool purification using demineralizer
Backwash spent fuel pool filter
Change spent fuel pool filter
Replace resin in spent fuel pool demineralizer
Operate system between refueling pool and spent fuel pool in different lineups
Operate the spent fuel pool skimmer loop
Monitor spent fuel pool cooling system operation
Perform borated water storage tank purification using filter
Perform borated water storage tank purification using demineralizer
Recirculate the spent fuel pool
Lower refueling pool level
Fill and vent the spent fuel pool purification system
Perform spent fuel pool leakage test
Fill the fuel transfer canal
Drain the fuel transfer canal
Perform fuel transfer canal purification
Recirculate fuel transfer canal
Perform decay heat removal using the spent fuel cooling system
Shutdown the spent fuel pool cooling system
Fill the dryer-separator pit
Drain the dryer-separator pit
Conduct nitrogen mixing of spent fuel pool cooling demineralizer resin

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between FUEL POOL COOLING AND CLEAN-UP and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Shutdown cooling system: Plant-Specific	2.6	2.9
K1.02	Residual heat removal system: Plant-Specific	2.9	3.0
K1.03	Condensate storage tank	2.3	2.3
K1.04	Process sampling system	2.0*	2.0*

SYSTEM: 233000 Fuel Pool Cooling and Clean-up

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.05	Plant air systems	2.2	2.2
K1.06	A.C. electrical power	2.3	2.3
K1.07	Condensate system: Plant-Specific	2.1	2.2
K1.08	Condensate transfer	2.5	2.5
K1.09	Component cooling water systems	2.6	2.6
K1.10	Containment drainage system: Plant-Specific	2.2	2.3
K1.11	Reactor building drainage system: Plant-Specific	2.3	2.4
K1.12	Radwaste system	2.5	2.6
K1.13	Suppression pool cleanup system: Plant-Specific	2.3	2.6
K1.14	Reactor building ventilation	2.5	2.5
K1.15	Storage pools	2.9	2.9
K1.16	Emergency cooling water systems: Plant-Specific	2.7	2.8
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Fuel pool cooling pumps	2.1*	2.2*
K2.02	RHR pumps	2.8*	2.9*
K3.	**Knowledge of the effect that a loss or malfunction of the FUEL POOL COOLING AND CLEAN-UP will have on following:** (CFR 41.7 /45.6)		
K3.01	Fuel pool temperature	3.2	3.4
K3.02	Fuel pool water level	3.1	3.2
K3.03	Fuel pool water clarity	2.6	2.8
K3.04	Fuel pool water chemistry	2.4*	2.6
K3.05	Fuel pool water fission product concentration	2.6	2.8
K3.06	Area radiation levels	2.9	3.2
K3.07	Suppression pool chemistry: Plant-Specific	2.3	2.9
K3.08	†Refueling operations	2.9	3.5
K4.	**Knowledge of FUEL POOL COOLING AND CLEAN-UP design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Redundancy	2.4	2.6
K4.02	Pool clarity	2.4	2.6
K4.03	Maintenance of adequate pool temperature	2.8	3.1
K4.04	Overpressure protection for fuel pool cooling system filter	2.0*	2.1
K4.05	Net positive suction head requirements for fuel pool cooling pumps	2.1*	2.2*
K4.06	Maintenance of adequate pool level	2.9	3.2
K4.07	Supplemental heat removal capability	2.7	2.9
K4.08	Pool cooling during loss of coolant accident: BWR-6	2.6*	2.8

SYSTEM: 233000 Fuel Pool Cooling and Clean-up

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K4.09	Maintenance of filter/demineralizer precoat during low flow conditions	2.1*	2.4*
K5.	**Knowledge of the operational implications of the following concepts as they apply to FUEL POOL COOLING AND CLEAN-UP :** (CFR 41.5 / 45.3)		
K5.01	Heat removal mechanisms	2.5	2.7
K5.02	Pump cavitation	2.1*	2.2*
K5.03	Spent fuel decay heat generation .Ep1666X.	2.6	2.8
K5.04	Demineralizer ion exchange	2.0*	2.2*
K5.05	Mechanical filtration operation	2.1*	2.2*
K5.06	Maximum normal heat load	2.5	2.7
K5.07	Maximum (abnormal) heat 102d	2.5	2.8
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the FUEL POOL COOLING AND CLEAN-UP :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical power	2.5	2.7
K6.02	Shutdown cooling system: Plant-Specific	2 2*	2.5*
K6.03	Residual heat removal: Plant-Specific	2.3	2.7
K6.04	Condensate transfer	2.5	2.6
K6.05	Condensate system	2.1*	2.3
K6.06	Condensate storage tanks	2.4	2.4
K6.07	Component cooling water systems	2.7	2.8
K6.08	Plant air systems	2.4	2.4
K6.09	Radwaste system	2.2	2.4
K6.10	Reactor cavity seal failure	2.9	3.3
K6.11	NSSSS/PCIS: Plant-Specific	2.3	2.6*
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the FUEL POOL COOLING AND CLEAN-UP controls including:** (CFR 41.5 / 45.5)		
A1.01	Surge tank level	2.6	2.9
A1.02	Pool level	2.9	3.1
A1.03	Pool temperature	3.1	3.3
A1.04	Pump discharge pressure	2.4	2.5
A1.05	Filter/ demineralize differential pressure	2.4*	2.3
A1.06	System flow	2.5	2.4
A1.07	System temperature	2.7	2.8
A1.08	Pool chemistry	2.1*	2.4
A1.09	Pool clarity	2.4	2.6

SYSTEM: 233000 Fuel Pool Cooling and Clean-up

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
A1.10	Pool activity levels	2.4	2.6*
A1.11	Suppression pool chemistry: BWR-6	2.4	2.9
A2.	**Ability to (a) predict the impacts of the following on the FUEL POOL COOLING AND CLEAN-UP ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	High pool level	2.7	2.9
A2.02	Low pool level	3.1	3.3
A2.03	Low surge tank level/high level	2.8	3.0
A2.04	Pump trip	2.6	2.7
A2.05	Valve closures	2.5	2.5
A2.06	Valve openings	2.5	2.5
A2.07	High fuel pool temperature	3.0	3.2
A2.08	Closed cooling water failure	2.9	3.1
A2.09	A.C. electrical power failures	2.7	2.9
A2.10	Refueling bellows seal high flow	2.9	3.3
A2.11	Fuel pool gate seal high flow	2.9	3.2
A2.12	High filter/ demineralizer differential pressure	2.4*	2.4
A2.13	Low filter/ demineralizer differential pressure	2.2*	2.2
A2.14	Low system flow	2.3	2.3
A2.15	High system temperature	2.8	2.9
A2.16	Loss of coolant accident signal	2.5	2.8
A2.17	Fuel transfer tube drain tank high level/low level: BWR-6	2-8	2.8
A2.18	Low pool clarity	2.5	2.7
A2.19	Inadequate system/pool chemistry	2.5	2.8
A3.	**Ability to monitor automatic operations of the FUEL POOL COOLING AND CLEAN-UP including:** (CFR 41.7 / 45.7)		
A3.01	Valve operation	2.4	2.5
A3.02	Pump trip(s)	2.6	2.6
A3.03	System indicating lights and alarms	2.6	2.6
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	System lights and alarms	2.6	2.6
A4.02	System lineups	2.3	2.5
A4.03	System flow	2.2	2.4
A4.04	Pool level	2.9*	3.1
A4.05	Pool temperature	2.7*	3.1*
A4.06	System temperature	2.5*	2.6*

SYSTEM: 233000 Fuel Pool Cooling and Clean-up

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.07	System pressures	2.2*	2.3*
A4.08	System differential pressures	2.2*	2.2*
A4.09	Pump operation	2.2*	2.2*
A4.10	Tank levels	2.5	2.6
A4.11	Closed cooling water temperature	2.5	2.5

SYSTEM: 261000 Standby Gas Treatment System

TASK: Perform lineups on the standby gas treatment system
Place the standby gas treatment system in standby readiness
Place the standby gas treatment system in service manually
Monitor the standby gas treatment system following automatic initiation
Remove one standby gas treatment (SGTS) train from service after automatic initiation
Secure the standby gas treatment system (SGTS)
Perform standby gas treatment manual bypass valve operation, and simulated auto act test
Perform standby gas treatment system logic system functional test
Perform one circuit of standby gas treatment system inoperable test

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between STANDBY GAS TREATMENT SYSTEM and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Reactor building ventilation system	3.4	3.6
K1.02	Drywell	3.2	3.4
K1.03	Suppression pool	2.9	3.1
K1.04	High radiation sampling system	2.5	2.8
K1.05	Radwaste system: Plant-Specific	2.3	2.4
K1.06	High pressure coolant injection system: Plant-Specific	3.0	3.1
K1.07	Elevated release stack	3.1	3.2
K1.08	Process radiation monitoring system	2.8	3.1
K1.09	Primary containment isolation system	3.2	3.4
K1.10	Plant air systems	2.2*	2.3
K1.11	Primary containment pressure	3.2	3.3
K1.12	Primary containment purge system: Plant-Specific	3.1	3.2
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Fan power	2.1*	2.3*
K2.02	Valve power	1.9*	2.0*
K2.03	Initiation logic	2.3*	2.5*
K2.04	Heater power	1.7*	1.9*
K3.	**Knowledge of the effect that a loss or malfunction of the STANDBY GAS TREATMENT SYSTEM will have on following:** (CFR 41.7 /45.6)		
K3.01	Secondary containment and environment differential pressure	3.3	3.6
K3.02	Off-site release rate	3.6	3.9

SYSTEM: 261000 Standby Gas Treatment System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K3.03	Primary containment pressure: Mark-I&II	3.2	3.4
K3.04	High pressure coolant injection system: Plant-Specific	3.1	3.1
K3 05	Secondary containment radiation/ contamination levels .	3.2	3.5
K3 06	Primary containment oxygen content: Mark-I&II	3.0	3.3
K4.	**Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	Automatic system initiation	3.7	3.8
K4.02	Charcoal bed decay heat removal	2.6	2.8
K4.03	Moisture removal	2.5	2.7
K4.04	Radioactive particulate filtration	2.7	2.9
K4.05	Fission product gas removal	2.6	2.8
K4.06	Charcoal bed retention	2.4*	2.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to STANDBY GAS TREATMENT SYSTEM :** (CFR 41.5 / 45.3)		
K5.01	Heat removal mechanisms	2.3*	2.6*
K5.02	Air operated valves: Plant-Specific	2.3*	2.5*
K6.	**Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM :** (CFR 41.7 / 45.7)		
K6.01	A.C. electrical distribution	2.9	3.0
K6.02	D.C. electrical distribution	2.4*	2.6*
K6.03	Emergency diesel generator system	3.0	3.1
K6.04	Process radiation monitoring	2.9	3.1
K6.05	Reactor protection system: Plant-Specific	3.1	3.2
K6.06	Plant air systems	2.4	2.6
K6.07	Primary containment atmosphere sampling system: Plant-Specific	2.2*	2.4
K6.08	Reactor vessel level: Plant-Specific	3.1	3.1
K6.09	Primary containment high pressure: Plant-Specific . .	3.1	3.3
	ABILITY		
A1.	**Ability to predict and/or monitor changes in parameters associated with operating the STANDBY GAS TREATMENT SYSTEM controls including:** (CFR 41.5 / 45.5)		
A1.01	System flow	2.9	3.1

SYSTEM: 261000 Standby Gas Treatment System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A1.02	Primary containment pressure	3.1	3.2
A1.03	†Off-site release levels	3.2	3.8
A1.04	Secondary containment differential pressure	3.0	3.3
A1.05	Primary containment oxygen level: Mark-I&II	2.7*	2.9*
A1.06	Drywell and suppression chamber differential pressure: Mark-I	2.7	3.0
A1.07	SBGTS train temperature	2.8	2.9
A2.	**Ability to (a) predict the impacts of the following on the STANDBY GAS TREATMENT SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** (CFR 41.5 / 45.6)		
A2.01	Low system flow	2.9	3.1
A2.02	High system flow	2.9	3.1
A2.03	High train temperature	2.9	3.2
A2.04	High train moisture content	2.5	2.7
A2.05	Fan trips	3.0	3.1
A2.06	Valve closures	2.9*	2.9*
A2.07	A.C. electrical failure	2.7*	2.8
A2.08	D.C. electrical failure	2.4*	2.7*
A2.09	Plant air system failure	2.4*	2.6*
A2.10	Low reactor water level: Plant-Specific	3.1	3.2
A2.11	High containment pressure	3.2	3.3
A2.12	High fuel pool ventilation radiation: Plant-Specific.	3.2	3.4
A2.13	High secondary containment ventilation exhaust radiation	3.4	3.7
A2.14	High system pressure: Plant-Specific	3.0	3.2
A2.15	High area radiation by refuel bridge: Plant-Specific.	3.0	3.4
A3.	**Ability to monitor automatic operations of the STANDBY GAS TREATMENT SYSTEM including:** (CFR 41.7 / 45.7)		
A3.01	System flow	3.2	3.3
A3.02	Fan start	3.2	3.1
A3.03	Valve operation	3.0	2.9
A3.04	System temperature	3.0	3.1
A4.	**Ability to manually operate and/or monitor in the control room:** (CFR 41.7 / 45.5 to 45.8)		
A4.01	†Off-site release levels: Plant-Specific	3.2*	4.0*
A4.02	Suction valves	3.1	3.1
A4.03	Fan	3.0	3.0
A4.04	Primary containment pressure	3.3	3.4

SYSTEM: 261000 Standby Gas Treatment System

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
A4.05	Drywell to suppression chamber/torus differential pressure: Mark-I,II	2.9	3.2
A4.06	Reactor building differential pressure	3.3	3.6
A4.07	System flow	3.1	3.2
A4.08	System temperature	2.6	2.7
A4.09	Ventilation valves/dampers	2.7	2.7

SYSTEM: 290003 Control Room HVAC

TASK: Perform system lineups
Place system in standby operating mode

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.	**Knowledge of the physical connections and/or cause-effect relationships between CONTROL ROOM HVAC and the following:** (CFR 41.2 to 41.9 / 45.7 to 45.8)		
K1.01	Radiation monitors	3.4	3.5
K1.02	Chlorine amonia detectors: Plant-Specific	2.9	3.1
K1.03	Remote air intakes: Plant-Specific	2.8	2.9
K1.04	Nuclear steam supply shut off system (NSSSS/PCIS): Plant-Specific	3.2	3.3
K1.05	Component cooling water systems	2.8	3.0
K1.06	Plant air systems	2.6	2.7
K1.07	Fire protection	2.9	3.0
K2.	**Knowledge of electrical power supplies to the following:** (CFR 41.7)		
K2.01	Fans	2.2*	2.4*
K2.02	Chiller units	2.4*	2.4*
K2.03	Motor operated valves: Plant-Specific	1.9*	2.0*
K3.	**Knowledge of the effect that a loss or malfunction of the CONTROL ROOM HVAC will have on following:** (CFR 41.7 /45.6)		
K3.01	Control room habitability	3.5	3.8
K3.02	Computer/instrumentation: Plant-Specific	3.3	3.6
K3.03	Control room temperature	2.9	3.1
K3.04	Control room pressure	2.8*	2.9
K4.	**Knowledge of CONTROL ROOM HVAC design feature(s) and/or interlocks which provide for the following:** (CFR 41.7)		
K4.01	System initiations/reconfiguration: Plant-Specific	3.1	3.2
K4.02	Control room temperatures	2.4*	2.6
K5.	**Knowledge of the operational implications of the following concepts as they apply to CONTROL ROOM HVAC** (CFR 41.5 / 45.3)		
K5.01	Airborne contamination (e.g., radiological, toxic gas, smoke) control	3.2	3.5
K5.02	Differential pressure control	2.8	2.8
K5.03	Temperature control	2.6	2.7

SYSTEM: 290003 Control Room HVAC

Tasks as noted previously

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K6.	Knowledge of the effect that a loss or malfunction of the following will have on the CONTROL ROOM HVAC : (CFR 41.7 / 45.7)		
K6.01	Electrical power	2.7	2.9
K6.02	Component cooling water systems	2.7	2.9
K6.03	Plant air systems	2.4	2.6
K6.04	Fire protection: Plant-Specific	2.6	2.8
	ABILITY		
A1.	Ability to predict and/or monitor changes in parameters associated with operating the CONTROL ROOM HVAC controls including: (CFR 41.5 / 45.5)		
A1.01	Filter differential pressure	2.1*	2.1*
A1.02	Fan differential pressure	2.1*	2.1*
A1.03	Area temperatures	2.6	2.6
A1.04	Control room pressure	2.5	2.8
A1.05	Radiation monitoring (control room)	3.2	3.3
A2.	Ability to (a) predict the impacts of the following on the CONTROL ROOM HVAC ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: (CFR 41.5 / 45.6)		
A2.01	Initiation/reconfiguration	3.1	3.2
A2.02	Extreme environmental conditions	3.1	3.4
A2.03	Initiation/reconfiguration failure	3.4	3.6
A2.04	Initiation/failure of fire protection system	3.1	3.3
A3.	Ability to monitor automatic operations of the CONTROL ROOM HVAC including: (CFR 41.7 / 45.7)		
A3.01	Initiation/reconfiguration	3.3	3.5
A3.02	Initiation/failure of fire protection system	3.0	3.4
A4.	Ability to manually operate and/or monitor in the control room: (CFR 41.7 / 45.5 to 45.8)		
A4.01	Initiate/reset system	3.2	3.2
A4.02	Fans	2.8	2.8
A4.03	Reposition dampers	2.8	2.8
A4.04	Environmental conditions	2.8	3.0

4.1 EMERGENCY PLANT EVOLUTIONS

295024	High Drywell Pressure
295025	High Reactor Pressure
295026	Suppression Pool High Water Temperature
295027	High Containment Temperature (Mark III Containment Only)
295028	High Drywell Temperature
295029	High Suppression Pool Water Level
295030	Low Suppression Pool Water Level
295031	Reactor Low Water Level
295032	High Secondary Containment Area Temperature
295033	High Secondary Containment Area Radiation Levels
295034	Secondary Containment Ventilation High Radiation
295035	Secondary Containment High Differential Pressure
295036	Secondary Containment High Sump / Area Water Level
295037	SCRAM Condition Present and Reactor Power Above APRM Downscale or unknown
295038	High Off-Site Release Rate
500000	High Containment Hydrogen Concentration.

