		Number: EA CRAD 31-39 Revision: 0 Effective Date: October 14, 2021 Latest Review: Not applicable
Review of Conduct of Operations Criteria and Review Approach Document		
Authorization and Approval	Kevin M. Witt Digitally signed by Kevin M. Witt Date: 2021.10.14 14:20:51 -04'00' Kevin M. Witt Director, Office of Nuclear Safety and Environmental Assessments, EA-31	Tamara D. Powell Digitally signed by Tamara D. Powell Date: 2021.10.14 14:06:03 -04'00' Lead, Tamara D. Powell Nuclear Engineer, Office of Nuclear Safety and Environmental Assessments, EA-31

1.0 PURPOSE

The mission of the U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments (EA-30) is to assess the effectiveness of safety and emergency management systems and practices used by line and contractor organizations and to provide clear, concise, rigorous, and independent evaluation reports of performance in protecting workers, the public, and the environment from the hazards associated with DOE activities.

In addition to the general independent oversight requirements and responsibilities specified in DOE Order 227.1A, *Independent Oversight Program*, this criteria review and approach document (CRAD), in part, fulfills the responsibility assigned to EA in DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, to conduct independent appraisals of high consequence activities. This CRAD specifically provides objectives, criteria, lines of inquiry, and review approaches to assess Conduct of Operations (ConOps) under DOE Order 422.1, *Conduct of Operations*, at DOE sites.

The CRADs are available to DOE line and contractor assessment personnel to aid them in developing effective DOE oversight, contractor self-assessment, and corrective action processes. The current revision of EA's CRADs are available at http://www.energy.gov/ea/criteria-and-review-approach-documents.

This CRAD supersedes EA CRAD 30-02, revision 0.

2.0 APPLICABILITY

The following CRAD is approved for use by the Office of Nuclear Safety and Environmental Assessments (EA-31).

3.0 FEEDBACK

Comments and suggestions for improvements on this CRAD can be directed to the Director, Office of Nuclear Safety and Environmental Assessments.

4.0 CRITERIA REVIEW AND APPROACH

The review of ConOps programs at DOE facilities and projects will evaluate the effectiveness of formal documentation, practices, and actions in place to implement disciplined and structured operations that support mission success and promote worker, public, and environmental protection. The goal of a ConOps program is to minimize the likelihood and consequences of human fallibility or technical and organizational system failures.

The following objectives are designed as stand-alone sections to be used in any combination as needed for the specific assessment. Additionally, the contractor's approved ConOps Matrix, consistent with the requirements of DOE Order 422.1, should be requested and consulted. Users can also refer to DOE-HDBK-1226, *Conduct of Operations Implementation*, for supplemental information, explanations, examples, and background to support evaluation of operations as described in DOE Order 422.1.

The objectives, criteria and lines of inquiry are supported by the following orders, standards, and handbooks (specific subsections are specified below in the objectives):

- DOE Order 422.1 Chg 3, *Conduct of Operations*
- DOE-HDBK-1226-2019, *Conduct of Operations Implementation*

OBJECTIVES

CO.1: The operator has established the policies, programs, and procedures that define an effective operations organization. (DOE Order 422.1, Attachment 2, Criteria 2.a.)

Criteria:

1. The operator has established and implemented the organizational roles, responsibilities, authority, and accountability. (DOE Order 422.1, Attachment 2, Criteria 2.a.(1))
2. The operator has established and implemented the adequate material and personnel resources to accomplish operations. (DOE Order 422.1, Attachment 2, Criteria 2.a.(2))
3. The operator has established and implemented the monitoring and self-assessment of operations. (DOE Order 422.1, Attachment 2, Criteria 2.a.(3))
4. The operator has established and implemented the management and worker accountability for the safe performance of work. (DOE Order 422.1, Attachment 2, Criteria 2.a.(4))
5. The operator has established and implemented the management training, qualification, succession, and, when appropriate, certification. (DOE Order 422.1, Attachment 2, Criteria 2.a.(5))
6. The operator has established and implemented the methods for the analysis of hazards and implementation of hazard controls in the work planning and execution process. (DOE Order 422.1, Attachment 2, Criteria 2.a.(6))

