Your Role In Operator Fundamentals

FUNDAMENTAL	Non-Licensed Operator	Licensed Operator	Shift Technical Advisor or Equivalent	Control Room Supervisor	Shift Manager
Monitoring	• Perform detailed rounds to detect actual or potential problems that could hamper plant operation, being attentive to all equipment, not just what logs require. • Identify degrading parameter and equipment trends. • Monitor parameters at a frequency based on their importance and historical equipment performance. • Validate parameters through multiple independent means, if available, avoiding undue focus on any single indicator.	• Monitor plant parameters at a frequency based on their importance. • Maintain awareness of critical parameter status. • Identify degrading parameter and equipment trends. • Verify and report automatic system actuations or response, which includes operator actions if the plant has not responded as expected. • Increase the frequency of monitoring key parameters during transients. • Believe your indications and use multiple independent means to validate parameter status, prior to initiating action.	• Provide “eyes on” monitoring and oversight for reactivity changes and transients. • Maintain broad awareness of all parameters to prevent integrated plant operating problems.	• Ensure effective plant monitoring by operators. • Perform control board walkdowns. • Maintain high levels of professionalism in the control room to minimize distractions to operators. • Track degraded and inoperable technical specification and other equipment important to safe and reliable plant operations. • Establish increased monitoring for disabled alarm functions, as appropriate.	• Ensure equipment used to monitor plant is functioning properly. • Know the status of the plant, key activities, and current risks. • Maintain oversight of plant and crew response during transient and emergency conditions. • Frequently monitor crew response and performance to ensure highest standards of excellence in performance.
Control	• Operate equipment with approved procedures, clearances, or other documents as appropriate to maintain proper configuration control and reduce the potential for operational events. • Anticipate the impact of component operation prior to its operation, and then verify that the expected effects occur during and following the operation. • Maintain systems and parameters within established limits to ensure that systems are not operated outside of the intended design and that operating margins are not eroded. • Prepare for operational evolutions to ensure that the effects of actions are understood and that abnormal conditions can be addressed. • Aggressively identify incorrect or inadequate procedures. • Apply human performance tools effectively when operating plant equipment. • Know which steps result in undesirable consequences if not performed correctly. • Ensure changes in system status are logged to help ensure that others understand the changes in plant conditions over time.	• Use detailed operating guidance when changing reactivity, operational modes, and system alignments, and be deliberate and careful with your actions. • Use one method at a time when making reactivity changes. • Maintain systems and parameters within established limits to ensure that systems are not operated outside of the intended design and that operating margins are not eroded. • Aggressively identify incorrect or inadequate procedures. • Know which steps result in undesirable consequences if not performed correctly. • Apply human performance tools effectively when operating plant equipment. • Anticipate the impact of component operation prior to its operation, and then verify that the expected effects occur during and following the operation. • Use sound judgment when deciding to take manual actions prior to automatic actions in response to parameter trends. • Take manual actions (in accordance with procedure direction, if available) when automatic actions do not occur. • Log changes in system status to help ensure that others understand the changes in plant conditions over time.	• Independently assess proper plant response to planned and unplanned reactor and thermal power changes. • Independently assess operator control of and response to planned and unplanned reactor and thermal power changes. • Provide technical advice to ensure the plant is operated in accordance with its design and procedures.	• Provide direction for implementation of normal and emergency operating procedures. • Establish limits for systems and parameters to ensure that systems are not operated outside of the intended design and that operating margins are not eroded. • Provide operators with specified rates when changing system parameters. • Set limits, establish supplemental monitoring, and identify contingency actions when operating automatic systems in manual. • Ensure core criticality predictions are determined and independently verified to be accurate before reactor startups. • Ensure reactivity and mode changes are directed by detailed operating procedures or approved reactivity plans to prevent errors and misunderstandings. • Ensure reactivity changes are made in a deliberate, carefully controlled manner. • Ensure that operators understand the how and why of their actions before they are performed. • Ensure that operators apply human performance tools effectively when they operate plant equipment. • Ensure operators maintain accurate and detailed logs to provide a history of plant changes and to allow reconstruction of events.	• Provide oversight for implementation of normal, abnormal, and emergency operating procedures. • Ensure reactor startups and reactivity changes are performed with clear guidance and deliberate caution, especially during approach to criticality. • Implement the site emergency plan while maintaining overview of changing plant conditions. • Establish correct priorities and focus for the crew and the station. • Intervene as necessary to ensure proper monitoring and control of the plant. • Ensure plans for reactivity changes are reviewed and approved by appropriate station and shift operations management. If plant conditions delay planned power changes, the reactivity plan is checked and revised as necessary to meet the new plant conditions.