EPE: 295024 High Drywell Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE :** (CFR 41.8 to 41.10)		
EK1.01	Drywell integrity: Plant-Specific	4.1	4.2*
EK1.02	Containment building integrity: Mark-III	3.9	4.1
EK2.	**Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following:** (CFR 41.7, 45.8)		
EK2.01	HPCI (FWCI): Plant-Specific	3.9	4.0
EK2.02	HPCS: Plant-Specific	3.7	3.7
EK2.03	LPCS: Plant-Specific	3.8	3.8
EK2.04	RHR/LPCI	3.9	3.9
EK2.05	RPS	3.9	4.0
EK2.06	Emergency generators	3.9	4.0
EK2.07	PCIS/NSSSS	3.9	3.9
EK2.08	ADS: Plant-Specific	4.0	4.1
EK2.09	Suppression pool makeup: Plant-Specific	2.9	3.1
EK2.10	A.C. distribution	3.5	3.5
EK2.11	Drywell spray (RHR) logic: Mark-I&II	4.2	4.2*
EK2.12	Suppression pool cooling	3.5	3.5
EK2.13	Suppression pool spray: Plant-Specific	3.8	3.8
EK2.14	Containment pressure: Mark-III	3.9	3.9
EK2.15	Containment spray logic: Plant-Specific	3.8	3.9
EK2.16	SPDS/ERIS/CRIDS: Plant-Specific	3.2	3.2
EK2.17	Auxiliary building isolation logic: Plant-Specific	3.0	3.3
EK2.18	Ventilation	3.3	3.4
EK2.19	Feedwater and condensate: Plant-Specific	2.9	2.9
EK2.20	D.C. distribution: Plant-Specific	2.8	2.9
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE :** (CFR 41.5, 45.6)		
EK3.01	Drywell spray operation: Mark-I&II	3.6	4.0
EK3.02	Suppression pool spray operation: Plant-Specific	3.5	3.8
EK3.03	Containment venting: Mark-III	3.6	4.1
EK3.04	†Emergency depressurization	3.7	4.1
EK3.05	†RPV flooding	3.5	3.8
EK3.06	Reactor SCRAM	4.0*	4.1
EK3.07	Drywell venting	3.5	4.0
EK3.03	Containment spray: Plant-Specific	3.7	4.1
EK3.09	Auxiliary building isolation: Plant-Specific	3.1	3.6

EPE: 295024 High Drywell Pressure

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA1.	**Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE:** (CFR 41.7, 45.6)		
EA1.01	HPCI (FWCI): Plant-Specific	4.1*	4.0
EA1.02	HPCS: Plant-Specific	3.8	3.7
EA1.03	LPCS: Plant-Specific	4.0	3.9
EA1.04	RHR/LPCI	4.1	3.9
EA1.05	RPS	3.9	4.0
EA1.06	Emergency generators	3.7	3.7
EA1.07	PCIS/NSSSS	3.8	3.9
EA1.08	ADS: Plant-Specific	3.9	3.9
EA1.09	Suppression pool makeup: Plant-Specific	2.9	3.0
EA1.10	A.C. distribution	3.4	3.6
EA1.11	Drywell spray: Mark-I&II	4.2*	4.2*
EA1.12	Suppression pool spray: Mark-I&II	3.8	3.8
EA1.13	Suppression pool cooling	3.6	3.6
EA1.14	Drywell ventilation system	3.4	3.5
EA1.15	Containment/drywell atmospheric monitoring	3.6	3.7
EA1.16	Containment/drywell vacuum breakers	3.4	3.4
EA1.17	Containment spray: Plant-Specific	3.9	3.9
EA1.18	Containment ventilation system: Mark-III	3.6	3.6
EA1.19	Containment atmosphere control: Plant-Specific	3.3	3.4
EA1.20	Standby gas treatment/FRVS: Plant-Specific	3.5	3.6
EA1.21	Recirculation system (LPCI loop select logic): Plant-Specific	3.4	3.8
EA1.22	D.C. distribution: Plant-Specific	2.7	2.9
EA2.	**Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE:** (CFR 41.10, 43.5, 45.13)		
EA2.01	Drywell pressure	4.2*	4.4*
EA2.02	Drywell temperature	3.9	4.0
EA2.03	Suppression pool level	3.8	3.8
EA2.04	Suppression chamber pressure: Plant-Specific	3.9	3.9
EA2.05	Suppression chamber air-space temperature: Plant-Specific	3.6	3.1
EA2.06	Suppression pool temperature	4.1	4.1
EA2.07	Containment radiation levels: Mark-III	3.4	3.9
EA2.08	Drywell radiation levels	3.6	4.0
EA2.09	Containment pressure: Mark-III	4.0*	4.1*
EA2.10	Containment temperature: Mark-III	3.7	3.9

EPE: 295025 High Reactor Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE :** (CFR 41.8 to 41.10)		
EK1.01	Pressure effects on reactor power	3.9	4.0
EK1.02	Reactor vessel integrity	4.1	4.2
EK1.03	Safety/relief valve tailpipe temperature/pressure relationships	3.6	3.8
EK1.04	Decay heat generation	3.6	3.9
EK1.05	†Exceeding safety limits	4.4*	4.7*
EK1.06	Pressure effects on reactor water level	3.5	3.6
EK2.	**Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following:** (CFR 41.7, 45.8)		
EK2.01	RPS	4.1*	4.1
EK2.02	Isolation condenser: Plant-Specific	4.2*	4.5*
EK2.03	RRCS: Plant-Specific	4.0	4.3
EK2.04	ARI/RPT/ATWS: Plant-Specific	3.9	4.1*
EK2.05	Safety/relief valves: Plant-Specific	4.1*	4.2
EK2.06	HPCI: Plant-Specific	3.8	3.8
EK2.07	RCIC: Plant-Specific	3.7	3.7
EK2.08	Reactor/turbine pressure regulating system: Plant-Specific	3.7	3.7
EK2.09	Reactor power	3.9	3.9
EK2.10	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.9	3.2
EK2.11	Reactor water level	3.5	3.6
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE :** (CFR 41.5, 45.6)		
EK3.01	Safety/relief valve opening	4.2	4.3*
EK3.02	Recirculation pump trip: Plant-Specific	3.9	4.1
EK3.03	HPCI operation: Plant-Specific	3.8	3.8
EK3.04	Isolation condenser initiation: Plant-Specific	4.5*	4.7*
EK3.05	RCIC operation: Plant-Specific	3.6	3.7
EK3.06	Alternate rod insertion: Plant-Specific	4.2*	4.4*
EK3.07	†RRCs initiation: Plant-Specific	3.3	3.7
EK3.08	Reactor/turbine pressure regulating system operation	3.5	3.5
EK3.09	Low-low set initiation: Plant-Specific	3.7	3.7

EPE: 295025 High Reactor Pressure

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA1.	**Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE:** (CFR 41.7, 45.6)		
EA1.01	Main steam line drains	2.9	3.0
EA1.02	Reactor/turbine pressure regulating system	3.8	3.8
EA1.03	Safety/relief valves: Plant-Specific	4.4*	4.4*
EA1.04	HPCI: Plant-Specific	3.8	3.9
EA1.05	RCIC: Plant-Specific	3.7	3.7
EA1.06	Isolation condenser: Plant-Specific	4.5*	4.5*
EA1.07	ARI/RPT/ATWS: Plant-Specific	4.1	4.1
EA1.08	†RRCS: Plant-Specific	3.3	3.7*
EA2.	**Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE:** (CFR 41.10, 43.5, 45.13)		
EA2.01	Reactor pressure	4.3*	4.3
EA2.02	Reactor power	4.2*	4.2
EA2.03	Suppression pool temperature	3.9	4.1
EA2.04	Suppression pool level	3.9	3.9
EA2.05	Decay heat generation	3.4	3.6
EA2.06	Reactor water level	3.7	3.8

EPE: 295026 Suppression Pool High Water Temperature

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : (CFR 41.8 to 41.10)		
EK1.01	Pump NPSH	3.0	3.4
EK1.02	Steam condensation	3.5	3.8
EK2.	Knowledge of the interrelations between SUPPRESSION POOL HIGH WATER TEMPERATURE and the following: (CFR 41.7, 45.8)		
EK2.01	Suppression pool cooling	3.9	4.0
EK2.02	Suppression pool spray: Plant-Specific	3.6	3.8
EK2.03	Suppression chamber pressure: Mark-I&II	3.2	3.6
EK2.04	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5	2.8
EK2.05	Containment pressure: Mark-III	3.0	3.3
EK2.06	Suppression pool level	3.5	3.7
EK3.	Knowledge of the reasons for the following responses as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: (CFR 41.5, 45.6)		
EK3.01	Emergency/normal depressurization	3.8	4.1
EK3.02	Suppression pool cooling	3.9	4.0
EK3.03	Suppression pool spray: Plant-Specific	3.5	3.8
EK3.04	†SBLC injection	3.7	4.1*
EK3.05	Reactor SCRAM	3.9	4.1
	ABILITY		
EA1.	Ability to operate and/or monitor the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: (CFR 41.7, 45.6)		
EA1.01	Suppression pool cooling	4.1	4.1
EA1.02	Suppression pool spray: Plant-Specific	3.6	3.8
EA1.03	Temperature monitoring	3.9*	3.9
EA2.	Ability to determine and/or interpret the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: (CFR 41.10, 43.5, 45.13)		
EA2.01	Suppression pool water temperature	4.1*	4.2*
EA2.02	Suppression pool level	3.8	3.9
EA2.03	Reactor pressure	3.9	4.0

EPE: 295027 High Containment Temperature (Mark III Containment Only)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EK1.	Knowledge of the operational implications of the following concepts as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) : (CFR 41.8 to 41.10)		
EK1.01	Equipment environmental qualifications: Mark-III.....	2.5	2.7
EK1.02	Reactor water level measurement: Mark-III............	3.0	3.2
EK1.03	Containment integrity: Mark-III......................	3.8	3.8
EK2.	Knowledge of the interrelations between HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) and the following: (CFR 41.7, 45.8)		
EK2.01	Containment spray: Plant-Specific....................	3.2	3.4
EK2.02	Components internal to the containment: Mark-III.....	3.2	3.3
EK2.03	Containment ventilation/cooling: Mark-III............	3.5	3.7
EK2.04	SPDS/ERIS/CRIDS/GDS: Mark-III........................	2.6	3.2
EK3.	Knowledge of the reasons for the following responses as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) : (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization: Mark-III.................	3.7	3.8
EK3.02	Containment spray: Plant-Specific....................	3.2	3.2
EK3.03	Reactor SCRAM: Mark-III..............................	3.7	3.7
	ABILITY		
EA1.	Ability to operate and/or monitor the following as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) : (CFR 41.7, 45.6)		
EA1.01	Containment spray: Plant-Specific....................	3.2	3.4
EA1.02	Containment ventilation/cooling: Mark-III............	3.5	3.5
EA1.03	Emergency depressurization: Mark-III.................	3.5	3.8
EA2.	Ability to determine and/or interpret the following as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) : (CFR 41.10, 43.5, 45.13)		
EA2.01	Containment temperature: Mark-III....................	3.7	3.7
EA2.02	Containment pressure: Mark-III.......................	3.7	3.7
EA2.03	Reactor pressure: Mark-III...........................	3.3	3.3
EA2.04	Containment radiation levels: Mark-III...............	3.3	3.7

EPE: 295028 High Drywell Temperature

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.8 to 41.10)		
EK1.01	Reactor water level measurement	3.5	3.7
EK1.02	Equipment environmental qualification	2.9	3.1
EK2.	**Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following:** (CFR 41.7, 45.8)		
EK2.01	†Drywell spray: Mark-I&II	3.7	4.1
EK2.02	Components internal to the drywell	3.2	3.3
EK2.03	Reactor water level indication	3.6	3.8
EK2.04	Drywell ventilation	3.6	3.6
EK2.05	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.3*	2.5
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization	3.6	3.9
EK3.02	RPV flooding	3.5	3.8
EK3.03	†Drywell spray operation: Mark-I&II	3.6	3.9
EK3.04	Increased drywell cooling	3.6	3.8
EK3.05	Reactor SCRAM	3.6	3.7
EK3.06	ADS	3.4	3.7
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.7, 45.6)		
EA1.01	Drywell spray: Mark-I&II	3.8	3.9
EA1.02	Drywell ventilation system	3.9	3.8
EA1.03	Drywell cooling system	3.9	3.9
EA1.04	Drywell pressure	3.9	4.0
EA1.05	ADS	3.7	3.7
EA2.	**Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Drywell temperature	4.0*	4.1*
EA2.02	Reactor pressure	3.8	3.9
EA2.03	Reactor water level	3.7	3.9

EPE: 295028 High Drywell Temperature

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA2.04	Drywell pressure......................................	4.1	4.2
EA2.05	Torus/suppression chamber pressure: Plant-Specific...	3.6	3.8
EA2.06	Torus/suppression chamber air space temperature: Plant-Specific.................................	3.4	3.7

EPE: 295029 High Suppression Pool Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL WATER LEVEL :** (CFR 41.8 to 41.10)		
EK1.01	Containment integrity	3.4	3.7
EK2.	**Knowledge of the interrelations between HIGH SUPPRESSION POOL WATER LEVEL and the following:** (CFR 41.7, 45.8)		
EK2.01	RHR/LPCI	3.0	3.3
EK2.02	HPCI: Plant-Specific	3.4	3.6
EK2.03	HPCS: Plant-Specific	3.3	3.5
EK2.04	Suppression pool cleanup system: Plant-Specific	2.4*	2.4*
EK2.05	Containment/drywell vacuum breakers	3.1	3.3
EK2.06	SRV's and discharge piping	3.4	3.5
EK2.07	Drywell/containment water level	3.1	3.2
EK2.08	Drywell/suppression chamber ventilation	2.6	2.9
EK2.09	RCIC: Plant-Specific	3.1	3.2
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL WATER LEVEL :** (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization	3.5	3.9*
EK3.02	Lowering suppression pool water level	3.6	4.0
EK3.03	Reactor SCRAM	3.4	3.5
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL :** (CFR 41.7, 45.6)		
EA1.01	HPCI: Plant-Specific	3.4*	3.5
EA1.02	HPCS: Plant-Specific	3.1	3.1
EA1.03	RHR/LPCI	2.9	3.0
EA1.04	RCIC: Plant-Specific	3.4	3.5
EA2.	**Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Suppression pool water level	3.5*	3.9*
EA2.02	Reactor pressure	3.5	3.6
EA2.03	Drywell/containment water level	3.4	3.5

EPE: 295030 Low Suppression Pool Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION POOL WATER LEVEL: (CFR 41.8 to 41.10)		
EK1.01	Steam condensation	3.8*	4.1*
EK1.02	Pump NPSH	3.5	3.8
EK1.03	Heat capacity	3.8	4.1*
EK2.	Knowledge of the interrelations between LOW SUPPRESSION POOL WATER LEVEL and the following: (CFR 41.7, 45.8)		
EK2.01	HPCI: Plant-Specific	3.8	3.9
EK2.02	RCIC: Plant-Specific	3.7	3.8
EK2.03	LPCS	3.8	3.9
EK2.04	RHR/LPCI	3.7	3.8
EK2.05	HPCS: Plant-Specific	3.8	3.9
EK2.06	Suppression pool make-up: Mark-III	3.9*	3.9*
EK2.07	Downcomer/ horizontal vent submergence	3.5	3.8
EK2.08	SRV discharge submergence	3.5	3.8
EK2.09	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.5	2.8
EK3.	Knowledge of the reasons for the following responses as they apply to LOW SUPPRESSION POOL WATER LEVEL: (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization	3.8	4.1
EK3.02	HPCI operation: Plant-Specific	3.5	3.7
EK3.03	RCIC operation: Plant-Specific	3.6	3.7
EK3.04	HPCS operation: Plant-Specific	3.5	3.5
EK3.05	Suppression pool make-up operation: Mark-III	3.6	3.6
EK3.06	Reactor SCRAM	3.6	3.8
EK3.07	NPSH considerations for ECCS pumps	3.5	3.8
	ABILITY		
EA1.	Ability to operate and/or monitor the following as they apply to LOW SUPPRESSION POOL WATER LEVEL: (CFR 41.7, 45.6)		
EA1.01	ECCS systems (NPSH considerations): Plant-Specific	3.6	3.8
EA1.02	RCIC: Plant-Specific	3.4	3.5
EA1.03	HPCS: Plant-Specific	3.4	3.4
EA1.04	Suppression pool make-up system: Mark-III	4.0	4.0
EA1.05	HPCI	3.5	3.5

EPE: 295030 Low Suppression Pool Water Level

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA1.06	Condensate storage and transfer (make-up to the suppression pool): Plant-Specific	3.4	3.4
EA2.	**Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Suppression pool level	4.1*	4.2*
EA2.02	Suppression pool temperature	3.9	3.9
EA2.03	Reactor pressure	3.7	3.9
EA2.04	Drywell/ suppression chamber differential pressure: Mark-I&II	3.5	3.7

EPE: 295031 Reactor Low Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to REACTOR LOW WATER LEVEL :** (CFR 41.8 to 41.10)		
EK1.01	Adequate core cooling................................	4.6*	4.7*
EK1.02	Natural circulation: Plant-Specific..................	3.8	4.1
EK1.03	Water level effects on reactor power.................	3.7	4.1
EK2.	**Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following:** (CFR 41.7, 45.8)		
EK2.01	Reactor water level indication.......................	4.4*	4.4*
EK2.02	Reactor pressure.....................................	3.8	3.9
EK2.03	Low pressure core spray..............................	4.2	4.3*
EK2.04	Reactor core isolation cooling: Plant-Specific.......	4.0	4.1
EK2.05	Low pressure coolant injection (RHR).................	4.2	4.3
EK2.06	High pressure (feedwater) coolant injection (FWCI/HPCI): Plant-Specific..........................	4.1	4.2
EK2.07	High pressure core spray: Plant-Specific.............	4.0	4.1
EK2.08	Automatic depressurization system....................	4.2*	4.3*
EK2.09	Recirculation system: Plant-Specific.................	3.3	3.4
EK2.10	Redundant reactivity control: Plant-Specific.........	4.0	4.0
EK2.[illegible]	Reactor protection system............................	4.4*	4.4*
EK2.12	Primary containment isolation system/ Nuclear steam supply shutoff.......................................	4.5*	4.5*
EK2.13	ARI/RPT/ATWS: Plant-Specific.........................	4.1	4.2
EK2.14	Emergency generators.................................	3.9	4.0
EK2.15	A.C. distribution: Plant-Specific....................	3.2	3.2
EK2.16	Reactor water level control..........................	4.1*	4.1
EK3.	**Knowledge of the reasons for the following responses as they apply to REACTOR LOW WATER LEVEL :** (CFR 41.5, 45.6)		
EK3.01	Automatic depressurization system actuation..........	3.9	4.2*
EK3.02	Core coverage..	4.4*	4.7*
EK3.03	Spray cooling..	4.1	4.4*
EK3.04	Steam cooling..	4.0	4.3*
EK3.05	Emergency depressurization...........................	4.2*	4.3*