7. The operator has established and implemented the methods for approving, posting, maintaining, and controlling access to electronic operations documents (procedures, drawings, schedules, maintenance actions, etc.) if electronic documents are used. (DOE Order 422.1, Attachment 2, Criteria 2.a.(7))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do written policies state goals for operations, safety, and security, the means to achieve them, and the controls instituted for the Conduct of Operations Program? • Do policies and procedures implement DOE requirements for operations? • Do policies and procedures implement DOE safety requirements? • Do policies and procedures implement DOE security requirements? • Are personnel and organizations assigned responsibilities for implementing policies? • Do policies clearly define operations personnel authority, accountability, and relationships with other groups, including Stop-Work authority? • How are policies, goals, expectations, and standards communicated to operations personnel?
2	• Are sufficient qualified operators available to complete assigned tasks without excessive overtime? • Are adequate technical personnel assigned to support operations? • Are staff development, retention, and succession managed under a long-range staffing plan? • Are adequate material, tooling, equipment, safety gear, and facilities available for safe operations?
3	• Are operating problems documented and evaluated, and are corrective actions taken? • Do supervisors and managers directly observe operations frequently and provide feedback? • Do appropriate outside organizations such as Quality Assurance or other oversight organizations observe operations and provide feedback? • Are assessment and observation issues tracked and corrected? • Are auditable, measurable, realistic, and challenging safety, environmental, and operations goals set? Examples are safety system operability; radiological or other exposure; facility operational availability; unscheduled shutdowns; overtime; staffing; qualification, and training; waste production; and plant instrumentation alarms and warnings. • Do facilities develop an action plan to achieve safety, environment, and operations goals with input from operations personnel, and review and approval by management? • Do facilities monitor and report to line and DOE management their progress on completing the action plan and achieving goals? Are goals and plans adjusted and modified as needed?
4	• Are management systems designed to minimize the effects of human performance failures? • Are personnel involved in repeated or willful violations of operating practices counseled, retrained, or disciplined as appropriate? • Are personnel recognized for notable safety improvement actions or ideas? • Do supervisory performance appraisals and promotions take operational and safety performance into consideration?
5	• Is formal supervisory and management training provided for first line and shift supervisors? • Are development, qualification, retention, and succession for supervisors managed under a long-range staffing plan? • Do supervisors achieve certification when required for their duties?

6	• Is the DOE Integrated Safety Management System used to plan work? • Are operations personnel trained in, and understand, integrating safety into work planning?
7	• Does management approve electronic document accessibility on both internal and public computer systems, considering security and privacy concerns? • Do procedures define the methods and positions responsible for approving, revising, and posting electronic documents?

CO.2: The operator has established and implemented operations practices to ensure that shift operators are alert, informed of conditions, and operate equipment properly. (DOE Order 422.1, Attachment 2, Criteria 2.b.)

Criteria:

1. The operator has established and implemented the prompt notification to operating personnel and supervisors of changes in the facility status, abnormalities, or difficulties encountered in performing assigned tasks. (DOE Order 422.1, Attachment 2, Criteria 2.b.(1))
2. The operator has established and implemented the adherence by operating personnel and other workers to established safety requirements. (DOE Order 422.1, Attachment 2, Criteria 2.b.(2))
3. The operator has established and implemented the awareness by operating personnel of the status of equipment through inspection, conducting checks, and tours of equipment and work areas. (DOE Order 422.1, Attachment 2, Criteria 2.b.(3))
4. The operator has established and implemented the procedures for completing round sheets or inspection logs, responding to abnormal conditions, and periodic supervisory reviews of round sheets or inspection logs. (DOE Order 422.1, Attachment 2, Criteria 2.b.(4))
5. The operator has established and implemented the procedures for protecting operators from personnel hazards, e.g., chemical, radiological, laser, noise, electromagnetic, toxic, or nano-scale materials. (DOE Order 422.1, Attachment 2, Criteria 2.b.(5))
6. The operator has established and implemented the prompt response to instrument indications, including the use of multiple indications to obtain parameters. (DOE Order 422.1, Attachment 2, Criteria 2.b.(6))
7. The operator has established and implemented the procedures for resetting protective devices. (DOE Order 422.1, Attachment 2, Criteria 2.b.(7))
8. The operator has established and implemented the authorization to operate facility equipment. (DOE Order 422.1, Attachment 2, Criteria 2.b.(8))
9. The operator has established and implemented the designating shift operating bases and the shift operating base are provided the necessary equipment and supplies. (DOE Order 422.1, Attachment 2, Criteria 2.b.(9))
10. The operator has established and implemented the professional and disciplined operator performance of duties. (DOE Order 422.1, Attachment 2, Criteria 2.b.(10))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do supervisors and operators keep each other informed of facility status changes, abnormalities, or difficulties? • Do operators keep supervisors informed of unexpected situations? • Do operators keep control rooms and central monitoring rooms informed of status changes, abnormalities, or difficulties?
2	• Do operators comply with safety programs, e.g., industrial, chemical, explosive, pressure, temperature, confined space, or others applicable to the facility?