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Conservatism	• Question conditions and situations that are out of the ordinary, unexpected, or that could erode margins to operating the plant conservatively, and resolve before continuing. • Maintain system design margins, do not wait to reach limits, and get supervision involved early. • Understand plant conditions and know the appropriate action to take when control of the plant or component cannot be maintained, including stopping the evolution and involving supervision. • Maintain nuclear safety as your overriding priority. • Maintain a low threshold for identifying problems.	• Avoid adding positive reactivity, especially by withdrawing control rods, in response to plant transients due to equipment failure and similar events. • Understand plant conditions and know the appropriate action to take when control of the plant or component cannot be maintained, including stopping the evolution, involving supervision, tripping the component, and scramming the reactor. • Question conditions and situations that are out of the ordinary, unexpected, or that could erode margins to operating the plant conservatively, and resolve before continuing. • Seek reasons for unexpected trends, and anticipate how unexpected trends may affect plant status or operation.	• Provide independent assessment of those activities that impact or have the potential to impact safety functions. • Discourage the addition of positive reactivity (especially by withdrawing control rods) in response to plant transients.	• Establish clear termination criteria for evolutions that involve reactivity. • Ensure that reactivity changes have increased oversight. • Ensure control room activities are conducted in a deliberate and careful manner. • Ensure that contingency plans are understood prior to executing evolutions where there is increased likelihood for an operational event, and establish and reinforce preestablished action criteria. • Ensure that inconsistencies and discrepancies identified in core predictions are thoroughly evaluated and resolved before the reactor is taken critical. • Ensure that margins to an undesirable state are maintained. • Ensure equipment needed to support effective plant operation is available and operating properly. • Question station activities and personnel work practices that jeopardize control of the plant.	• Give highest priority to nuclear safety – ensure readiness and understanding when proceeding with infrequent, elevated risk, or abnormal conditions. • Demonstrate safety over production through decisions and actions. • Maintain margin for key safety functions. • Understand the risk profile for the existing plant configuration, including the collective risk of having multiple, diverse components out of service. • Ensure actions are based on sound operational principles, not solely on compliance with rules. • Reinforce the need for conservative decision-making related to the operation of the reactor with every qualified operator frequently. • Ensure that operators understand that when faced with unexpected or uncertain conditions, place the plant in a safe condition, and do not hesitate to reduce power or scram the reactor. • Avoid waving administrative limits for reactivity control in order to achieve schedule efficiency.
Teamwork	• Notify the CR staff prior to initiating and upon completion of actions that affect control room parameters. • Ensure the CR authorizes/is aware of plant manipulations. • Ask questions to obtain necessary information. • Advocate your position when an action is being taken that appears inappropriate or not expected for given conditions. • Understand your role when performing coordinated evolutions. • Perform accurate and detailed shift turnovers, including changes in system alignments and component status to ensure that oncoming operators are aware of plant status.	• Communicate the status of parameters to the operating crew when needed by describing the parameter, its value, trend and action needed or taken. • Advocate your position when an action is being taken that appears inappropriate or not expected for given conditions. • Ask questions to obtain necessary information. • Understand your role when performing coordinated evolutions. • Perform accurate and detailed shift turnovers, including changes in system alignments and component status to ensure that oncoming operators are aware of plant status. • Coordinate field and control room activities to achieve intended results.	• Maintain an independent perspective from the operating crew. • Challenge the operating crew with alternatives and candid discussions. • Advocate for operating the plant within system design margins. • Be the “conscience” for the core and for critical safety functions.	• Lead the control room crew by teaching and reinforcing the application of operator fundamentals. • Maintain effective command and control: • Use available resources thoughtfully to ensure operators take actions according to priorities to mitigate an event. • Stay in role and maintain a broad overview of a transient or evolution and avoid becoming overly involved in the performance of a single task. • Oversee core reactivity changes such as control rod motion, core flow changes, significant steam flow changes, chemical additions or dilutions. • Refrain from allowing concurrent tasks that could distract operators during reactivity manipulations. • Perform briefings and updates to keep crewmembers aware of plant conditions and upcoming operations. • Manage activities to prevent crew overload or distraction.	• Demonstrate strong leadership by setting high standards for operators and site personnel. • Ensure that activities are managed to prevent crew overload or distraction. • Model excellence in behaviors and leadership, especially regarding nuclear safety. • Be critical of team performance to improve team performance. • Solicit challenge and diverse opinions and resolve conflicts to achieve the best solutions and improve the effectiveness of the team. • Consistently correct and coach gaps with candid feedback. • Ensure that operators with little or no reactor startup experience are specifically monitored during reactivity manipulations. • Communicate operational impacts and priorities clearly.

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Knowledge	• Maintain integrated plant knowledge. • Understand the how and why of your actions prior to proceeding. • Understand system and component purposes and design. • Before operating a component, confirm an understanding of its function and interactions with other components. • Regularly review system drawings and diagrams with the intention of refreshing basic knowledge.	• Understand how core reactivity coefficients vary with core life and the actions you can implement to properly control the reactor, giving special attention to coefficients that add positive reactivity. • Observe a reactor startup on the unit that you will be operating prior to taking the reactor critical your first time. • Identify and practice using the appropriate reactor and plant indications to monitor core reactivity during training. • Maintain integrated plant knowledge. • Understand the how and why of your actions prior to proceeding. • Understand system and component purposes and design. • Before operating a component, confirm an understanding of its function and interactions with other components. • Regularly review system drawings and diagrams with the intention of refreshing basic knowledge.	• Understand design and technical specification bases. • Understand nucleonics, fuel/core design, and reactor engineering fundamentals, including fundamental reactor theory on core poisons, how they are produced or consumed in the reactor, and how reactor power changes and core age affect core poison concentrations. • Understand how core reactivity coefficients vary with core life and the actions that can be implemented to properly control the reactor. • Maintain in-depth understanding of plant equipment, systems, and emergency operating procedures and the associated bases.	• Ensure that operators conducting reactivity manipulations have been properly trained. • Ensure that personnel understand their roles and responsibilities prior to performance of plant activities. • Maintain integrated plant knowledge. • Understand system and component purposes and design. • Understand how core reactivity coefficients vary with core life and the actions you can implement to properly control the reactor, giving special attention to coefficients that add positive reactivity. • Establish a learning environment among crewmembers and encourage questioning, challenging, and knowledge reviews. • Regularly review system drawings and diagrams with the intention of refreshing basic knowledge.	• Be accountable for training and qualification of operations personnel. • Use training to improve performance. • Ask for simulator scenarios that challenge fundamental knowledge of plant design, engineering principles, and sciences. • Verify plant design, engineering principles, and sciences are covered in operator continuing training. • Regularly evaluate crewmember knowledge of plant design, engineering principles, and sciences. • Establish a learning environment among crewmembers and encourage questioning, challenging, and knowledge reviews.