EPE: **295031 Reactor Low Water Level**

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EA1.	**Ability to operate and/or monitor the following as they apply to REACTOR LOW WATER LEVEL :** (CFR 41.7, 45.6)		
EA1.01	Low pressure coolant injection (RHR): Plant-Specific.	4.4*	4.4*
EA1.02	High pressure (feedwater) coolant injection: Plant-Specific..	4.5*	4.5*
EA1.03	Low pressure core spray..............................	4.4*	4.4*
EA1.04	High pressure core spray: Plant-Specific.............	4.3*	4.2
EA1.05	Reactor core isolation system: Plant-Specific	4.3*	4.3*
EA1.06	Automatic depressurization system....................	4.4*	4.4*
EA1.07	Safety/relief valves.................................	3.7*	3.7*
EA1.08	Alternate injection systems: Plant-specific..........	3.8	3.9
EA1.09	Isolation condenser: Plant-Specific..................	3.3*	3.5*
EA1.10	Control rod drive....................................	3.6	3.7
EA1.11	Condensate...	4.1	4.1
EA1.12	Feedwater..	3.9	4.1*
EA1.13	Reactor water level control..........................	4.3*	4.3*
EA2.	**Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Reactor water level............................	4.6*	4.6*
EA2.02	Reactor power..................................	4.0	4.2*
EA2.03	Reactor pressure...............................	4.2*	4.2*
EA2.04	Adequate core cooling..........................	4.6*	4.8*

EPE: 295032 High Secondary Containment Area Temperature

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EK1.	Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: (CFR 41.8 to 41.10)		
EK1.01	Personnel protection	3.6	3.8
EK1.02	†Radiation releases	3.6	4.0
EK1.03	Secondary containment leakage detection: Plant-Specific	3.5?	3.9?
EK1.04	Impact of operating environment on components	3.1	3.6
EK2.	Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA TEMPERATURE and the following: (CFR 41.7, 45.8)		
EK2.01	Area/room coolers	3.5	3.6
EK2.02	Secondary containment ventilation	3.6	3.7
EK2.03	Fire protection system	3.3	3.4
EK2.04	PCIS/NSSSS	3.6	3.8
EK2.05	Temperature sensitive instrumentation	3.2	3.4
EK2.06	Area temperature monitoring system	3.3	3.4
EK2.07	Leak detection system concept: Plant-Specific	3.6	3.8
EK2.08	Systems required for safe shut-down	3.8	3.9
EK3.	Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : (CFR 41.5, 45.6)		
EK3.01	Emergency/normal depressurization	3.5	3.8
EK3.02	Reactor SCRAM	3.6	3.8
EK3.03	Isolating affected systems	3.8	3.9*
	ABILITY		
EA1.	Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : (CFR 41.7, 45.6)		
EA1.01	Area temperature monitoring system	3.6	3.7
EA1.02	Leak detection system concept: Plant-Specific	3.4	3.5
EA1.03	Secondary containment ventilation	3.7	3.7
EA1.04	Fire protection system	3.3	3.4
EA1.05	Affected systems so as to isolate damaged portions	3.7	3.9

EPE: 295032 High Secondary Containment Area Temperature

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA2.	Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE : (CFR 41.10, 43.5, 45.13)		
EA2.01	Area temperature....................................	3.8*	3.8
EA2.02	Equipment operability...............................	3.3	3.5
EA2.03	Cause of high area temperature......................	3.8	4.0

EPE: 295033 High Secondary Containment Area Radiation Levels

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : (CFR 41.8 to 41.10)		
EK1.01	Component environmental qualifications................	2.4	2.8*
EK1.02	Personnel protection................................	3.9	4.2*
EK1.03	†Radiation releases..................................	3.9	4.2*
EK2.	Knowledge of the interrelations between HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS and the following: (CFR 41.7, 45.8)		
EK2.01	Area radiation monitoring system......................	3.8	4.0
EK2.02	Process radiation monitoring system...................	3.8	4.1
EK2.03	Secondary containment ventilation: Plant-Specific....	3.7	3.9
EK2.04	Standby gas treatment system/FRVS.....................	3.9	4.2
EK3.	Knowledge of the reasons for the following responses as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization............................	3.3	3.5
EK3.02	Reactor SCRAM...	3.5	3.6
EK3.03	Isolating affected systems............................	3.8	3.9
EK3.04	Personnel evacuation..................................	4.0	4.4*
EK3.05	Emergency plan..	3.6	4.5*
	ABILITY		
EA1.	Ability to operate and/or monitor the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : (CFR 41.7, 45.6)		
EA1.01	Area radiation monitoring system......................	3.9	4.0
EA1.02	Process radiation monitoring system...................	3.7	3.8
EA1.03	Secondary containment ventilation.....................	3.8	3.8
EA1.04	SBGT/FRVS...	4.2*	4.2
EA1.05	Affected systems so as to isolate damaged portions....	3.9	4.0
EA1.06	Portable radiation monitoring instruments.............	2.9*	3.1*
EA1.07	Personnel dosimetry...................................	3.5	3.6
EA1.08	Control room ventilation: Plant-Specific.............	3.6	3.8

EPE: 295033 High Secondary Containment Area Radiation Levels

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
EA2.	Ability to determine and/or interpret the following as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS : (CFR 41.10, 43.5, 45.13)		
EA2.01	Area radiation levels	3.8	3.9
EA2.02	Equipment operability	3.1	3.2
EA2.03	†Cause of high area radiation	3.7	4.2

EPE: 295034 Secondary Containment Ventilation High Radiation

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION :** (CFR 41.8 to 41.10)		
EK1.01	Personnel protection	3.8	4.1
EK1.02	†Radiation releases	4.1	4.4*
EK2.	**Knowledge of the interrelations between SECONDARY CONTAINMENT VENTILATION HIGH RADIATION and the following:** (CFR 41.7, 45.8)		
EK2.01	Process radiation monitoring system	3.9	4.2
EK2.02	Area radiation monitoring system	3.8	3.9
EK2.03	SBGT/FRVS: Plant-Specific	4.3*	4.5*
EK2.04	Secondary containment ventilation	3.9	3.9
EK2.05	Fuel building ventilation: Mark-III	3.5	3.7
EK2.06	PCIS/NSSSS: Plant-Specific	3.9	4.2
EK3.	**Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION :** (CFR 41.5, 45.6)		
EK3.01	Isolating secondary containment ventilation	3.8	4.1
EK3.02	Starting SBGT/FRVS: Plant-Specific	4.1	4.1
EK3.03	Personnel evacuation	4.0*	4.4*
EK3.04	Fuel building ventilation: Plant-Specific	3.7	3.8
EK3 05	Manual SCRAM and depressurization: Plant-Specific	3.6	3.9
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION :** (CFR 41.7, 45.6)		
EA1.01	Area radiation monitoring system	3.8	3.8
EA1.02	Process radiation monitoring system	3.9	4.0
EA1.03	Secondary containment ventilation	4.0	3.9
EA1.04	SBGT/FRVS: Plant-Specific	4.1*	4.2*
EA1.05	Fuel building ventilation: Plant-Specific	3.8	3.8
EA2.	**Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT VENTILATION HIGH RADIATION :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Ventilation radiation levels	3.8	4.2

EPE: 295034 Secondary Containment Ventilation High Radiation

		IMPORTANCE	
K/A NO.	**ABILITY**	**RO**	**SRO**
EA2.02	Cause of high radiation levels........................	3.7	4.2*

EPE: 295035 Secondary Containment High Different 1 Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE :** (CFR 41.8 to 41.10)		
EK1.01	Secondary containment integrity	3.9	4.2*
EK1.02	†Radiation release	3.7	4.2
EK2.	**Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE and the following:** (CFR 41.7, 45.8)		
EK2.01	Secondary containment ventilation	3.6	3.6
EK2.02	SBGT/FRVS	3.6	3.8
EK2.03	†Off-site release rate	3.3	4.1
EK2.04	Blow-out panels: Plant-Specific	3.3	3.7
EK3.	**Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE :** (CFR 41.5, 45.6)		
EK3.01	Blow-out panel operation: Plant-Specific	2.8	3.1
EK3.02	Secondary containment ventilation response	3.3	3.5
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE:** (CFR 41.7, 45.6)		
EA1.01	Secondary containment ventilation system	3.6	3.6
EA1.02	SBGT/FRVS	3.8	3.8
EA2.	**Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE:** (CFR 41.8 to 41.10)		
EA2.01	Secondary containment pressure: Plant-Specific	3.8	3.9
EA2.02	†Off-site release rate: Plant-Specific	2.8*	4.1

EPE: 295036 Secondary Containment High Sump/Area Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL :** (CFR 41.8 to 41.10)		
EK1.01	Radiation releases	2.9	3.1
EK1.02	Electrical ground/ circuit malfunction	2.6*	2.8*
EK2.	**Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL and the following:** (CFR 41.7, 45.8)		
EK2.01	Secondary containment equipment and floor drain system	3.1	3.2
EK2.02	Post-accident sampling system: Plant-Specific	2.6	2.9
EK2.03	Radwaste	2.8	3.1
EK3.	**Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL :** (CFR 41.5, 45.6)		
EK3.01	Emergency depressurization	2.6	2.8
EK3.02	Reactor SCRAM	2.8	2.8
EK3.03	Isolating affected systems	3.5	3.6
EK3.04	Pumping secondary containment sumps	3.1	3.4
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL :** (CFR 41.7, 45.6)		
EA1.01	Secondary containment equipment and floor drain systems	3.2	3.3
EA1.02	Affected systems so as to isolate damaged portions	3.5	3.6
EA1.03	Radwaste	2.8	3.0
EA1.04	Radiation monitoring: Plant-Specific	3.1	3.4
EA2.	**Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Operability of components within the affected area	3.0	3.2
EA2.02	Water level in the affected area	3.1	3.1
EA2.03	Cause of the high water level	3.4	3.8

EPE: 295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN :** (CFR 41.8 to 41.10)		
EK1.01	Reactor pressure effects on reactor power.............	4.1*	4.3*
EK1.02	Reactor water level effects on reactor power..........	4.1*	4.3*
EK1.03	Boron effects on reactor power (SBLC).................	4.2	4.4*
EK1.04	Hot shutdown boron weight: Plant-Specific............	3.4	3.6
EK1.05	Cold shutdown boron weight: Plant-Specific...........	3.4	3.6
EK1.06	Cooldown effects on reactor power.....................	4.0*	4.2*
EK1.07	Shutdown margin.......................................	3.4	3.8
EK2.	**Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following:** (CFR 41.7, 45.8)		
EK2.01	RPS...	4.2*	4.3
EK2.02	RRCS: Plant-Specific..................................	4.0	4.2
EK2.03	ARI/RPT/ATWS: Plant-Specific..........................	4.1	4.2
EK2.04	SBLC system...	4.4*	4.5
EK2.05	CRD hydraulic system..................................	4.0	4.1
EK2.06	CRD mechanisms..	3.5	3.6
EK2.07	Neutron monitoring system.............................	4.0*	4.0
EK2.08	SPDS/ERIS/CRIDS/GDS: Plant-Specific...................	2.7	3.1
EK2.09	Reactor water level...................................	4.0	4.2
EK2.10	Reactor pressure......................................	3.8	4.1
EK2.11	RMCS: Plant-Specific..................................	3.8	3.9
EK2.12	Rod control and information system: Plant-Specific...	3.6	3.8
EK2.13	Alternate boron injection methods: Plant-Specific....	3.4	4.1
EK2.14	RPIS: Plant-Specific..................................	3.6	3.9
EK3.	**Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN :** (CFR 41.5, 45.6)		
EK3.01	Recirculation pump trip/runback: Plant-Specific......	4.1	4.2
EK3.02	SBLC injection..	4.3*	4.5*
EK3.03	Lowering reactor water level..........................	4.1*	4.5*
EK3.04	Hot shutdown boron weight: Plant-Specific............	3.2	3.7

EPE: 295037 SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK3.05	Cold shutdown boron weight: Plant-Specific...........	3.2	3.7
EK3.06	Maintaining heat sinks external to the containment....	3.8	4.1
EK3.07	Various alternate methods of control rod insertion: Plant-Specific....................................	4.2	4.3*
EK3.08	ATWS circuitry: Plant-Specific.......................	3.6*	3.9*
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN :** (CFR 41.7, 45.6)		
EA1. 01	Reactor Protection System.............................	4.6*	4.6*
EA1.02	RRCS: Plant-Specific..................................	3.8	4.0
EA1.03	ARI/RPT/ATWS: Plant-Specific.........................	4.1*	4.1*
EA1. 04	SBLC..	4.5*	4.5*
EA1.05	CRD hydraulics systems................................	3.9	4.0
EA1.06	Neutron monitoring system.............................	4.1*	4.1
EA1.07	RMCS: Plant-Specific..................................	3.9	4.0
EA1.08	Rod control and information system: Plant-Specific...	3.6	3.6
EA1.09	SPDS/ERIS/CRIDS/GDS: Plant-Specific..................	2.8*	3.0
EA1.10	Alternate boron injection methods: Plant-Specific....	3.7	3.9
EA1. 11	PCIS/NSSSS..	3.5	3.6
EA2.	**Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN :** (CFR 41.10, 43.5, 45.13)		
EA2.01	Reactor power...	4.2*	4.3*
EA2.02	Reactor water level...................................	4.1*	4.2*
EA2.03	SBLC tank level.......................................	4.3*	4.4*
EA2.04	Suppression pool temperature..........................	4.0*	4.1*
EA2.05	Control rod position..................................	4.2*	4.3*
EA2.06	Reactor pressure......................................	4.0	4.1
EA2.07	Containment conditions/isolations.....................	4.0	4.2*

EPE: 295038 High Off-Site Release Rate

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.8 to 41.10)		
EK1.01	Biological effects of radioisotope ingestion..........	2.5	3.1
EK1.02	†Protection of the general public......................	4.2*	4.4*
EK1.03	†Meteorological effects on off-site release............	2.8	3.8
EK2.	**Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following:** (CFR 41.7, 45.8)		
EK2.01	Radwaste...	3.1	3.4
EK2.02	Offgas system..	3.6	3.8
EK2.03	Plant ventilation systems..............................	3.6	3.8
EK2.04	Stack-gas monitoring system: Plant-Specific..........	3.9	4.2
EK2.05	†Site emergency plan...................................	3.7	4.7*
EK2.06	Process liquid radiation monitoring system............	3.4	3.7
EK2.07	Control room ventilation...............................	3.5	3.7
EK2.08	SPDS/ERIS/CRIDS/GDS: Plant-Specific..................	2.6	3.1
EK2.09	Post accident sample system (PASS): Plant-Specific...	2.9*	3.5*
EK2.10	Condenser air removal system...........................	3.2	3.4
EK2.11	MSIV leakage control: Plant-Specific..................	3.1	3.4
EK2.12	Feedwater leakage control: BWR-6......................	3.5	3.8
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE:** (CFR 41.5, 45.6)		
EK3.01	†Implementation of site emergency plan.................	3.6	4.5*
EK3.02	System isolations......................................	3.9	4.2
EK3.03	Control room ventilation isolation: Plant-Specific...	3.7	3.9
EK3.04	†Emergency depressurization............................	3.6	3.9
	ABILITY		
EA1.	**Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.7, 45.6)		
EA1.01	Stack-gas monitoring system: Plant-Specific..........	3.9	4.2
EA1.02	†Meteorological instrumentation........................	3.0*	3.8
EA1.03	Process liquid radiation monitoring system............	3.7	3.9
EA1.04	SPDS/ERIS/CRIDS/GDS: Plant-Specific..................	2.8	3.2
EA1.05	Post accident sample system (PASS): Plant-Specific...	3.0*	3.5*
EA1.06	Plant ventilation......................................	3.5	3.6
EA1.07	Control room ventilation: Plant-Specific.............	3.6	3.8

EPE: 295038 High Off-Site Release Rate

K/A NO.	ABILITY	IMPORTANCE RO	SRO
EA2.	Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE : (CFR 41.10, 43.5, 45.13)		
EA2.01	†Off-site	3.3*	4.3*
EA2.02	†Total number of curies released	2.5*	3.3*
EA2.03	†Radiation levels	3.5*	4.3*
EA2.04	Source of off-site release	4.1*	4.5*

EPE: 500000 High Containment Hydrogen Concentration

K/A NO.	Knowledge	IMPORTANCE RO	SRO
EK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH CONTAINMENT HYDROGEN CONCENTRATIONS:** (CFR 41.8 to 41.10)		
EK1.01	Containment integrity	3.3	3.9
EK2.	**Knowledge of the interrelations between HIGH CONTAINMENT HYDROGEN CONCENTRATIONS the following:** (CFR 41.7, 45.8)		
EK2.01	Containment hydrogen monitoring systems	3.1	3.5
EK2.02	Containment oxygen monitoring systems	3.1	3.5
EK2.03	Containment Atmosphere Control System	3.3	3.4
EK2.04	Drywell recirculating fan	2.7	2.9
EK2.05	Hydrogen and oxygen recombiners	3.2	3.3
EK2.06	Wetwell Spray system	3.0	3.4
EK2.07	Drywell vent system	3.2	3.7
EK2.08	Wet Well vent system	3.2	3.6
EK2.09	Drywell nitrogen purge system	3.0	3.3
EK3.	**Knowledge of the reasons for the following responses as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS:** (CFR 41.5, 45.6)		
EK3.01	Initiation of containment atmosphere control system . .	2.9	3.3
EK3.02	Operation of drywell recirculating fans	2.8	3.0
EK3.03	Operation of hydrogen and oxygen recombiners	3.0	3.5
EK3.04	Emergency depressurization	3.1	3.9
EK3.05	Operation of wet well (suppression pool) sprays	2.9	3.4
EK3.06	Operation of wet well vent	3.1	3.7
EK3.07	Operation of drywell vent	3.1	3.7
EK3.08	Operation of drywell nitrogen purge system	3.1	3.6
EA1.	**Ability to operate and monitor the following as they apply to HIGH CONTAINMENT HYDROGEN CONTROL:** (CFR 41.7, 45.6)		
EA1.01	Primary containment hydrogen instrumentation	3.4	3.3
EA1.02	Primary containment oxygen instrumentation	3.3	3.2
EA1.03	Containment atmosphere control system	3.4	3.2
EA1.04	Drywell recirculating fans	2.9	2.9
EA1.05	Wetwell sprays	3.3	3.3
EA1.06	Drywell sprays	3.3	3.4
EA1.07	Nitrogen purge system	3.4	3.3

EPE: 500000 High Containment Hydrogen Concentration

K/A NO.	Knowledge	IMPORTANCE RO	IMPORTANCE SRO
EA2	Ability to determine and / or interpret the following as they apply to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS: (CFR 41.10, 43.5, 45.13)		
EA2.01	Hydrogen monitoring system availability	3.1	3.5
EA2.02	Oxygen monitoring system availability	3.0	3.5
EA2.03	Combustible limits for drywell	3.3	3.8
EA2.04	Combustible limits for wetwell	3.3	3.3