	• Do operators use proper personal protective equipment (PPE)? • Do operators use ladders or other approved means for overhead access in the absence of permanent ladders or catwalks? • Do operators refrain from climbing or walking on components? • Do operators use appropriate electrical safety procedures?
3	• Do operators regularly tour their assigned areas on a frequency determined by management, normally early in each shift? Are tours thorough enough to provide detailed equipment status? • Do routine security concerns not override tour responsibilities? • Do operators inspect equipment status and condition during tours for proper operation, operability of standby equipment, and any work planned or in progress? • Do operators recognize, document, and report abnormal conditions and take action to correct the conditions? Examples include leaks, out of specification readings, abnormal trends, fire or safety hazards, clogged drains, cleanliness issues, or building deficiencies. • Do operators periodically check alarm and annunciator functionality?
4	• Does management approve round sheets, including frequency and time of instrument readings and allowable delay (normally one hour or less)? • Do round sheets cover the operator's area and equipment parameters; and do data entry blocks follow the tour route? • Do round sheets provide normal, and max/min expected equipment instrumentation readings where appropriate? • Do round sheets provide safety limits where appropriate? • Are data readings outside the normal or max/min range circled or otherwise highlighted and reported to the supervisor? Do operators, and supervisors when appropriate, take corrective action to restore proper function? • Do operators make narrative records of important events, abnormal conditions, and corrective actions, on round sheets or logbooks? • Are data entries on round sheets made at the specified time? If readings are delayed beyond the allowable range, are the actual time and explanation for the delay recorded? • Do supervisors review round sheets for trends, abnormalities, and proper data and narrative entries during each shift? • Do supervisors periodically monitor operator rounds for proper execution and for any changes needed for changed facility conditions?
5	• Are operators appropriately qualified for expected hazards and do they know protection practices to maintain personnel exposure as low as reasonably achievable and within facility controls for radiation, chemicals, electromagnetic fields, toxic materials, and other personnel hazards? • Do operators comply with all posted personnel protection requirements and precautions? • Do operators properly use appropriate monitoring instruments when required? • Do operators remain aware of their radiological, toxic, or other exposures and take action to minimize them? • Do operators properly use appropriate administrative controls such as work permits, radiological work permits, and confined space permits? • Do operators promptly report and take corrective action for radiological or hazardous material protection deficiencies? • Do operators and supervisors notify protection personnel prior to activities that affect the protection status? (Industrial Hygiene, Radiological, etc.) • Do supervisors periodically review exposure trends of operators to detect and correct adverse factors that contribute to personnel exposures?

6	• Do operators believe their indications unless proven otherwise? • Do operators check other indicators, when possible, to confirm unexpected readings? • Do operators take prompt action to investigate and correct abnormal conditions and trends? • Do operators identify inaccurate or malfunctioning instruments and inform appropriate supervisors and repair organizations?
7	• Do operators attempt to determine the cause of protective device trips? (Breakers, fuses, relief valves, safety systems, etc.) • Do supervisors and management provide guidance on addressing protective device trips? Normally, are devices reset only after assuring that no abnormal condition exists that would cause a trip? • Does management investigate protective system trips and unplanned shutdowns?
8	• Do designated supervisors direct the overall operation of the facility, including load changes? • Do personnel operating equipment have appropriate qualification and certification? • Are operators and supervisors aware of all activities affecting equipment? • Does management designate routine operations that do not require permission for performance? • Do supervisors approve non-routine operation of facility or process controls? • During emergencies, do operators take immediate actions for worker, public, and environmental protection without permission? In such cases, do operators inform supervisors promptly? • Do operators achieve plant safety over production for normal, emergency, and abnormal operations?
9	• Are shift operating bases, the normal location for operator(s) when not otherwise performing evolutions, established for all feasible shift positions? • Are shift operating bases equipped with communications, references, and office materials and equipment needed for facility operations, and are they conveniently located within the operating area? • Do shift turnovers normally occur at the operating base and do operators return there when not performing operations at equipment locations or touring?
10	• Are potential distractions such as electronic devices (radio, TV, music players, games), personal telephone calls, game playing, and horseplay prohibited? • Are non-work-related written materials prohibited? Operators may read training bulletins, technical manuals, or operating experience information or review other written, audible, or visual materials that relate to operator duties. • Do supervisors ensure operators' primary duties are not compromised and do they provide guidance on potentially distracting materials and devices? • Do operators monitor equipment leaks and installed leak collection devices with a goal to minimize leaks and maximize time to leak repairs? • Do operators monitor the number and aging of out of specification log readings with a goal to minimize out of specification readings and maximize time to correct the out of specification conditions? • Do operators monitor the incidence of unauthorized system modifications to include attached hoses and or unauthorized system cross connects?

CO.3: The operator has established and implemented operations practices that promote orderly, business-like control area operations. (DOE Order 422.1, Attachment 2, Criteria 2.c.)

Criteria:

1. The operator has established and implemented control area access. (DOE Order 422.1, Attachment 2, Criteria 2.c.(1))
2. The operator has established and implemented the formality and discipline in the control and at-the-controls area. (DOE Order 422.1, Attachment 2, Criteria 2.c.(2))
3. The operator has established and implemented the surveillance of control panels and timely response to determine and correct the cause of abnormalities/out-of-specification conditions. (DOE Order 422.1, Attachment 2, Criteria 2.c.(3))
4. The operator has established and implemented the limitation of the number of concurrent evolutions and duties. (DOE Order 422.1, Attachment 2, Criteria 2.c.(4))
5. The operator has established and implemented the authorization to operate control area equipment. (DOE Order 422.1, Attachment 2, Criteria 2.c.(5))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are control areas and at-the-controls areas clearly identified and are boundaries understood? • Is control area access limited to persons on official business only? Is access to the at-the-controls area further limited to persons who need to be in the area? • Is entry to control and at-the-controls areas granted by designated persons whose identity and/or position is known to persons desiring entry?
2	• Do all persons in the area display professional and disciplined behavior? Are only activities essential to operations and authorized by management permitted in the area? • Are potential distractions such as electronic devices (radio, TV, music players, games), personal telephone calls, game playing, and horseplay prohibited? • Are non-work-related discussions minimized?
3	• Are operators alert and attentive to control panel indicators and alarms and do they monitor panels frequently? • Do operators closely monitor indications and conditions, and trend them to detect problems early? • Are concurrent operations that affect control panel indications limited, so that operators' ability to detect and respond to abnormal conditions is not compromised? • Are operators ready to take backup control of automated or computer systems?
4	• Are operator ancillary duties limited to prevent interference with monitoring control panel indicators and alarms? • Is it true that tasks such as tagouts, work authorizations, procedure reviews, maintenance, or required reading do not constitute a major portion of operators' shift responsibilities? • Is control panel operator administrative workload minimized? Do other operators continue monitoring when one operator has necessary administrative work?
5	• Is operation of control area equipment performed only by persons specifically authorized in writing? • Do trainees operating control area equipment do so only under the direct supervision of the normally assigned operator? • Are unauthorized operator aids, to include uncontrolled copies of drawings, procedures, and lists, prohibited in the control room? • Are existing operator aids controlled and periodically reviewed? • Does operations management routinely perform observations of control room activities?

	• Does operations management assess the aggregate impact of off-normal conditions on control room operators? Such off-normal conditions include but are not limited to out of spec readings, caution tags, out-of-service equipment, temporary procedures, system impairments, temporary modifications, and locked in control room alarms.