4.2 ABNORMAL PLANT EVOLUTIONS

295001	Partial or Complete Loss of Forced Core Flow Circulation
295002	Loss of Main Condenser Vacuum
295003	Partial or Complete Loss of A.C. Power
295004	Partial or Complete Loss of D.C. Power
295005	Main Turbine Trip
295006	SCRAM
295007	High Reactor Pressure
295008	High Reactor Water Level
295009	Low Reactor Water Level
295010	High Drywell Pressure
295011	High Containment Temperature (Mark III Containment Only)
295012	High Drywell Temperature
295013	High Suppression Pool Water Temperature
295014	Inadvertent Reactivity Addition
295015	Incomplete SCRAM
295016	Control Room Abandonment
295017	High Off-Site Release Rate
295018	Partial or Complete Loss of Component Cooling Water
295019	Partial or Complete Loss of Instrument Air
295020	Inadvertent Containment Isolation
295021	Loss of Shutdown Cooling
295022	Loss of Control Rod Drive Pumps
295023	Refueling Accidents
600000	Plant Fire On Site

APE: 295001 Partial or Complete Loss of Forced Core Flow Circulation

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : (CFR 41.8 to 41.10)		
AK1.01	Natural circulation..................................	3.5	3.6
AK1.02	Power/flow distribution..............................	3.3	3.5
AK1.03	†Thermal limits......................................	3.6	4.1
AK1.04	†Limiting cycle oscillation: Plant-Specific...........	2.5	3.3
AK2.	Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: (CFR 41.7, 45.8)		
AK2.01	Recirculation system.................................	3.6	3.7
AK2.02	Nuclear boiler instrumentation.......................	3.2	3.3
AK2.03	Reactor water level..................................	3.6	3.7
AK2.04	Reactor/turbine pressure regulating system: Plant-Specific..	3.3	3.3
AK2.05	LPCI loop select logic: Plant-Specific...............	3.2	3.6
AK2.06	Reactor power..	3.8	3.8
AK2.07	Core flow indication.................................	3.4	3.4
AK2.08	Standby liquid control: BWR-1........................	2.5*	2.8
AK3.	Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : (CFR 41.5, 45.6)		
AK3.01	Reactor water level response.........................	3.4	3.6
AK3.02	Reactor power response...............................	3.7	3.8
AK3.03	Idle loop flow.......................................	2.8	2.9
AK3.04	Reactor SCRAM..	3.4	3.6
AK3.05	Reduced loop operating requirements: Plant-Specific..	3.2	3.6
AK3.06	Core flow indication.................................	2.9	3.0
	ABILITY		
AA1.	Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION : (CFR 41.7, 45.6)		
AA1.01	Recirculation system.................................	3.5	3.6
AA1.02	RPS..	3.3	3.3

APE: 295001 Partial or Complete Loss of Forced Core Flow Circulation

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA1.03	RMCS: Plant-Specific..................................	2.6	2.7
AA1.04	Rod control and information system: BWR-5&6..........	2.6	2.8
AA1.05	Recirculation flow control system.....................	3.3	3.3
AA1.06	Neutron monitoring system.............................	3.3	3.4
AA1.07	Nuclear boiler instrumentation system.................	3.1	3.2
AA1.08	Standby liquid control: BWR-1.........................	2.5*	2.8
AA2.	**Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Power/flow map..	3.5	3.8
AA2.02	Neutron monitoring....................................	3.1	3.2
AA2.03	Actual core flow......................................	3.3	3.3
AA2.04	Individual jet pump flows: Not-BWR-1&2...............	3.0	3.1
AA2.05	Jet pump operability: Not-BWR-1&2.....................	3.1	3.4
AA2.06	Nuclear boiler instrumentation........................	3.2	3.3

APE: 295002 Loss of Main Condenser Vacuum

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to LOSS OF MAIN CONDENSER VACUUM :** (CFR 41.8 to 41.10)		
AK1.01	Plant efficiency..	2.1*	2.5
AK1.02	Turbine efficiency......................................	2.2*	2.5
AK1.03	Loss of heat sink.......................................	3.6	3.8
AK1.04	Increased offgas flow...................................	3.0	3.3
AK2.	**Knowledge of the interrelations between LOSS OF MAIN CONDENSER VACUUM and the following:** (CFR 41.7, 45.8)		
AK2.01	RPS...	3.5	3.5
AK2.02	Main turbine..	3.1	3.2
AK2.03	PCIS/NSSSS..	3.5	3.6
AK2.04	Reactor/turbine pressure regulating system..............	3.2	3.3
AK2.05	Feedwater system..	2.7	2.7
AK2.06	Condensate system.......................................	2.6	2.7
AK2.07	Offgas system...	3.1	3.1
AK2.08	Condenser circulating water system......................	3.1	3.2
AK2.09	Vacuum drag (low conductivity drain): Plant-Specific.	2.4	2.4
AK2.10	Reactor recirculation system: Plant-Specific...........	2.4*	2.5
AK2.11	Seal steam: Plant-Specific..............................	2.6	2.7
AK3.	**Knowledge of the reasons for the following responses as they apply to LOSS OF MAIN CONDENSER VACUUM :** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM: Plant-Specific...........................	3.7	3.8
AK3.02	Turbine trip..	3.4	3.4
AK3.03	Reactor feedpump turbine trip: Plant-Specific........	3.3	3.3
AK3.04	Bypass valve closure....................................	3.4	3.6
AK3.05	Main steam isolation valve: Plant-Specific...........	3.4	3.4
AK3.06	Air ejector flow..	2.9	2.9
AK3.07	Decreased main generator output.........................	2.4	2.5
AK3.08	Recirculation system run-backs: Plant-Specific.......	2.8	2.9
AK3.09	Reactor power reduction.................................	3.2	3.2

ABILITY

AA1. **Ability to operate and/or monitor the following as they apply to LOSS OF MAIN CONDENSER VACUUM :**
(CFR 41.7, 45.6)

APE: 295002 Loss of Main Condenser Vacuum

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AA1.01	Condensate system	2.6	2.6
AA1.02	Offgas system	2.9	2.9
AA1.03	RPS	3.4	3.5
AA1.04	PCIS/NSSSS	3.3	3.4
AA1.05	Main turbine	3.2	3.2
AA1.06	Reactor/turbine pressure regulating system	3.0	3.1
AA1.07	Condenser circulating water system	3.1	2.9
AA1.08	Recirculating flow control system	2.6	2.7
AA1.09	Reactor manual control/rod control and information system	2.4	2.4
AA1.10	Feedwater system: Plant-Specific	2.7	2.7
AA2.	**Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Condenser vacuum/absolute pressure	2.9	3.1
AA2.02	Reactor power: Plant-Specific	3.2	3.3
AA2.03	Generator output	2.3	2.4
AA2.04	Offgas system flow	2.8	2.9

APE: 295003 Partial or Complete Loss of A.C. Power

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER :** (CFR 41.8 to 41.10)		
AK1.01	Effect of battery discharge rate on capacity..........	2.7	2.9
AK1.02	Load shedding.......................................	3.1	3.4
AK1.03	Under voltage/degraded voltage effects on electrical loads..	2.9	3.2
AK1.04	Electrical bus divisional separation.................	3.1	3.2
AK1.05	Failsafe component design............................	2.6	2.7
AK1.06	Station blackout: Plant-Specific....................	3.8	4.0*
AK2.	**Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF A.C. POWER and the following:** (CFR 41.7, 45.8)		
AK2.01	Station batteries....................................	3.2	3.2
AK2.02	Emergency generators.................................	4.1*	4.2*
AK2.03	A.C. electrical distribution system..................	3.7	3.9
AK2.04	A.C. electrical loads................................	3.4	3.5
AK2.05	Isolation condenser: Plant-Specific..................	3.8*	4.0
AK2.06	D.C. electrical loads................................	3.4	3.5
AK3.	**Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER :** (CFR 41.5, 45.6)		
AK3.01	Manual and auto bus transfer.........................	3.3	3.5
AK3.02	Selective tripping...................................	2.9	3.1
AK3.03	Load shedding..	3.5	3.6
AK3.04	Ground isolation.....................................	3.0	3.2
AK3.05	Reactor SCRAM..	3.7	3.7
AK3.06	Containment isolation................................	3.7	3.7
AK3.07	Initiation of isolation condenser: Plant-Specific....	3.8*	4.0*
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER :** (CFR 41.7, 45.6)		
AA1.01	A.C. electrical distribution system..................	3.7	3.8
AA1.02	Emergency generators.................................	4.2*	4.3*
AA1.03	Systems necessary to assure safe plant shutdown.......	4.4*	4.4*

APE: 295003 Partial or Complete Loss of A.C. Power

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA1.04	D.C. electrical distribution system..................	3.6	3.7
AA2.	**Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Cause of partial or complete loss of A.C. power.......	3.4	3.7
AA2.02	Reactor power, pressure, and level....................	4.2*	4.3*
AA2.03	Battery status: Plant-Specific........................	3.2	3.5
AA2.04	System lineups..	3.5	3.7
AA2.05	Whether a partial or complete loss of A.C. power has occurred..	3.9*	4.2*

APE: 295004 Partial or Complete Loss of D.C. Power

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER :** (CFR 41.8 to 41.10)		
AK1.01	†Automatic load shedding: Plant-Specific	2.9	3.2
AK1.02	Redundant D.C. power supplies: Plant-Specific	3.2	3.4
AK1.03	Electrical bus divisional separation	2.9	2.9
AK1.04	Effect of battery discharge rate on capacity	2.8	2.9
AK1.05	Loss of breaker protection	3.3	3.4
AK1.06	Prevention of inadvertent system(s) actuation upon restoration of D.C. power	3.3	3.6
AK2.	**Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF D.C. POWER and the following:** (CFR 41.7, 45.8)		
AK2.01	Battery charger	3.1	3.1
AK2.02	Batteries	3.0	3.1
AK2.03	D.C. bus loads	3.3	3.3
AK3.	**Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER :** (CFR 41.5, 45.6)		
AK3.01	†Load shedding: Plant-Specific	2.6	3.1
AK3.02	Ground isolation/fault determination	2.9	3.3
AK3.03	Reactor SCRAM: Plant-Specific	3.1	3.5
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER :** (CFR 41.7, 45.6)		
AA1.01	D.C. electrical distribution systems	3.3	3.4
AA1.02	Systems necessary to assure safe plant shutdown	3.8	4.1
AA1.03	A.C. electrical distribution	3.4	3.6
AA2.	**Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Cause of partial or complete loss of D.C. power	3.2	3.6
AA2.02	Extent of partial or complete loss of D.C. power	3.5	3.9
AA2.03	Battery voltage	2.8	2.9
AA2.04	System lineups	3.2	3.3

APE: 295005 Main Turbine Generator Trip

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to MAIN TURBINE GENERATOR TRIP :** (CFR 41.8 to 41.10)		
AK1.01	Pressure effects on reactor power	4.0	4.1
AK1.02	†Core thermal limit considerations	3.2	3.6
AK1.03	Pressure effects on reactor level	3.5	3.7
AK2.	**Knowledge of the interrelations between MAIN TURBINE GENERATOR TRIP and the following:** (CFR 41.7, 45.8)		
AK2.01	RPS	3.8	3.9
AK2.02	Feedwater temperature	2.9	3.0
AK2.03	Recirculation system	3.2	3.3
AK2.04	Main generator protection	3.3	3.3
AK2.05	Extraction steam system	2.6	2.7
AK2.06	Seal steam evaporator: Plant-Specific	1.9*	1.9*
AK2.07	Reactor pressure control	3.6	3.7
AK2.08	A.C. electrical distribution.	3.2	3.3
AK2.09	Feedwater - HPCI: BWR-2	4.0	4.3
AK3.	**Knowledge of the reasons for the following responses as they apply to MAIN TURBINE GENERATOR TRIP:** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM	3.8	3.8
AK3.02	Recirculation pump downshift/trip: Plant-Specific	3.4	3.5
AK3.03	Feedwater temperature decrease	2.8	3.0
AK3.04	Main generator trip	3.2	3.2
AK3.05	Extraction steam/moisture separator isolations	2.5	2.6
AK3.06	Realignment of electrical distribution	3.3	3.3
AK3.07	Bypass valve operation	3.8	3.8
AK3.08	Feedwater - HPCI actuation: BWR-2	4.0	4.3
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP :** (CFR 41.7, 45.6)		
AA1.01	Recirculation system: Plant-Specific	3.1	3.3
AA1.02	RPS	3.6	3.6
AA1.03	Reactor manual control/Rod control and information system	2.7	2.8
AA1.04	Main generator controls	2.7	2.8

APE: 295005 Main Turbine Generator Trip

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AA1.05	Reactor/turbine pressure regulating system............	3.6	3.6
AA1.06	Condenser vacuum breaker..........................	2.4	2.6
AA1.07	A.C. electrical distribution..........................	3.3	3.3
AA2.	**Ability to determine and/or interpret the following as they apply to MAIN TURBINE GENERATOR TRIP :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Turbine speed..	2.6	2.7
AA2.02	Turbine vibration....................................	2.4	2.7
AA2.03	Turbine valve position...............................	3.1	3.1
AA2.04	Reactor pressure.....................................	3.7	3.8
AA2.05	Reactor power..	3.8	3.9
AA2.06	Feedwater temperature................................	2.6	2.7
AA2.07	Reactor water level..................................	3.5	3.6
AA2.08	Electrical distribution status.......................	3.2	3.3

APE: 295006 SCRAM

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to SCRAM :** (CFR 41.8 to 41.10)		
AK1.01	Decay heat generation and removal	3.7	3.9
AK1.02	Shutdown margin	3.4	3.7
AK1.03	Reactivity control	3.7	4.0
AK2.	**Knowledge of the interrelations between SCRAM and the following:** (CFR 41.7, 45.8)		
AK2.01	RPS	4.3*	4.4*
AK2.02	Reactor water level control system	3.8	3.8
AK2.03	CRD hydraulic system	3.7	3.8
AK2.04	Turbine trip logic: Plant-Specific	3.6	3.7
AK2.05	CRD mechanism	3.1	3.3
AK2.06	Reactor power	4.2*	4.3*
AK2.07	Reactor pressure control	4.0	4.1
AK3.	**Knowledge of the reasons for the following responses as they apply to SCRAM :** (CFR 41.5, 45.6)		
AK3.01	Reactor water level response	3.8	3.9
AK3.02	Reactor power response	4.1*	4.2*
AK3.03	Reactor pressure response	3.8	3.9*
AK3.04	Reactor water level setpoint setdown: Plant-Specific	3.1	3.3
AK3.05	Direct turbine generator trip: Plant-Specific	3.8	4.0
AK3.06	Recirculation pump speed reduction: Plant-Specific	3.2	3.3
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to SCRAM :** (CFR 41.7, 45.6)		
AA1.01	RPS	4.2*	4.2*
AA1.02	Reactor water level control system	3.9	3.8
AA1.03	Reactor/turbine pressure regulating system	3.7	3.7
AA1.04	Recirculation system	3.1	3.2
AA1.05	Neutron monitoring system	4.2*	4.2*
AA1.06	CRD hydraulic system	3.5	3.6
AA1.07	Control rod position	4.1	4.1

APE: 295006 SCRAM

K/A NO.	ABILITY	IMPORTANCE RO	SRO
AA2.	Ability to determine and/or interpret the following as they apply to SCRAM : (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor power	4.5*	4.6*
AA2.02	Control rod position	4.3*	4.4*
AA2.03	Reactor water level	4.0	4.2*
AA2.04	Reactor pressure	4.1	4.1*
AA2.05	Whether a reactor SCRAM has occurred	4.6*	4.6*
AA2.06	Cause of reactor SCRAM	3.5	3.8

APE: 295007 High Reactor Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR PRESSURE :** (CFR 41.8 to 41.10)		
AK1.01	Pump shutoff head	2.9	3.2
AK1.02	Decay heat generation	3.1	3.4
AK1.03	Pressure effects on reactor power	3.8	3.9
AK1.04	Turbine load	2.7	2.8
AK2.	**Knowledge of the interrelations between HIGH REACTOR PRESSURE and the following:** (CFR 41.7, 45.8)		
AK2.01	Reactor/turbine pressure regulating system	3.5	3.7
AK2.02	Reactor power	3.8	3.8
AK2.03	RHR/LPCI: Plant-Specific	3.1	3.2
AK2.04	LPCS	3.2	3.3
AK2.05	Shutdown cooling: Plant-Specific	2.9	3.1
AK2.06	PCIS/NSSSS: Plant-Specific	3.5	3.7
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE :** (CFR 41.5, 45.6)		
AK3.01	Isolation condenser operation: Plant-Specific	4.0	4.2
AK3.02	HPCI operation: Plant-Specific	3.7	3.8*
AK3.03	RCIC operation: Plant-Specific	3.4	3.5
AK3.04	Safety/relief valve operation: Plant-Specific	4.0	4.1*
AK3.05	Low pressure system isolation	3.0	3.2
AK3.06	Reactor/turbine pressure regulating system operation	3.7	3.8
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE :** (CFR 41.7, 45.6)		
AA1.01	Isolation condenser: Plant-Specific	4.0	4.2
AA1.02	HPCI: Plant-Specific	3.5	3.7*
AA1.03	RCIC: Plant-Specific	3.4	3.5
AA1.04	Safety/relief valve operation: Plant-Specific	3.9	4.1*
AA1.05	Reactor/turbine pressure regulating system	3.7	3.8

APE: 295007 High Reactor Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AA2.	Ability to determine and/or interpret the following as they apply to HIGH REACTOR PRESSURE : (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor pressure	4.1*	4.1*
AA2.02	Reactor power	4.1*	4.1*
AA2.03	Reactor water level	3.7	3.7

APE: 295008 High Reactor Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH REACTOR WATER LEVEL :** (CFR 41.8 to 41.10)		
AK1.01	Moisture carryover....................................	3.0	3.2
AK1.02	Component erosion/damage...............................	2.8	2.8
AK1.03	Feed flow/steam flow mismatch..........................	3.2	3.2
AK1.04	Containment integrity: Alis-Chalmers...................	4.0	4.3*
AK2.	**Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following:** (CFR 41.7, 45.8)		
AK2.01	RPS: Plant-Specific....................................	3.7	3.8
AK2.02	Reactor feedwater system...............................	3.6	3.8
AK2.03	Reactor water level control............................	3.6	3.7
AK2.04	PCIS/NSSSS: Plant-Specific.............................	3.1	3.3
AK2.05	HPCI: Plant-Specific...................................	3.8	3.9
AK2.06	RCIC: Plant-Specific...................................	3.4	3.6
AK2.07	HPCS: Plant-Specific...................................	2.9	3.0
AK2.08	Main turbine: Plant-Specific...........................	3.4	3.5
AK2.09	Reactor water cleanup system (ability to drain): Plant-Specific...................................	3.1	3.1
AK2.10	RHR (ability to drain): Plant-Specific.................	2.7	2.8
AK2.11	Main steam...	3.1	3.3
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH REACTOR WATER LEVEL :** (CFR 41.5, 45.6)		
AK3.01	Main turbine trip......................................	3.4	3.5
AK3.02	Reactor SCRAM: Plant-Specific..........................	3.6*	3.9*
AK3.03	PCIS/NSSSS initiation: Plant-Specific..................	2.9	3.1
AK3.04	Reactor feed pump trip: Plant-Specific.................	3.3	3.5
AK3.05	HPCI turbine trip: Plant-Specific......................	3.5	3.6
AK3.06	RCIC turbine trip: Plant-Specific......................	3.4	3.5
AK3.07	HPCS isolation: Plant-Specific.........................	3.2	3.3
AK3.08	RCIC steam supply valve closure: Plant-Specific........	3.4	3.5
AK3.09	HPCS injection valve closure: Plant-Specific...........	3.3	3.4