CO.4: The operator has established and implemented operations practices that ensure accurate, unambiguous communications among operations personnel. (DOE Order 422.1, Attachment 2, Criteria 2.d.)

Criteria:

1. The operator has established and implemented the provision of communications systems for emergency and normal operations. (DOE Order 422.1, Attachment 2, Criteria 2.d.(1))
2. The operator has established and implemented the administrative control of communications equipment, including authorization to use the public address system and allowable locations and purposes for radio use. (DOE Order 422.1, Attachment 2, Criteria 2.d.(2))
3. The operator has established and implemented the methods for control areas to contact operators and supervisors. (DOE Order 422.1, Attachment 2, Criteria 2.d.(3))
4. The operator has established and implemented the use of abbreviations and acronyms. (DOE Order 422.1, Attachment 2, Criteria 2.d.(4))
5. The operator has established and implemented the use of oral instructions and communications, including use of repeat-backs and sender/receiver identifications. (DOE Order 422.1, Attachment 2, Criteria 2.d.(5))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are all facility personnel promptly alerted to facility emergencies? • Are communications systems in place to support normal operations? • Are alternate methods provided for areas where public address or emergency signals cannot be heard? • Are communications systems periodically tested? • Can control areas override other communications system users for emergencies?
2	• Is public address system use controlled to maintain its effectiveness and prevent it becoming commonplace? • Are point-to-point communications the preferred method wherever practical? • Is radio usage controlled to prevent electronic interference with facility equipment? Are radio-prohibited areas defined and marked? • Are radio frequency or channel assignments controlled and readily available to users? • Where appropriate, are dedicated radio or pager channels assigned to specific functions such as emergency communications or security?
3	• Do policies define how to notify operators or supervisors to contact the control area? • Are emergency and normal notification methods distinctive?
4	• Are acronyms and abbreviations developed and promulgated for oral and written communications? • Are only approved abbreviations and acronyms allowed/required to be used?
5	• Do policies require clear and concise oral communications? • Do policies define when repeat-backs are appropriate and how they are implemented?

	• Do policies define protocols for transmitting information and identifying senders and receivers? • Are backup and emergency communication systems availability measured? • Are all control room operators familiar with the use of backup and emergency communication systems? • Are alternate communication methods to address areas where emergency communications are not heard routinely tested/exercised?

CO.5: The operator has established and implemented operations practices that control on-shift training of facility operators, prevent inadvertent or incorrect trainee manipulation of equipment. (DOE Order 422.1, Attachment 2, Criteria 2.e.)

Criteria:

1. The operator has established and implemented the on-shift training program. (DOE Order 422.1, Attachment 2, Criteria 2.e.(1))
2. The operator has established and implemented the authorization and documentation of training activities. (DOE Order 422.1, Attachment 2, Criteria 2.e.(2))
3. The operator has established and implemented the supervision and control of personnel under instruction by qualified personnel. (DOE Order 422.1, Attachment 2, Criteria 2.e.(3))
4. The operator has established and implemented the facility conditions and controls for conducting training during operational activities, including suspension of training during unanticipated or abnormal events. (DOE Order 422.1, Attachment 2, Criteria 2.e.(4))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Has the Operations Manager approved the operator qualification program and coordinated changes with the Training Department? • Do candidates receive one-on-one instruction, on station, for positions requiring operator certification? • Is on-shift training conducted by persons both qualified to operate equipment and authorized to train others?
2	• Are training activities during operations specifically identified in the training program, including knowledge requirements and trainee actions such as perform, simulate, etc.? • Is qualification program completion formally documented, with on-shift and classroom training activities documented as they occur?
3	• Do qualified operator-instructors supervise trainees to prevent mis-operation of equipment? • Do early-stage trainees discuss operations, procedures, and actions before performing actual operations? • Do more proficient trainees point and describe actions before taking them? • Do operator-instructors always monitor trainees and remain capable of intervention? • Do operator-instructors verify trainee entries on official round sheets and logs, and discuss any out-of-specification readings or unfavorable trends?
4	• Are training activities conducted only when facility conditions permit, and as authorized by facility management? • Are training activities and trainee operation of equipment suspended immediately during emergency or unanticipated abnormal conditions, or when deemed appropriate for safety or operational conditions?