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA1.	Ability to operate and/or monitor the following as they apply to HIGH REACTOR WATER LEVEL : (CFR 41.7, 45.6)		
AA1.01	Reactor water level control: Plant-Specific..........	3.7	3.7
AA1.02	Reactor water cleanup (ability to drain): Plant-Specific..	3.3	3.3
AA1.03	Main steam system: Plant-Specific....................	3.1	3.1
AA1.04	HPCI: Plant-Specific................................	3.5	3.5
AA1.05	RCIC: Plant-Specific................................	3.3	3.3
AA1.06	HPCS: Plant-Specific................................	2.8	2.8
AA1.07	Main turbine: Plant-Specific........................	3.4	3.4
AA1.08	Feedwater system.....................................	3.5	3.5
AA1.09	Ability to drain: Plant-Specific....................	3.3	3.3
AA2.	Ability to determine and/or interpret the following as they apply to HIGH REACTOR WATER LEVEL : (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor water level..................................	3.9	3.9
AA2.02	Steam flow/feedflow mismatch.........................	3.4	3.4
AA2.03	Reactor water cleanup blowdown flow..................	2.9	3.0
AA2.04	Heatup rate: Plant-Specific.........................	3.1	3.3
AA2.05	Swell..	2.9	3.1

APE: 295009 Low Reactor Water Level

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	Knowledge of the operational implications of the following concepts as they apply to LOW REACTOR WATER LEVEL : (CFR 41.8 to 41.10)		
AK1.01	Steam carryunder	2.7	2.9
AK1.02	Recirculation pump net positive suction head: Plant-Specific	3.0	3.1
AK1.03	Jet pump net positive suction head: Not-BWR-1&2	2.7	2.7
AK1.04	Jet pump efficiency: Not-BWR-1&2	2.4	2.4
AK1.05	Natural circulation	3.3	3.4
AK2.	Knowledge of the interrelations between LOW REACTOR WATER LEVEL and the following: (CFR 41.7, 45.8)		
AK2.01	Reactor water level indication	3.9	4.0
AK2.02	Reactor water level control	3.9	3.9
AK2.03	Recirculation system	3.1	3.2
AK2.04	Reactor water cleanup	2.6	2.6
AK3.	Knowledge of the reasons for the following responses as they apply to LOW REACTOR WATER LEVEL : (CFR 41.5, 45.6)		
AK3.01	Recirculation pump run back: Plant-Specific	3.2	3.3
AK3.02	Reactor feedpump runout flow control: Plant-Specific.	2.7	2.8
	ABILITY		
AA1.	Ability to operate and/or monitor the following as they apply to LOW REACTOR WATER LEVEL : (CFR 41.7, 45.6)		
AA1.01	Reactor feedwater	3.9	3.9
AA1.02	Reactor water level control	4.0	4.0
AA1.03	Recirculation system: Plant-Specific	3.0	3.1
AA1.04	Reactor water cleanup	2.7	2.7
AA2.	Ability to determine and/or interpret the following as they apply to LOW REACTOR WATER LEVEL : (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor water level	4.2	4.2
AA2.02	Steam flow/feed flow mismatch	3.6	3.7
AA2.03	Reactor water cleanup blowdown rate	2.9	2.9

APE: 295010 High Drywell Pressure

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE :** (CFR 41.8 to 41.10)		
AK1.01	Downcomer submergence: Mark-I&II....................	3.0	3.4
AK1.02	Submergence vent control: Mark-III..................	2.8	3.1*
AK1.03	Temperature increases................................	3.2	3.4
AK2.	**Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following:** (CFR 41.7, 45.8)		
AK2.01	Suppression pool level...............................	3.2	3.3
AK2.02	Drywell/suppression chamber differential pressure: Mark-I&II..	3.3	3.5
AK2.03	Drywell/containment differential pressure: Mark-III..	3.0	3.1
AK2.04	Nitrogen makeup system: Plant-Specific..............	2.6	2.8
AK2.05	Drywell cooling and ventilation.....................	3.7	3.8
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE :** (CFR 41.5, 45.6)		
AK3.01	Drywell venting......................................	3.8	4.0*
AK3.02	Increased drywell cooling............................	3.4	3.4
AK3.03	Radiation level monitoring...........................	3.2	3.5
AK3.04	Leak investigation...................................	3.5	3.8
AK3.05	Temperature monitoring...............................	3.5	3.4
AK3.06	Termination of drywell inerting: Plant-Specific......	2.4*	2.8
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE :** (CFR 41.7, 45.6)		
AA1.01	Drywell ventilation/cooling..........................	3.4	3.5
AA1.02	Drywell floor and equipment drain sumps..............	3.6	3.6
AA1.03	Nitrogen makeup: Plant-Specific......................	2.6	2.6
AA1.04	Drywell sampling system..............................	3.1	3.0
AA1.05	Drywell/suppression vent and purge...................	3.1	3.4
AA1.06	Leakage detection systems............................	3.3	3.5
AA1.07	Containment (drywell) atmosphere control.............	3.2	3.4

APE: 295010 High Drywell Pressure

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA2.	Ability to determine and/or interpret the following as they apply to HIGH DRYWELL PRESSURE : (CFR 41.10, 43.5, 45.13)		
AA2.01	†Leak rates..	3.4	3.8
AA2.02	Drywell pressure................................	3.8	3.9
AA2.03	Drywell radiation levels........................	3.3	3.6
AA2.04	Drywell humidity: Plant-Specific................	2.8	3.0
AA2 05	Drywell air cooler drain flow: BWR-6............	3.3	3.3
AA2 06	Drywell temperature.............................	3.6	3.6

APE: 295011 High Containment Temperature (Mark III Containment Only)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) :** (CFR 41.8 to 41.10)		
AK1.01	Containment pressure: Mark-III........................	4.0*	4.1*
AK2.	**Knowledge of the interrelations between HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) and the following:** (CFR 41.7, 45.8)		
AK2.01	Containment ventilation/cooling: Mark-III............	3.7	4.0
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) :** (CFR 41.5, 45.6)		
AK3.01	Increased containment cooling: Mark-III..............	3.6	3.9
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) :** (CFR 41.7, 45.6)		
AA1.01	Containment ventilation/cooling system: Mark-III.....	3.6	3.9
AA2.	**Ability to determine and/or interpret the following as they apply to HIGH CONTAINMENT TEMPERATURE (MARK III CONTAINMENT ONLY) :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Containment temperature: Mark-III....................	3.6	3.9
AA2.02	Containment pressure: Mark-III.......................	4.0*	4.1*
AA2.03	Containment humidity: Mark-III.......................	2.8	3.2

APE: 295012 High Drywell Temperature

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.8 to 41.10)		
AK1.01	Pressure/temperature relationship	3.3	3.5
AK1.02	Reactor power level control	3.1	3.2
AK2.	**Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following:** (CFR 41.7, 45.8)		
AK2.01	Drywell ventilation	3.4	3.5
AK2.02	Drywell cooling	3.6	3.7
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.5, 45.6)		
AK3.01	Increased drywell cooling	3.5	3.6
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.7, 45.6)		
AA1.01	Drywell ventilation system	3.5	3.6
AA1.02	Drywell cooling system	3.8	3.8
AA2.	**Ability to determine and/or interpret the following as they apply to HIGH DRYWELL TEMPERATURE :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Drywell temperature	3.8	3.9
AA2.02	Drywell pressure	3.9	4.1
AA2.03	Drywell humidity: Plant-Specific	2.8	3.1

APE: 295013 High Suppression Pool Temperature

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH SUPPRESSION POOL TEMPERATURE :** (CFR 41.8 to 41.10)		
AK1.01	Pool stratification	2.5	2.6
AK1.02	Ambient temperature effects	2.4	2.5
AK1.03	Localized heating	3.0	3.3
AK1.04	Complete condensation	2.9	3.2
AK2.	**Knowledge of the interrelations between HIGH SUPPRESSION POOL TEMPERATURE and the following:** (CFR 41.7, 45.8)		
AK2.01	Suppression pool cooling	3.6	3.7
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL TEMPERATURE :** (CFR 41.5, 45.6)		
AK3.01	Suppression pool cooling operation	3.6	3.8
AK3.02	Limiting heat additions	3.6	3.8
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE :** (CFR 41.7, 45.6)		
AA1.01	Suppression pool cooling	3.9	3.9
AA1.02	Systems that add heat to the suppression pool	3.9	3.9
AA2.	**Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Suppression pool temperature	3.8	4.0
AA2.02	Localized heating/stratification	3.2	3.5

APE: 295014 Inadvertent Reactivity Addition

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION :** (CFR 41.8 to 41.10)		
AK1.01	Prompt critical	3.7	3.8
AK1.02	Reactivity anomaly	3.3	3.7
AK1.03	Shutdown margin	3.7	4.0
AK1.04	PCIOMR: Plant-Specific	3.0	3.4
AK1.05	†Fuel thermal limits	3.7	4.2*
AK1.06	Abnormal reactivity additions	3.8	3.9
AK2.	**Knowledge of the interrelations between INADVERTENT REACTIVITY ADDITION and the following:** (CFR 41.7, 45.8)		
AK2.01	RPS	3.9	4.1
AK2.02	†Fuel thermal limits	3.7	4.2*
AK2.03	Fuel temperature	3.3	3.4
AK2.04	Void concentration	3.2	3.3
AK2.05	Neutron monitoring system	4.0	4.1*
AK2.06	Moderator temperature	3.4	3.5
AK2.07	Reactor power	3.9	3.9
AK2.08	RMCS: Plant-Specific	3.4	3.5
AK2.09	Rod control and information system: Plant-Specific	3.4	3.6
AK2.10	Safety limits	4.1	4.5*
AK2.11	Recirculation flow control	3.6	3.7
AK3.	**Knowledge of the reasons for the following responses as they apply to INADVERTENT REACTIVITY ADDITION:** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM	4.1*	4.1
AK3.02	Control rod blocks	3.7	3.7
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to INADVERTENT REACTIVITY ADDITION:** (CFR 41.7, 45.6)		
AA1.01	RPS	4.0	4.1*
AA1.02	Recirculation flow control system	3.6	3.8
AA1.03	RMCS: Plant-Specific	3.5	3.5
AA1.04	Rod control and information system: Plant-Specific	3.2	3.3
AA1.05	Neutron monitoring system	3.9	3.9
AA1.06	Reactor/turbine pressure regulating system	3.3	3.4

APE: 295014 Inadvertent Reactivity Addition

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AA1.07	Cold water injection	4.0	4.1
AA2.	**Ability to determine and/or interpret the following as they apply to INADVERTENT REACTIVITY ADDITION :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor power	4.1*	4.2*
AA2.02	Reactor period	3.9	3.9
AA2.03	Cause of reactivity addition	4.0	4.3*
AA2.04	†Violation of fuel thermal limits	4.1	4.4*
AA2.05	†Violation of safety limits	4.2*	4.6

APE: 295015 Incomplete SCRAM

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to INCOMPLETE SCRAM :** (CFR 41.8 to 41.10)		
AK1.01	Shutdown margin	3.6*	3.9*
AK1.02	Cooldown effects on reactor power	3.9	4.1
AK1.03	Reactivity effects	3.8	3.9
AK1.04	Reactor pressure: Plant-Specific	3.8	3.8
AK2.	**Knowledge of the interrelations between INCOMPLETE SCRAM and the following:** (CFR 41.7, 45.8)		
AK2.01	CRD hydraulics	3.8	3.9
AK2.02	RMCS: Plant-Specific	3.6	3.7
AK2.03	Rod control and information system: Plant-Specific	3.2	3.6
AK2.04	RPS	4.0	4.1
AK2.05	Rod worth minimizer: Plant-Specific	2.6	2.8
AK2.06	RSCS: Plant-Specific	2.6	2.8
AK2.07	CRD mechanism	3.3	3.4
AK2.08	Neutron monitoring system	3.6	3.7
AK2.09	RPIS	3.5	3.6
AK2.10	SPDS/ERIS/CRIDS/GDS: Plant-Specific	2.8	3.0
AK2.11	Instrument air	3.5	3.7
AK3.	**Knowledge of the reasons for the following responses as they apply to INCOMPLETE SCRAM :** (CFR 41.5, 45.6)		
AK3.01	Bypassing rod insertion blocks	3.4	3.7
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to INCOMPLETE SCRAM :** (CFR 41.7, 45.6)		
AA1.01	CRD hydraulics	3.8	3.9
AA1.02	RPS	4.0	4.2*
AA1.03	RMCS: Plant-Specific	3.6	3.8
AA1.04	Rod control and information system: Plant-Specific	3.4	3.7
AA1.05	Rod worth minimizer: Plant-Specific	2.5*	2.8*
AA1.06	RSCS: Plant-Specific	2.7	2.9

APE: 295015 Incomplete SCRAM

K/A NO.	ABILITY	IMPORTANCE RO	SRO
AA1.07	Neutron monitoring system..............................	3.6	3.7
AA1.08	Process computer/SPDS/ERIS/CRIDS/GDS: Plant-Specific.	2.7	2.9
AA2.	**Ability to determine and/or interpret the following as they apply to INCOMPLETE SCRAM :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor power..	4.1*	4.3*
AA2.02	Control rod position.................................	4.1*	4.2*

APE: 295016 Control Room Abandonment

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to CONTROL ROOM ABANDONMENT :** (CFR 41.8 to 41.10)		
AK2.	**Knowledge of the interrelations between CONTROL ROOM ABANDONMENT and the following:** (CFR 41.7, 45.8)		
AK2.01	Remote shutdown panel: Plant-Specific................	4.4*	4.5*
AK2.02	Local control stations: Plant-Specific...............	4.0*	4.1*
AK2.03	Control room HVAC..................................	2.9*	3.1*
AK3.	**Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT :** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM......................................	4.1*	4.2*
AK3.02	Turbine trip.......................................	3.7*	3.8*
AK3.03	Disabling control room controls....................	3.5	3.7*
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT :** (CFR 41.7, 45.6)		
AA1.01	RPS..	3.8	3.9
AA1.02	Reactor/turbine pressure regulating system...........	2.9*	3.1*
AA1.03	RPIS...	3.0*	3.1
AA1.04	A.C. electrical distribution.........................	3.1	3.2
AA1.05	D.C. electrical distribution.........................	2.8	2.9
AA1.06	Reactor water level.................................	4.0	4.1
AA1.07	Control room/local control transfer mechanisms........	4.2*	4.3*
AA1.08	Reactor pressure....................................	4.0	4.0
AA1.09	Isolation/emergency condenser(s): Plant-Specific.....	4.0	4.0
AA2.	**Ability to determine and/or interpret the following as they apply to CONTROL ROOM ABANDONMENT :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor power......................................	4.1*	4.1*
AA2.02	Reactor water level.................................	4.2*	4.3*
AA2.03	Reactor pressure....................................	4.3*	4.4*
AA2.04	Suppression pool temperature.........................	3.9	4.1
AA2.05	Drywell pressure....................................	3.8	3.9
AA2.06	Cooldown rate.......................................	3.3	3.5
AA2.07	Suppression chamber pressure.........................	3.2	3.4

APE: 295017 High Off-Site Release Rate

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.8 to 41.10)		
AK1.01	Biological effects of radioisotope ingestion..........	2.2*	2.5
AK1.02	†Protection of the general public......................	3.8*	4.3*
AK1.03	†Meteorological effects on off-site release............	2.7	3.4
AK2.	**Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following:** (CFR 41.7, 45.8)		
AK2.01	Fission product production versus reactor power.......	2.8	3.3
AK2.02	Radwaste...	2.8	3.1
AK2.03	Off-gas system...	3.3	3.5
AK2.04	Plant ventilation systems..............................	3.1	3.3
AK2.05	Stack-gas monitoring system: Plant-Specific..........	3.4	3.6
AK2.06	†Site emergency plan....................................	3.4	4.6*
AK2.07	Control room ventilation...............................	3.2	3.4
AK2.08	SPDS/ERIS/CRIDS/GDS....................................	2.8	3.3
AK2.09	Condenser air removal system: Plant-Specific.........	2.8	2.9
AK2.10	Process radiation monitoring system..................	3.3	3.6
AK2.11	MSIV leakage control: Plant-Specific.................	3.1	3.2
AK2.12	Standby gas treatment/FRVS.............................	3.4	3.7
AK2.13	RPS..	3.4	3.7
AK2.14	PCIS/NSSSS...	4.0	4.1
AK3.	**Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.5, 45.6)		
AK3.01	System isolations......................................	3.6	3.9
AK3.02	Plant ventilation......................................	3.3	3.5
AK3.03	†Implementation of site emergency plan.................	3.3	4.5*
AK3.04	Power reduction..	3.6	3.8
AK3.05	Control room ventilation: Plant-Specific.............	3.3	3.6
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.7, 45.6)		
AA1.01	Radwaste...	2.7*	3.1
AA1.02	Off-gas system...	3.5	3.7
AA1.03	Plant ventilation systems..............................	3.4	3.4
AA1.04	Stack-gas monitoring system: Plant-Specific..........	3.6	3.8
AA1.05	SPDS/ERIS/CRIDS/GDS: Plant-Specific..................	2.7	3.2

APE: 295017 High Off-Site Release Rate

K/A NO.	ABILITY	IMPORTANCE RO	SRO
AA1.06	Condenser air removal system: Plant-Specific.........	3.2	3.2
AA1.07	Process radiation monitoring system..................	3.4	3.6
AA1.08	MSIV leakage control: Plant-Specific.................	3.1	3.4
AA1.09	Standby gas treatment/FRVS...........................	3.6	3.8
AA1.10	RPS..	3.6	3.7
AA1.11	PCIS/NSSSS...	3.9	4.1
AA1.12	†Meteorological data.................................	2.5*	3.9
AA2.	**Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE :** (CFR 41.10, 43.5, 45.13)		
AA2.01	†Off-site release rate: Plant-Specific................	2.9*	4.2*
AA2.02	†Total number of curies released: Plant-Specific......	2.4*	3.5*
AA2.03	†Radiation levels: Plant-Specific.....................	3.1	3.9
AA2.04	†Source of off-site release...........................	3.6	4.3*
AA2.05	†Meteorological data..................................	2.5	3.8

APE: 295018 Partial or Complete Loss of Component Cooling Water

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : (CFR 41.8 to 41.10)		
AK1.01	Effects on component/system operations................	3.5	3.6
AK2.	Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER and the following: (CFR 41.7, 45.8)		
AK2.01	System loads...	3.3	3.4
AK2.02	Plant operations.......................................	3.4	3.6
AK3.	Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : (CFR 41.5, 45.6)		
AK3.01	Isolation of non-essential heat loads: Plant-Specific	2.9	3.2
AK3.02	Reactor power reduction................................	3.3	3.4
AK3.03	Securing individual components (prevent equipment damage)...	3.1	3.3
AK3.04	Starting standby pump..................................	3.3	3.3
AK3.05	Placing standby heat exchanger in service.............	3.2	3.3
AK3.06	Increasing cooling water flow to heat exchangers......	3.3	3.3
AK3.07	Cross-connecting with backup systems..................	3.1	3.2
	ABILITY		
AA1.	Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : (CFR 41.7, 45.6)		
AA1.01	Backup systems...	3.3	3.4
AA1.02	System loads...	3.3	3.4
AA1.03	Affected systems so as to isolate damaged portions....	3.3	3.4

APE: 295018 Partial or Complete Loss of Component Cooling Water

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA2.	Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : (CFR 41.10, 43.5, 45.13)		
AA2.01	Component temperatures	3.3	3.4
AA2.02	Cooling water temperature	3.1	3.2
AA2.03	Cause for partial or complete loss	3.2	3.5
AA2.04	System flow	2.9	2.9
AA2.05	System pressure	2.9	2.9

APE: 295019 Partial or Complete Loss of Instrument Air

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR :** (CFR 41.8 to 41.10)		
AK2.	**Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR and the following:** (CFR 41.7, 45.8)		
AK2.01	CRD hydraulics	3.8	3.9
AK2.02	Component cooling water	2.9	3.0
AK2.03	Reactor feedwater	3.2	3.3
AK2.04	Reactor water cleanup	2.8	2.8
AK2.05	Main steam system	3.4	3.4
AK2.06	Offgas system	2.8	2.9
AK2.07	Condensate system	3.2	3.2
AK2.08	Plant ventilation	2.8	2.9
AK2.09	Containment	3.3	3.3
AK2.10	Fuel pool cooling	2.8	2.8
AK2.11	Radwaste	2.5	2.6
AK2.12	Standby gas treatment/FRVS	3.3	3.4
AK2.13	Isolation condenser: Plant-Specific	3.2*	3.2*
AK2.14	Plant air systems	3.2	3.2
AK2.15	Standby liquid control system	2.3*	2.6
AK2.16	Reactor core isolation cooling	2.8	2.8
AK2.17	High pressure coolant injection: Plant-Specific	2.7	2.7
AK2.18	ADS: Plant-Specific	3.5	3.5
AK2.19	RHR/LPCI: Plant-Specific	2.7	2.8
AK3.	**Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR :** (CFR 41.5, 45.6)		
AK3.01	Backup air system supply: Plant-Specific	3.3	3.4
AK3.02	Standby air compressor operation	3.5	3.4
AK3.03	Service air isolations: Plant-Specific	3.2	3.2
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR :** (CFR 41.7, 45.6)		
AA1.01	Backup air supply	3.5	3.3

APE: 295019 Partial or Complete Loss of Instrument Air

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA1.02	Instrument air system valves: Plant-Specific.........	3.3	3.1
AA1.03	Instrument air compressor power supplies..............	3.0	3.0
AA1.04	Service air isolations valves: Plant-Specific........	3.3	3.2
AA2.	**Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Instrument air system pressure........................	3.5	3.6
AA2.02	Status of safety-related instrument air system loads (see AK2.1 - AK2.19)..................................	3.6	3.7

APE: 295020 Inadvertent Containment Isolation

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to INADVERTENT CONTAINMENT ISOLATION :** (CFR 41.8 to 41.10)		
AK1.01	Loss of normal heat sink	3.7	3.9
AK1.02	Power/reactivity control	3.5	3.8
AK1.03	Water chemistry	2.3	2.5
AK1.04	Bottom head thermal stratification	2.5	2.8
AK1.05	Loss of drywell/containment cooling	3.3	3.6
AK2.	**Knowledge of the interrelations between INADVERTENT CONTAINMENT ISOLATION and the following:** (CFR 41.7, 45.8)		
AK2.01	Main steam system	3.6	3 7
AK2.02	Sampling system	2.6	2.8
AK2.03	Drywell/containment ventilation/cooling: Plant-Specific	3.1	3.3
AK2.04	RWCU system	3.1	3.1
AK2.05	Isolation condenser: Plant-Specific	4.2*	4.2
AK2.06	HPCI: Plant-Specific	3.8	3.8
AK2.07	RCIC: Plant-Specific	3.4	3.4
AK2.08	Traversing in-core probes: Plant-Specific	2.5*	2.6
AK2.09	RHR/shutdown cooling: Plant-Specific	3.1	3.3
AK2.10	Drywell equipment/floor drain sumps	2.9	3.1
AK2.11	Standby gas treatment system/FRVS: Plant-Specific	3.2	3.4
AK2.12	Instrument air/nitrogen: Plant-Specific	3.1	3.2
AK3.	**Knowledge of the reasons for the following responses as they apply to INADVERTENT CONTAINMENT ISOLATION:** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM	3.8	3.8
AK3.02	Drywell/containment pressure response	3.3	3.5
AK3.03	Drywell/containment temperature response	3.2	3.2
AK3.04	Reactor pressure response	4.1	4.1
AK3.05	Reactor water level response	3.8	3.9
AK3.06	Suppression pool water level response	3.3	3.4
AK3.07	Suppression pool temperature response	3.4	3.6
AK3.08	Suppression chamber pressure response	3.3	3.5

APE: 295020 Inadvertent Containment Isolation

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA1.	**Ability to operate and/or monitor the following as they apply to INADVERTENT CONTAINMENT ISOLATION :** (CFR 41.7, 45.6)		
AA1.01	PCIS/NSSSS	3.6	3.6
AA1.02	Drywell ventilation/cooling system	3.2	3.2
AA1.03	Containment ventilation system: Plant-Specific	2.9	3.1
AA2.	**Ability to determine and/or interpret the following as they apply to INADVERTENT CONTAINMENT ISOLATION :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Drywell/containment pressure	3.6	3.7
AA2.02	Drywell/containment temperature	3.3	3.4
AA2.03	Reactor power	3.7	3.7
AA2.04	Reactor pressure	3.9	3.9
AA2.05	Reactor water level	3.6	3.6
AA2.06	Cause of isolation	3.4	3.8

APE: 295021 Loss of Shutdown Cooling

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING : (CFR 41.8 to 41.10)		
AK1.01	Decay heat	3.6	3.8
AK1.02	Thermal stratification	3.3	3.4
AK1.03	Adequate core cooling	3.9	3.9
AK1.04	Natural circulation	3.6	3.7
AK2.	Knowledge of the interrelations between LOSS OF SHUTDOWN COOLING and the following: (CFR 41.7, 45.8)		
AK2.01	Reactor water temperature	3.6	3.7
AK2.02	Reactor water cleanup	3.2	3.3
AK2.03	RHR/shutdown cooling	3.6	3.6
AK2.04	Component cooling water systems: Plant Specific	3.0	3.1
AK2.05	Fuel pool cooling and cleanup system	2.7	2.8
AK2.06	Reactor vessel headspray: Plant-Specific	2.5	2.6
AK2.07	Reactor recirculation	3.1	3.2
AK3.	Knowledge of the reasons for the following responses as they apply to LOSS OF SHUTDOWN COOLING : (CFR 41.5, 45.6)		
AK3.01	Raising reactor water level	3.3	3.4
AK3.02	Feeding and bleeding reactor vessel	3.3	3.4
AK3.03	Increasing drywell cooling	2.9	2.9
AK3.04	Maximizing reactor water cleanup flow	3.3	3.4
AK3.05	Establishing alternate heat removal flow paths	3.6	3.8
	ABILITY		
AA1.	Ability to operate and/or monitor the following as they apply to LOSS OF SHUTDOWN COOLING : (CFR 41.7, 45.6)		
AA1.01	Reactor water cleanup system	3.4	3.4
AA1.02	RHR/shutdown cooling	3.5	3.5
AA1.03	Component cooling water systems: Plant-Specific	3.1	3.1
AA1.04	Alternate heat removal methods	3.7	3.7
AA1.05	Reactor recirculation	3.0	3.0
AA1.06	Containment/ drywell temperature	2.8	3.0
AA2.	Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING : (CFR 41.10, 43.5, 45.13)		
AA2.01	Reactor water heatup/cooldown rate	3.5	3.6

APE: **295021 Loss of Shutdown Cooling**

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA2.02	RHR/shutdown cooling system flow......................	3.4	3.4
AA2.03	Reactor water level..................................	3.5	3.6
AA2.04	Reactor water temperature............................	3.6	3.5
AA2.05	Reactor vessel metal temperature.....................	3.4	3.3
AA2.06	Reactor pressure.....................................	3.2	3.3
AA2.07	Reactor recirculation flow...........................	2.9	3.1

APE: 295022 Loss of CRD Pumps

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to LOSS OF CRD PUMPS:** (CFR 41.8 to 41.10)		
AK1.01	Reactor pressure vs. rod insertion capability.........	3.3	3.4
AK1.02	Reactivity control....................................	3.6	3.7
AK2.	**Knowledge of the interrelations between LOSS OF CRD PUMPS and the following:** (CFR 41.7, 45.8)		
AK2.01	Recirculation system: Plant-Specific.................	2.8	3.0
AK2.02	CRD mechanism...	3.1	3.1
AK2.03	Accumulator pressures................................	3.4	3.4
AK2.04	Reactor water level..................................	2.5	2.7
AK2.05	Reactor water cleanup: Plant-Specific................	2.4	2.5
AK2.06	Shared components with other units: Plant-Specific...	2.6	2.8
AK2.07	Reactor pressure (SCRAM assist): Plant-Specific......	3.4	3.6
AK3.	**Knowledge of the reasons for the following responses as they apply to LOSS OF CRD PUMPS:** (CFR 41.5, 45.6)		
AK3.01	Reactor SCRAM...	3.7*	3.9*
AK3.02	CRDM high temperature................................	2.9	3.1
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to LOSS OF CRD PUMPS:** (CFR 41.7, 45.6)		
AA1.01	CRD hydraulic system.................................	3.1	3.2
AA1.02	RPS...	3.6	3.6
AA1.03	Recirculation system: Plant-Specific.................	2.7	2.8
AA1.04	Reactor water cleanup system: Plant-Specific.........	2.5	2.6
AA2.	**Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Accumulator pressure.................................	3.5	3.6
AA2.02	CRD system status....................................	3.3	3.4
AA2.03	CRD mechanism temperatures...........................	3.1	3.2

APE: **295023 Refueling Accidents**

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
AK1.	**Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS :** (CFR 41.8 to 41.10)		
AK1.01	Radiation exposure hazards............................	3.6	4.1
AK1.02	Shutdown margin.......................................	3.2	3.6
AK1.03	Inadvertent criticality...............................	3.7	4.0
AK2.	**Knowledge of the interrelations between REFUELING ACCIDENTS and the following:** (CFR 41.7, 45.8)		
AK2.01	Fuel handling equipment...............................	3.3	3.7
AK2.02	Fuel pool cooling and cleanup system..................	2.9	3.2
AK2.03	Radiation monitoring equipment........................	3.4	3.6
AK2.04	RMCS/Rod control and information system...............	3.2	3.4
AK2.05	Secondary containment ventilation.....................	3.5	3.7
AK2.06	Containment ventilation: Mark-III.....................	3.4	3.8
AK2.07	Standby gas treatment/FRVS............................	3.6	3.9
AK3.	**Knowledge of the reasons for the following responses as they apply to REFUELING ACCIDENTS :** (CFR 41.5, 45.6)		
AK3.01	Refueling floor evacuation............................	3.6	4.3*
AK3.02	Interlocks associated with fuel handling equipment....	3.4	3.8
AK3.03	Ventilation isolation.................................	3.3	3.6
AK3.04	Non-coincident SCRAM function.........................	3.0	3.5
AK3.05	Initiation of SLC/shut-down cooling: Plant-Specific(BWR-1).........................	3.5	4.0
	ABILITY		
AA1.	**Ability to operate and/or monitor the following as they apply to REFUELING ACCIDENTS :** (CFR 41.7, 45.6)		
AA1.01	Secondary containment ventilation.....................	3.3	3.5
AA1.02	Fuel pool cooling and cleanup system..................	2.9	3.1
AA1.03	Fuel handling equipment...............................	3.3	3.6
AA1.04	Radiation monitoring equipment........................	3.4	3.7
AA1.05	Fuel transfer system: Plant-Specific..................	2.8	3.5
AA1.06	Neutron monitoring....................................	3.3	3.4
AA1.07	Standby gas treatment/FRVS............................	3.6	3.6
AA1.08	†Containment building ventilation: Mark-III.........	3.3	3.4

APE: 295023 Refueling Accidents

K/A NO.	ABILITY	IMPORTANCE RO	IMPORTANCE SRO
AA2.	**Ability to determine and/or interpret the following as they apply to REFUELING ACCIDENTS :** (CFR 41.10, 43.5, 45.13)		
AA2.01	Area radiation levels..................................	3.6	4.0
AA2.02	Fuel pool level..	3.4	3.7
AA2.03	Airborne contamination levels..........................	3.3*	3.8*
AA2.04	†Occurrence of fuel handling accident..................	3.4	4.1
AA2.05	†Entry conditions of emergency plan....................	3.2	4.6*

APE: 600000 Plant Fire On Site

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
AK1	Knowledge of the operation applications of the following concepts as they apply to Plant Fire On Site:		
AK1.01	Fire Classifications by type	2.5	2.8
AK1.02	Fire Fighting	2.9	3.1
AK2.	Knowledge of the interrelations between PLANT FIRE ON SITE and the following:		
AK2.01	Sensors, detectors and valves	2.6	2.7
AK2.02	Controllers and positioners	2.4	2.5
AK2.03	Motors	2.5	2.6
AK2.04	Breakers, relays, and disconnects	2.5	2.6
AK3	Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE:		
AK3.01	Installation of fire detectors	2.0	2.1
AK3.02	Steps called our in the site fire protection plant, fire protection system manual, and fire zone manual	2.2	2.8
AK3.03	Fire detector surveillance test	2.0	2.2
AK3.04	Actions contained in the abnormal procedure for plant fire on site	2.8	3.4

K/A NO.	ABILITY	IMPORTANCE RO	SRO
AA1	Ability to operate and / or monitor the following as theyapply to PLANT FIRE ON SITE:		
AA1.01	Respirator air pack	3.0	2.9
AA1.02	Re-installation of fire detector	1.8	1.9
AA1.03	Bypass of fire zone detector	1.8	2.2
AA1.04	Bypass of heat detector	1.9	2.2
AA1.05	Plant and control room ventilation systems	3.0	3.1
AA1.06	Fire alarm	3.0	3.0
AA1.07	Fire alarm reset panel	2.3	2.4
AA1.08	Fire fighting equipment used on each class of fire . .	2.6	2.9
AA1.09	Plant fire zone panel (including detector location) . .	2.5	2.7
AA2	Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE:		
AA2.01	Gas treatment system	2.2	2.3
AA2.02	Damper position	2.8	2.9
AA2.03	Fire alarm	2.8	3.2
AA2.04	The fire's extent of potential operational damage to plant equipment	2.8	3.1
AA2.05	Ventilation alignment necessary to secure affected area	2.9	3.0
AA2.06	Need for pressurizing control room (recirculating mode)	2.5	2.8
AA2.07	Whether malfunction is due to common-mode electrical failures	2.6	3.0
AA2.08	Limits of affected area		
AA2.09	That a failed fire alarm detector exists	2.4	2.8
AA2.10	Time limit of long-term-breathing air system for control room	2.9	3.1
AA2.11	Time limit for use of respirators	2.9	3.0
AA2.12	Location of vital equipment within fire zone	3.1	3.5
AA2.13	Need for emergency plant shutdown	3.2	3.8
AA2.14	Equipment that will be affected by fire suppression activities in each zone	3.0	3.6
AA2.15	Requirements for establishing a fire watch	2.3	3.5
AA2.16	Vital equipment and control systems to be maintained and operated during a fire	3.0	3.5
AA2.17	Systems that may be affected by the fire	3.1	3.6

5 COMPONENTS

291001	Valves (CFR 41.3)
291002	Sensors and Detectors (CFR 41.7)
291003	Controllers and positioners (CFR 41.7)
291004	Pumps(CFR 41.3)
291005	Motors and Generators (CFR 41.7)
295006	Heat Exchangers and Condensors (CFR 41.4)
295007	Demineralizers and Ion Exchangers (CFR 41.3)
295008	Breakers, Relays and Disconnects (CFR 41.7)

COMPONENT: 291001 Valves
(CFR 41.3)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.01	The operation of safety valves	3.4	3.5
K1.02	The operation of relief valves	3.4	3.6
K1.03	The relationship of valve position to flow rate and back pressure	2.7	2.8
K1.04	Valve design for a given failed-valve position (open, closed, and as-is positions; spring loaded valves; hydraulic, pneumatically controlled valves; electric motor-driven valves)	2.7	2.8
K1.05	The significance of stem position (valve status) for gate valves	2.9	2.8
K1.06	Safety concerns in the use of gate valves (protect valves seals, open slowly)	2.7	2.7
K1.07	Cautions for placing a valve controller in manual mode	3.4	3.4
K1.08	Emergency operation of MOV with motor inoperable	3.4	3.5
K1.09	The stroke test for a valve, including the use of a stopwatch	2.7	2.7
K1.10	Principles of operation and purpose of check valves	3.1	3.1
K1.11	Operation of manual valves and verification of position with indicator lights	3.2	3.2
K1.12	Reason for using globe valves versus gates valves for throttling	2.6	2.8

COMPONENT: 291002 Sensors/Detectors
(CFR 41.7)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Flow		
K1.01	Operation of venturis and orifices	2.4	2.5
K1.02	Temperature compensation requirements	2.4	2.5
K1.03	Effects of gas or steam on liquid flow rate indications (erroneous reading)	2.5	2.6
K1.04	Modes of failure	2.9	3.1
K1.05	Operation of a flow D/P cell type flow detector	3.1	3.1
	Level		
K1.06	Temperature/pressure compensation requirements	2.8	2.9
K1.07	Operation of a differential pressure level detector	3.2	3.2
K1.08	Effects of operating environment (pressure, temperature, and radiation)	2.8	2.9
K1.09	Modes of failure	3.3	3.3
	Pressure		
K1.10	Theory of operation of bourdon tubes, diaphragms, bellows, and pressure detectors	2.4	2.5
K1. 11	Effects of operating environment (pressure, temperature, radiation)	2.3	2.5
K1.12	Operation of a pressure D/P cell	2.8	2.9
K1.13	Modes of failure	2.9	3.1
	Temperature		
K1.14	Theory of operation of T/C, RTD, thermostats, thermometers (expanding fluid)	2.3*	2.4
K1.15	Indications of failure modes of T/C, RTD, thermometers	2.6	2.8
	Position Detector		
K1.16	Failure modes of reed switches, LVDT, limit switches, and potentiometers	2.5	2.7

COMPONENT: 291002 Sensors/Detectors
(CFR 41.7)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.17	Applications of reed switches, magnets, LVDT, potentiometers, and limit switches	2.3*	2.4
	<u>Electrical</u>		
K1.18	Applications of voltmeters, ammeters, frequency, and ground detectors	2.2*	2.4
	<u>Nuclear Instrumentation</u>		
K1.19	Operation of fission chambers, ion chambers	3.0	3.1
K1.20	Neutron monitoring indication units	3.2	3.2
K1.21	Effects of voltage changes on neutron detector performance	2.8	2.9
K1.22	Failure modes of fission chambers, ion chambers, and proportional counters	3.0	3.1
	<u>Radiation Detection</u>		
K1.23	Operation of ion chambers, G-M tubes and scintillation detectors	2.8	2.9
K1.24	Use of portable radiation monitoring instruments	3.1	3.2

COMPONENT: 291003 Controllers and Positioners
(CFR 41.7)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Function and operation of flow controller in manual and automatic modes	3.5	3.7
K1.02	Function and operation of a speed controller	3.5	3.6
K1.03	Operation of a valve controller, including seal-in features	3.3	3.4
K1.04	Function and operation of pressure and temperature controllers, including pressure and temperature control valves	3.3	3.3
K1.05	Function and characteristics of valve positioners	2.8	2.8
K1.06	Function and characteristics of governors and other mechanical controllers	2.5	2.6
K1.07	Safety precautions with respect to the operation of controllers and positioners	2.8	2.8
K1.08	Theory of operation of the following types of controllers: electronic, electrical, and pneumatic	2.2*	2.2*
K1.09	Effects on operation of controllers due to proportional, proportional and reset, and proportional and integral features	2.0*	2.2*

COMPONENT: 291004 Pumps
(CFR 41.3)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Centrifugal		
K1.01	Identification, symptoms, and consequences of cavitation	3.2	3.2
K1.02	Reasons for venting a centrifugal pump	2.8	2.8
K1.03	Consequences of air binding	2.8	2.9
K1.04	Consequences of operating a pump dead headed or for extended recirculation times	3.0	3.1
K1.05	Discuss relationships among head, flow, speed, and power	2.8	2.9
K1.06	Need for net positive suction head (NPSH); effects of loss of suction	3.3	3.3
K1.07	Starting current and operating current interpretation	2.8	2.8
K1.J8	Purpose of starting a pump with discharge valve closed	2.8	2.8
K1.09	Pressure and flow relationship of pumps in parallel	2.3*	2.4*
K1.10	Pressure and flow relationship of pumps in series	2.3*	2.4*
K1. 11	Definition of pump shutoff head	2.4	2.5
K1.12	"Runout" of a centrifugal pump (definition, indications, causes, effects, and corrective measures)	2.8	2.8
K1.13	Principles of operation of a centrifugal pump	2.6	2.7
K1.14	Relationship between flow from a pump and suction heads	2.5	2.5
K1.15	Purpose of pump minimum flow requirements		
	Positive Displacement	2.9	2.9
K1.16	Discuss relationship among head, flow, speed, and power	2.5	2.7
K1.17	Net positive suction head (NSPH) requirements for a positive displacement pump	2.5	2.6
K1.18	Consequences of operating a positive displacement pump against a closed flow path	3.3	3.3

COMPONENT: 291004 Pumps
(CFR 41.3)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.19	Functions and characteristics of positive displacement pumps	2.6	2.6
K1.20	Reason for starting a positive displacement pump with the discharge valve open; need to clear the flow path	3.1	3.1
K1.21	Safety procedures and precautions associated with positive displacement pumps	3.1	3.0

COMPONENT: 291005 Motors and Generators (CFR 41.7)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Locked motor rotor, recognition from motor parameters	2.6	2.6
K1.02	Potential consequences of overheating motor insulation or motor bearings	2.6	2.7
K1.03	Causes of excessive current in motors, such as low voltage, overloading , and mechanical binding	2.6	2.7
K1.04	Relationship between pump motor current (ammeter reading) and the following: pump fluid flow, head, speed, and stator temperature	2.7	2.7
K1.05	Explain the difference between starting current and operating (running) current in a motor	2.6	2.7
K1.06	Reason for limiting the number of motor starts in a given time period	2.9	3.1
K1.07	Electrical units: volts, amps, A.C., D.C., and hertz	2.6	2.6
K1.08	Consequences of overexcited/underexcited	2.5	2.6
K1.09	†Interrelations of the following: VARs, Watts, Amps, Volts, Power factor	2.3*	2.6

COMPONENT: **291006 Heat Exchangers and Condensers (CFR 41.4)**

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Startup/shutdown of a heat exchanger	2.7	2.7
K1.02	Proper filling of a shell-and-tube heat exchanger	2.6	2.6
K1.03	Basic heat transfer in a heat exchanger	2.4	2.6
K1.04	Effects of heat exchanger flow rates that are too high or too low	2.8	2.8
K1.05	Flow paths for the heat exchanger (counterflow and U-types)	2.2*	2.3*
K1.06	Components of a heat exchanger (shells, tubes, plates, etc.)	2.3*	2.3*
K1.07	Control of heat exchanger temperatures	2.7	2.8
K1.08	Relationship between flow rates and temperatures	2.9	3.0
K1.09	Definition of thermal shock	2.7	2.8
K1.10	Principle of operation of condensers	2.8	2.8
K1.11	Relationship between condenser vacuum and backpressure	2.8	2.8
K1.12	Causes of natural circulation	2.9	3.0
K1.13	Use of steam tables to determine saturation pressure for a given temperature and vice versa	2.7	2.9
K1.14	Fluid hammer and methods of prevention	3.1	3.2
K1.15	Effects of heat exchanger tube fouling	2.6	2.8
K1.16	Effects of scaling on heat exchanger operation	2.5	2.6
K1.17	Consequences of heat exchanger tube failure	2.7	2.8
K1.18	Reasons for non-condensible gas removal	2.8	2.9

COMPONENT: 291007 Demineralizers and Ion Exchangers (CFR 41.3)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Effect of excessive differential pressure on demineralizer performance	2.6	2.7
K1.04	Reason for sampling inlet and outlet of demineralizer	2.5	2.6
K1.02	Effects of channeling in a demineralizer	2.8	2.9
K1.03	Purpose of a demineralizer	2.8	2.9
K1.05	Purpose of demineralizer D/P gauge	2.4	2.5
K1.06	Reason for demineralizer temperature and flow limits	2.7	2.7
K1.07	Principles of demineralizer operation	2.3*	2.5
K1.08	Demineralizer D/P to determine condition of demineralizer resin bed	2.6	2.6
K1.09	Effects of demineralizer operation on water conductivity	2.7	2.7

COMPONENT: 291008 Breakers, Relays and Disconnects (CFR 41.7)

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Purpose for racking out breakers (de-energize components and associated control and indication circuits)	3.6	3.6
K1.02	Local indication that breaker is open, closed or tripped	3.4	3.5
K1.03	Meaning of power supply circuit breaker indicator lights and capability to remotely open and close	3.3	3.4
K1.04	Operation of various push buttons, switches and handles and the resulting action on breakers	3.3	3.3
K1.05	Function of thermal overload protection device	3.0	3.1
K1.06	Interpreting one-line diagram of control circuitry	3.2	3.6
K1.07	Safety procedures and precautions associated with breakers, including MCC bus breakers, high, medium and low voltage breakers, relays and disconnects	3.5*	3.7
K1.08	Effects of closing breakers with current out of phase, different frequencies, high voltage differential, low current, or too much load	3.4	3.5
K1.09	Effect of racking out breakers on control and indicating circuits and removal of control power on breaker operation	3.4	3.5
K1.10	Function, control, and precautions associated with disconnects	3.3*	3.4

6 Theory

6.1 Reactor Theory (CFR 41.1)

292001	Neutrons
292002	Neutron Life Cycle
292003	Reactor Kinetics and Neutron Sources
292004	Reactivity Coefficients
292005	Control rods
292006	Fission Product Poisons
292007	Fuel Depletion and Burnable Poisons
292008	Reactor Operational Physics

6.2 Thermodynamics Theory (CFR 41.14)

293001	Thermodynamic Units and Properties
293002	Basic Energy Concepts
293003	Steam
293004	Thermodynamic Process
293005	Thermodynamic Cycles
293006	Fluid Statics
293007	Heat Transfer and Heat Exchangers
293008	Thermal Hydraulics
293009	Core Thermal Limits
293010	Brittle Fracture and Vessel Thermal Stress

6.1 Reactor Theory
(CFR 41.1)

REACTOR THEORY: 292001 Neutrons

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Define fast, intermediate, and slow neutrons.	2.0*	2.1*
K1.02	Define prompt and delayed neutrons.	3.0	3.1
K1.03	Define thermal neutrons.	2.7	2.7
K1.04	Describe neutron moderation.	3.2	3.2
K1.05	Identify characteristics of good moderators.	2.4*	2.6*
K1.06	Define neutron lifetime.	1.9*	1.9*
K1.07	Define neutron generation time.	1.9*	1.9*
K1.08	Describe fast flux, thermal flux, and flux distribution.	2.2*	2.4

REACTOR THEORY: 292002 Neutron Life Cycle

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Describe the neutron life cycle using the following terms:		
K1.01	--fast fission factor.	1.9*	1.9*
K1.02	--fast non-leakage probability factor.	1.9*	1.9*
K1.03	--resonance escape probability factor.	2.0*	2.1*
K1.04	--thermal non-leakage probability factor.	1.9*	2.0*
K1.05	--thermal utilization factor.	1.9*	2.0*
K1.06	--reproduction factor.	1.9*	1.9*
K1.07	Define critical, subcritical, and supercritical with respect to a reactor.	3.5*	3.5
K1.08	Define effective multiplication factor and discuss its relationship to the state of d reactor.	2.7	2.8
K1.09	Define K-excess.	2.4*	2.6
K1.10	Define shutdown margin.	3.2	3.5
K1.11	Define reactivity.	3.2	3.3
K1.12	State the relationship between reactivity and effective multiplication factor.	2.4	2.5
K1.13	†Calculate shutdown margin using procedures and given plant parameters	1.8	2.4*
K1.14	†Evaluate change in shutdown margin due to changes in plant parameters	2.6	2.9

REACTOR THEORY: 292003 Reactor Kinetics and Neutron Sources

		IMPORTANCE	
K/A NO.	KNOWLEDGE	RO	SRO
K1.01	Explain the concept of subcritical multiplication.	2.9	3.0
K1.02	Given the simplified formula for subcritical multiplication, perform calculations involving steady state count rate and source count rate.	2.1*	2.3*
K1.03	Describe the production of delayed neutrons.	2.4	2.4
K1.04	Define delayed neutron fraction and effective delayed neutron fraction; state the reasons for variation.	2.5	2.5
K1.05	Define reactor period.	3.7	3.7
K1.06	Explain the effect of delayed neutrons on reactor period.	3.7	3.7
K1.07	Explain prompt critical, prompt jump, and prompt drop.	3.3	3.3
K1.08	Given the power equation, solve problems for power changes and period.	2.7	2.8
K1.09	Define doubling time and calculate it using the power equation.	2.5*	2.6*
K1.10	Explain the necessity for installed neutron sources in a reactor core.	2.4*	2.4
K1.11	Explain why installed sources are not needed after one cycle of core operation.	2.4	2.4

REACTOR THEORY: 292004 Reactivity Coefficients

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Define the temperature coefficient of reactivity.	3.2	3.2
K1.02	Describe the effect on the magnitude of the temperature coefficient of reactivity from changes in moderator temperature and core age.	2.5*	2.6*
K1.03	Explain resonance absorption.	2.6	2.7
K1.04	Explain doppler broadening and self-shielding.	2.6	2.7
K1.05	Define the doppler coefficient of reactivity.	2.9	2.9
	Describe the effect on the magnitude of the doppler coefficient of reactivity for changes in the following:		
K1.06	--Moderator temperature	2.1*	2.2*
K1.07	--Core void fraction	2.1*	2.2*
K1.08	--Fuel temperature	2.2*	2.4*
K1.09	--Core age	1.9*	2.1*
K1.10	Define the void coefficient of reactivity.	3.2	3.2
	Describe the effect on the magnitude of void coefficient from changes in the following:		
K1. 11	--Core void fraction	2.5	2.6
K1. 12	--Fuel temperature	2.2*	2.3*
K1.13	--Core age	2.1*	2.2*
K1.14	Compare the relative magnitudes of the temperature, doppler, and void coefficients of reaCtivitY.	3.3	3.3

REACTOR THEORY: 292005 Control Rods

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Relate notch and rod position.	3.2*	3.3*
K1.02	Name the material used for thermal neutron absorption in control rods.	2.5	2.6
K1.03	Describe nuclear properties of active material in the rod.	1.9*	1.9*
K1.04	Predict direction of change in reactor power for a change in control rod position.	3.5	3.5
K1.05	Define rod density.	2.5*	2.6
K1.06	Define reactor scram.	3.7*	3.8*
K1.07	Define control rod worth, differential control rod worth, and integral control rod worth.	2.4	2.6
K1.08	Explain the shape of curves for differential and integral CRW versus rod position.	2.1*	2.3
K1.09	Explain direction of change in the magnitude of CRW for a change in moderator temperature, void fraction, and control rod density, and Xenon.	2.5*	2.6
K1.10	†State the purpose of flux shaping and rod sequencing.	2.8	3.3
K1.11	Define deep rods, and shallow rods.	2.4*	2.5*
K1.12	†Describe effects of deep, and shallow control rods on axial and radial flux distribution.	2.6	2.9

REACTOR THEORY: 292006 Fission Product Poisons

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Define fission product poison.	2.7	2.8
K1.02	State the characteristics of Xenon-135 as a fission product poison.	3.1	3.1
K1.03	Describe the production of Xenon-135.	2.9	2.9
K1.04	Describe the removal of Xenon-135.	2.9	2.9
	Describe the following processes and state their effect on reactor operations:		
K1.05	--Equilibrium Xenon	2.9	2.9
K1.06	--Maneuvering Xenon	2.7	2.7
K1.07	--Xenon following a scram	3.2	3.2
K1.08	†Describe the effects that Xenon concentration has on flux shape and control rod patterns.	2.8	3.2
	Plot the curve and explain the reasoning for the reactivity insertion by Xenon-135 versus time for the following:		
K1.09	--Initial reactor startup and ascension to rated power.	2.5	2.5
K1.10	--Reactor startup with Xenon-135 already present in the core	2.9	2.9
K1. 11	--Power changes from steady-state power to another.	2.6	2.7
K1.12	--Reactor scram.	2.8	2.3
K1.13	--Reactor shutdown.	2.6*	2.6
K1.14	Explain the process and reasons for the Reactor Operator to compensate for the time dependent behavior of Xenon-135 concentration in the reactor.	3.1	3.2
K1.15	State the characteristics of Samarium-149 as a fission product poison.	2.1	2.1*
K1.16	Describe the production of Samarium-149.	1.8*	1.9*
K1.17	Describe the removal of Samarium-149.	1.9*	1.9*

REACTOR THEORY: 292006 Fission Product Poisons

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.18	Define equilibrium samarium.	1.8*	1.8*
	Plot the curve and explain the reasoning for reactivity insertion by Samarium-149 versus time for the following:		
K1.19	--Initial reactor startup and ascension to rated power.	1.7*	1.8*
K1.20	--Reactor shutdown.	1.6*	1.7*
K1.21	Describe effects of power changes on samarium concentration.	1.7*	1.8*
K1.22	Compare effects of Samarium-149 on reactor operation with those of Xenon-135.	2.4*	2.4

REACTOR THEORY: 292007 Fuel Depletion And Burnable Poisons

		IMPORTANCE	
K/A NO.	KNOWLEDGE	RO	SRO
K1.01	Define burnable poison and state its use in the reactor.	2.9	3.1
K1.02	Describe and explain distribution of burnable poisons in the core.	1.8*	2.0*
K1.03	†Given a curve of K-effective versus core age, state the reasons for maximum, minimum, and inflection points.	2.4*	2.7

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Startup and Approach to Criticality		
K1.01	List parameters which should be monitored and controlled during the approach to criticality.	3.8	3.9*
K1.02	List reactivity control mechanisms which exist for plant conditions during the approach to criticality.	3.8	3.8
K1.03	Describe count rate and period response which should be observed for rod withdrawal during the approach to criticality.	4.1	4.0
K1.04	Relate the concept of subcritical multiplication to predicted count rate and period response for control rod withdrawal during the approach to critical.	3.3	3.4
K1.05	Explain characteristics to be observed when the reactor is very close to criticality.	4.3*	4.3*
	Criticality		
K1.06	List parameters which should be monitored and controlled upon reaching initial criticality.	4.2*	4.2
K1.07	Define criticality as related to a reactor startup.	3.9	3.9
K1.08	Describe reactor power and period response once criticality is reached.	4.1	4.1
	Intermediate Range Operation		
K1.09	List parameters which should be monitored and controlled during the intermediate phase of startup.	3.9*	3.9*
K1.10	Explain procedures for adjusting reactor period during the intermediate phase of startup.	3.6	3.6
K1.11	Discuss the concept of the point of adding heat (POAH) and its impact on reactor power.	3.7	3.8
K1.12	Describe reactor power and period response prior to reaching the POAH.	3.6	3.7
K1.13	Explain characteristics to look for when the POAH is reached.	3.8	3.9

REACTOR THEORY: 292008 Reactor Operational Physics

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	<u>Heatup Operation</u>		
K1.14	Describe three parameters to be monitored and controlled during heatup.	3.5	3.5
K1.15	Describe reactor power and period response after reaching the point of adding heat.	3.7	3.7
K1.16	Explain procedures for establishing and controlling heatup rate.	3.6	3.7
	<u>Power Operation</u>		
K1.17	Describe three parameters to be monitored and controlled during power operation.	3.6	3.6
K1.18	Describe means by which reactor power will be increased to rated power.	3.8	3.8
K1.19	Explain transient and steady-state effects of a control rod withdrawal on reactor power and void fraction content.	3.1	3.2
K1.20	Explain transient and steady-state effects of an increase in core flow on reactor power and void fraction.	3.3	3.4
K1.21	Explain the relationship between steam production rate and reactor power given specific conditions.	2.9	3.0
K1.22	Explain the effect that opening steam bypass valves, during power operation, will have on reactor power.	3.5	3.6
K1.23	†Explain the necessity for rod pattern exchanges.	2.6	3.1
K1.24	†Describe the parameters to be monitored and controlled during rod pattern exchanges.	2.8	3.2
	<u>Reactor Response on a Scram</u>		
K1.25	Explain the shape of a curve of reactor power versus time after a scram.	2.8	2.9
	<u>Normal Reactor Shutdown</u>		
K1.26	Explain reactor power response to a decrease in core flow.	3.4	3.7

REACTOR THEORY: 292008 Reactor Operational Physics

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.27	Explain reactor power response to a control rod insertion.	3.4	3.5
K1.28	Explain the necessity for inserting control rods in a predetermined sequence during normal shutdown.	3.4	3.7
K1.29	Define decay heat.	3.4	3.6
K1.30	Explain the relationship between decay heat generation and: a) power level history, b) power production, and c) time since reaction shut down.	3.2	3.5

6.2 THERMODYNAMICS
(CFR 41.14)

THERMODYNAMICS: 293001 Thermodynamic Units and Properties

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Convert between absolute and relative pressure and vacuum scales.	2.2*	2.3*
K1.02	Recognize the difference between absolute and relative temperature scales.	2.1*	2.1*
K1.03	Describe how common pressure and level sensing instruments work.	2.5*	2.7
K1.04	Explain relationships between work, power, and energy.	1.8*	1.9*

THERMODYNAMICS: 293002 Basic Energy Concepts

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Identify energy and work forms.	1.6*	1.7*
K1.02	Explain the law of conservation of energy.	1.9*	1.9*
K1.03	Explain the difference between state and phase of a working substance.	1.6*	1.7*
K1.04	Explain the application of enthalpy in the monitoring of plant processes.	2.1*	2.4*
K1.05	Identify the relationship between heat flow during a process and a T-s diagram representation of the process.	2.0*	2.2*
K1.06	Define specific heat.	1.8*	2.1*
K1.07	Apply specific heat in solving heat transfer problems.	1.5*	1.6*

THERMODYNAMICS: 293003 Steam

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Describe effects of pressure on density or specific volume of a liquid.	2.3*	2.4
K1.02	Distinguish between liquids, vapors, gases, and fluids.	2.2*	2.3*
K1.03	Define latent heat of vaporization	2.3	2.4
K1.04	Define vaporization line	2.0*	2.1*
K1.05	Define critical point	1.8*	1.8*
K1.06	Define vapor dome	1.8*	2.0*
K1.07	Define saturated liquid	2.7	2.8
K1.08	Define wet vapor	1.8*	1.9*
K1.09	Define saturated vapor	2.5*	2.6*
K1.10	Define vapor pressure	1.8*	1.9*
K1.11	Define moisture content	2.3*	2.3*
K1.12	Define quality	2.5	2.6
K1.13	Define superheated vapor	2.3*	2.4*
K1.14	Define supersaturated vapor	1.8*	1.8*
K1.15	Define subcooled and compressed liquids	2.4*	2.4*
K1.16	Define subcooling	2.8	2.8
K1.17	Define specific heat	1.9*	2.1*
	Identify the following terms on a T-s diagram:		
K1.18	--Critical point	1.7*	1.7*
K1.19	--Saturated liquid line	2.1*	2.2*
K1.20	--Saturated vapor line	2.2*	2.3*
K1.21	--Solid, liquid, gas, vapor, and fluid regions	2.1*	2.2*
K1.22	Explain the usefulness of steam tables to the Control Room Operator.	2.9	3.2
K1.23	Use saturated and superheated steam tables.	2.8*	3.1*

THERMODYNAMICS: 293004 Thermodynamic Processes

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Explain the relationship between real and ideal processes.	1.6*	1.7*
K1.02	Explain the shape of the T-s diagram process line for a typical boiler.	1.8*	1.9*
	<u>Nozzles</u>		
K1.03	Describe the functions of nozzles in flow restrictors.	2.2*	2.2*
K1.04	Describe the functions of nozzles in air ejectors.	2.5	2.6
K1.05	Describe the principles of operation of a jet pump	2.7	2.7
	<u>Turbines</u>		
K1.06	Explain the function of nozzles, fixed blading, and moving blading in the turbine.	1.9*	2.1*
K1.07	Explain the reason turbines are multistages.	2.1*	2.2*
K1.08	Define turbine efficiency.	2.0*	2.1*
K1.09	Explain the difference between actual turbine performance and ideal thermal efficiency.	1.7*	1.8*
	<u>Pumps</u>		
K1.10	Define pump efficiency.	1.8*	1.9*
K1.11	Explain the difference between ideal and real pumping processes.	1.7*	1.8*
	<u>Condensers</u>		
K1.12	Discuss subcooling.	2.9	3.1
K1.13	Explain vacuum formation in condenser processes.	2.5	2.6
K1.14	Explain the condensing process.	2.6	2.7
	<u>Throttling and the Throttling Process</u>		
K1.15	Define throttling.	2.2*	2.3*
K1.16	Explain the reduction of process pressure from throttling.	2.1*	2.3*

THERMODYNAMICS: 293005 Thermodynamic Cycles

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Define thermodynamic cycle.	1.7*	1.8*
K1.02	Define thermodynamic cycle efficiency in terms of net work produced and energy applied.	1.7*	1.7*
K1.03	Describe the moisture effects on turbine integrity and efficiency.	2.6	2.7
K1.04	Explain steam quality effects on nuclear turbine design.	2.3*	2.4*
K1.05	State the advantages of moisture separators/reheaters and feedwater heaters for a typical steam cycle.	2.7	2.8

THERMODYNAMICS: 293006 Fluid Statics

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	Distinguish between fluids and other substances.	1.7*	1.8*
K1.02	Distinguish between static pressure, dynamic pressure, and total pressure.	2.0*	2.2*
K1.03	Define head loss.	2.4	2.5
K1.04	Discuss operational considerations of viscosity as related to head loss.	1.7*	1.9*
K1.05	Explain operational implications of fluid hammer	3.2	3.3
	Pumps and Pump Characteristics		
K1.06	--State the purpose of a pump.	2.5*	2.6*
K1.07	--Discuss pump head.	2.5	2.6
K1.08	--Discuss relationship between pump speed, head, flow, and power without using formulas or calculations.	2.5	2.6
K1.09	--Define cavitation.	2.8	2.9
K1.10	--Define net positive suction head (NPSH).	2.7	2.8
K1.11	--Define pump shut-off head, pump runout, and axial thrust.	2.4	2.5
K1.12	--Explain the importance of proper system venting for pump operations.	2.9	2.9
K1.13	--Explain the results of putting centrifugal pumps in parallel or series combinations.	2.6	2.7
K1.14	--Given the characteristic curve for a typical centrifugal pump, explain the reason for its shape.	2.2*	2.3*
K1.15	--Using a centrifugal pump characteristic curve and a system characteristic curve, illustrate how the system operating point changes due to system changes.	2.3*	2.4*
K1.16	--Describe how a centrifugal pump characteristic curve will change with pump speed.	2.1*	2.3*
K1.17	--Explain how operating a centrifugal pump at shutoff head may cause overheating of the pump and describe methods used to avoid overheating.	2.6	2.7

THERMODYNAMICS: 293006 Fluid Statics

K/A NO.	KNOWLEDGE	IMPORTANCE RO	SRO
K1.18	--Discuss the characteristic curve for a typical positive displacement pump and explain the reason for its shape.	1.9*	2.1*
K1.19	--Describe the problems that will occur in emergency core cooling systems if the pumps are operated at lower than design flow for extended periods of time.	2.7	2.9
K1.20	Define or explain mass flow rate	2.4	2.4
K1.21	Define or explain two-phase flow	2.4*	2.6
K1.22	Define or explain pressure spike	2.2*	2.3*
K1.23	Define or explain gas binding	2.2*	2.3*
K1.24	Define or explain recirculation ratio	2.1*	2.3*
K1.25	Define or explain pipe whip	2.1*	2.2*
K1.26	Explain why flow measurements must be corrected for density changes.	2.3	2.4
K1.27	Explain the relationship between pressure head and velocity head in a fluid system.	1.8*	2.0*
K1.28	Discuss the velocity profiles for laminar flow and tubulent flow.	1.7*	1.8*
K1.29	Describe the methods of controlling system flow rates.	2.6	2.7

THERMODYNAMICS: 293007 Heat Transfer and Heat Exchanges

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Heat Transfer		
K1.01	Describe three mechanisms of heat transfer.	3.2	3.2
K1.02	Describe thermal conductivity.	2.4	2.6
K1.03	Explain the manner in which fluid films affects heat transfer.	2.7	2.8
	Heat Exchangers		
K1.04	Discuss parallel-flow heat exchangers.	1.9*	2.2*
K1.05	Discuss counter-flow heat exchangers.	2.0*	2.2*
K1.06	Discuss the factors which affect heat transfer rate in a heat exchanger.	2.7	2.8
K1.07	Describe how the presence of gases or steam can affect heat transfer and fluid flow in heat exchangers.	2.7	2.9
	Condenser Applications of Heat Transfer		
K1.08	List functions of the main condenser in a power plant.	3.0	3.1
K1.09	Discuss operational implications of condensate depression.	2.5	2.7
	Core Thermal Power		
K1.10	Define core thermal power.	2.7*	2.9*
K1.11	†Explain methods of calculating core thermal power.	2.6	3.1
K1.12	Define percent reactor power.	2.6*	2.7*
K1.13	†Calculate core thermal power using a simplified heat balance.	2.3*	2.9*

THERMODYNAMICS: 293008 Thermal Hydraulics

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
	Boiling Heat Transfer		
K1.01	Distinguish between boiling processes and other heat transfer mechanisms.	2.6	2.8
K1.02	Describe surface or cavity nucleation.	2.2*	2.3*
K1.03	List factors affecting bubble formation in a cavity.	1.9*	2.1*
K1.04	Describe means by which boiling improves convection heat transfer.	2.6	2.7
K1.05	Describe microconvection.	1.4*	1.5*
	Pool Boiling Curve (T vs. Q/A)		
K1.06	Define a natural convection heat transfer.	2.5	2.6
K1.07	Define nucleate boiling, subcooled nucleate boiling, and bulk boiling.	2.8	3.0
K1.08	Describe DNB (departure from nucleate boiling).	2.9	3.1
K1.09	Describe OTB (onset of transition boiling).	3.0	3.2
K1.10	Describe CHF (critical heat flux).	2.9	3.0
K1.11	Describe transition (partial film) boiling.	2.7	2.8
K1.12	Describe stable film boiling.	2.7	2.8
K1.13	Describe burnout and burnout heat flux.	2.3*	2.3*
	Two Phase Flow		
K1.14	Classify slug flow region along a fuel channel, experiencing two phase flow.	2.0*	2.1*
K1.15	Describe annular flow region along a hypothetical fuel channel, experiencing two phase flow.	2.2*	2.3
K1.16	Describe dryout region or mist flow region along a hypothetical fuel channel, experiencing two phase flow.	2.2*	2.3
K1.17	Describe OTB point along a hypothetical fuel channel, experiencing two phase flow.	2.5	2.8

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.18	Describe effects of flowrate and phase change on the heat transfer coefficient.	2.2*	2.4
	<u>Core Inlet Subcooling</u>		
K1.19	Define core inlet subcooling.	2.6	2.8
K1.20	Define carryunder.	2.4	2.6
	<u>Voids and Void Fraction</u>		
K1.21	Define void fraction.	3.0	3.0
K1.22	Explain the term void as applied to core operations	2.9	3.0
K1.23	Define qualilty	2.5	2.7
K1.24	Draw the temperature profile from the centerline of a fuel pellet to the centerline of the channel.	2.4	2.5
	<u>Recirculation System</u>		
K1.25	Explain the reason for forced core recirculation.	3.2	3.2
K1.26	Explain the jet pump operating principle.	2.9	3.1
K1.27	Explain the necessity of determining core coolant flow.	2.9	3.0
K1.28	Describe the factors affecting single- and two-phase flow resistance.	2.3*	2.5*
	<u>Core Orificing</u>		
K1.29	Describe the effects of increasing bundle power on bundle flow resistance.	2.8	3.0
K1.30	Compare the flow resistance through high powered bundles to that of low powered bundles.	2.7	2.7
K1.31	Explain the necessity of core orificing.	2.9	3.0
K1.32	Describe core bypass flow.	2.5	2.6
K1.33	Explain the need for adequate core bypass flow.		
	<u>Natural Circulation</u>	2.4	2.6

		IMPORTANCE	
K/A NO.	KNOWLEDGE	RO	SRO
K1.34	Explain the causes of natural circulation in BWR's.	2.9	3.1
K1.35	Describe problems that thermal stratification can cause.	3.1	3.3
K1.36	Describe means by which the operator can determine if natural circulation flow exists.	3.1	3.3
K1.37	Describe means by which the operator can enhance natural circulation.	3.2	3.4
	Sketch the axial temperature and enthalpy profiles for a typical reactor coolant channel and describe how they are affected by the following:		
K1.38	--Onset of nucleate boiling	1.8*	2.1*
K1.39	--Axial core flux	1.8*	1.9*
K1.40	--Inlet temperature	1.8*	1.9*
K1.41	--Heat generation rate	1.8*	2.0*
K1.42	--Flow rate in the channel	1.8*	1.9*
K1.43	Sketch the temperature profile in the axial and radial directions for a typical fuel rod and explain the reason for its shape.	2.0*	2.2*

THERMODYNAMICS: 293009 Core Thermal Limits

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	†Explain radial peaking factor (RPF)	2.1*	2.5*
K1.02	†Explain axial peaking factor(APF)	2.2*	2.6
K1.03	†Explain local peaking factor(LPF)	2.1*	2.5*
K1.04	†Explain total peaking factor(TPF)	2.2*	2.6
K1.05	State the reason thermal limits are necessary.	3.3	3.5
	<u>LHGR</u>		
K1.06	†Define LHGR.	3.4	3.8
K1.07	†Explain the basis of the limiting condition of LHGR.	2.8	3.6
K1.08	†Describe the mode of fuel failure for LHGR.	3.0	3.4
K1.09	†Define FLPD and MFLPD.	3.1	3.7
	<u>MAPLHGR</u>		
K1.10	†Define APLHGR	3.3	3.7
K1.11	†Explain the basis of the limiting condition for APLGHR.	2.8	3.6
K1.12	†Describe the mode of fuel failure for APLHGR.	2.9	3.5
K1.13	†Define MAPLHGR	3.1	3.6
K1.14	†Explain the mechanisms most limiting for each region of the MAPLHGR limit curves.	2.2*	2.7
K1.15	†Describe conditions under which radiative heat transfer becomes the significant method of heat transfer within a fuel bundle.	2.6	3.1
K1.16	†Discuss how changes in the heat generation rate and thermal conductivity of the fuel rod affect fuel centerline temperature	2.4	2.8
	<u>MCPR</u>		
K1.17	†Define critical power.	3.3	3.7
K1.18	†Define critical power ratio.	3.2	3.7

THERMODYNAMICS: 293009 Core Thermal Limits

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.19	†Explain the basis of the limiting condition for CPR.	2.8	3.6
K1.20	†Describe the mode of fuel failure for CPR.	3.1	3.6
K1.21	†Define MCPR.	3.1	3.6
K1.22	†Describe the effects of subcooling on critical power.	2.9	3.3
K1.23	†Describe the effects of mass flow on critical power.	2.8	3.2
K1.24	†Describe the effects of pressure on critical power.	2.7	3.2
K1.25	†Describe the effects of local power distribution on critical power.	2.7	3.2
K1.26	†Describe the effects of axial power distribution on critical power.	2.6	3.1
K1.27	†Explain the purpose of the flow biasing correlation factor, (K), as it relates to MCPR limits.	2.7	3.3
K1.28	†Define FLCPR.	3.0	3.5
	<u>Thermal Time Constant</u>		
K1.29	Define fuel thermal time constant.	2.4*	2.7
K1.30	†Relate thermal time constant to transient operating condition.	2.3	2.7
	<u>Pellet Clad Interaction</u>		
K1.31	Describe pellet-clad interaction (PCI).	3.0	3.4
K1.32	List the causes of PCI.	2.9	3.3
K1.33	Describe the purpose of the pellet to clad gap.	2.4	2.8
K1.34	Identify the possible effects of fuel densification.	2.3*	2.6
K1.35	Describe the effects of iodine and cadmium on PCI.	2.2*	2.6*
	<u>PCIOMR</u>		
K1.36	†Explain the purpose for PCIOMR (Plant Specific).	2.8	3.4

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.37	†Identify how the PCIOMR rules minimize the adverse effects of PCI (Plant Specific).	2.6	3.3
K1.38	†State the items measured for each of the three core thermal limits.	2.7	3.1
	<u>For the following plant operating or accident conditions, identify which of the three core thermal limits are most limiting</u>:		
K1.39	Full power operation	2.8	3.2
K1.40	Loss of reactor coolant	2.8	3.3
K1.41	Increase in core flow	2.8	3.3
K1.42	Increase in reactor pressure	2.8	3.3
K1.43	Cold water addition	2.9	3.4

THERMODYNAMICS: 293010 Brittle Fracture and Vessel Thermal Stress

K/A NO.	KNOWLEDGE	IMPORTANCE RO	IMPORTANCE SRO
K1.01	State the brittle fracture mode of failure.	2.4*	2.8
K1.02	†State the definition of Nil-Ductility Transition Temperature.	2.2*	2.7
K1.03	Define reference temperature.	2.0*	2.5
K1.04	†State how the possibility of brittle fracture is minimized by operating limitations.	2.9	3.2
K1.05	†State the effect of fast neutron irradiation on reactor vessel metals.	2.5	2.8

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This document provides the basis for the development of content-valid licensing examinations for reactor operators and senior reactor operators. The examinations developed using the BWR catalog will cover those topics listed under Title 10, Code of Federal Regulations, Part 55. The BWR catalog contains approximately 7,000 knowledge and ability (K/A) statements for reactor operators and senior reactor operators. Each K/A statement has been rated for its importance to safe operation of the plant in a manner ensuring personnel and public health and safety. The BWR K/A caltalog is organized into six major sections: Organization of the Catalog; Plant Wide Generic Knowledge and Abilities; Plant Systems Grouped by Safety Functions; Emergency and Abnormal Plant Evolutions; Components; and Theory

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