	• Has management established the maximum number of trainees allowed during operations and the maximum number of trainees per operator-instructor? • Do training documents (qualification cards) indicate which actions are performed, simulated, or discussed? • Is there a minimum number of perform actions required for qualification cards? • Does operations management maintain a controlled list of on-the job training (OJT) qualified operators for signing qualification cards? • Is trainee progress on qualification monitored to assure qualifications are completed in a timely manner? • Are operators required to stand a minimum number of watches under instruction prior to qualification?

CO.6: The operator has established and implemented operations practices for investigating events to determine their impact and prevent recurrence. (DOE Order 422.1, Attachment 2, Criteria 2.f.; DOE-STD-1045-93)

Criteria:

1. The operator has established and implemented the specific events requiring investigation, and criteria for identifying other events or conditions to be investigated. (DOE Order 422.1, Attachment 2, Criteria 2.f.(1))
2. The operator has established and implemented the designation of investigators and their training and qualification. (DOE Order 422.1, Attachment 2, Criteria 2.f.(2))
3. The operator has established and implemented the investigation process and techniques. (DOE Order 422.1, Attachment 2, Criteria 2.f.(3))
4. The operator has established and implemented the causal analysis and corrective action determination. (DOE Order 422.1, Attachment 2, Criteria 2.f.(4))
5. The operator has established and implemented the event investigation, reporting, training, and trending. (DOE Order 422.1, Attachment 2, Criteria 2.f.(5))
6. The operator has established and implemented the response to known or suspected sabotage. (DOE Order 422.1, Attachment 2, Criteria 2.f.(6))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are violations of a safety documentation design limit investigated? • Is abnormal or unexpected system performance that adversely affects operations or safety (e.g., improper instrument readings, automatic control failure, chemical analysis, etc.) investigated? • Are abnormal or unexpected safety conditions (e.g., stray voltage, safety feature or interlock malfunction, etc.) investigated? • Is discovery of mispositioned valves, switches, or components investigated? • Are events reportable to DOE or other agencies (e.g., EPA, DOT, State regulators, etc.) investigated? • Are unplanned shutdowns or significant losses of operation investigated? • Are procedural violations or personnel errors with actual or potential personnel injury, facility damage, or facility safety degradation investigated? • Are equipment failures that could affect safety or mission investigated? • Are radiological or toxic material release limits being exceeded or material being lost investigated?

	• Are recorded data being out-of-specification or showing unexpected trends, with actual or potential adverse impact on operations or safety, investigated? • Is actual or suspected sabotage investigated? • Is loss of special nuclear material investigated? • Are repetitive problems investigated? • Is measuring and test equipment found to be out of calibration, with actual or potential impact on operations or safety, investigated? • Are investigations directed by appropriate authority, particularly for near-miss situations, performed? • Are related requirements in DOE O 232.2, *Occurrence Reporting and Processing of Operations Information*, and DOE O 225.1, *Accident Investigations*, integrated?
2	• Is a senior manager responsible for investigations? When they delegate investigations or portions of investigations to others, do they retain overall responsibility for rigor and consistency of investigations? • Are investigators experienced and technically qualified? • Are investigators unbiased and have no vested interest in the results of the investigation? • Are investigators trained in facility systems, operations, and investigation techniques?
3	• Does timely data collection by a designated person include: initial conditions, operator statements, pertinent computer/instrument printouts or charts, pertinent documentation and records, and other appropriate information? • Are records and data annotated to prevent misinterpretation? • Is investigation data permanently recorded for future reference? • Does data collection not interfere with facility operation unless vital to understanding the event? • Are the facts of the event reconstructed chronologically from the data? • Is the event analyzed to determine equipment and personnel response, procedure and equipment adequacy, human performance factors, and safety impact? • Does management determine the appropriate restart process (if applicable)?
4	• Are the causes determined? • Are appropriate corrective actions to prevent recurrence of the event determined? • Are corrective actions approved by the responsible manager and tracked to completion?
5	• Are investigation reports timely? • Do investigation reports contain a description of the event, its impact, root cause, lessons learned, and corrective actions? • Do investigation reports note any positive aspects of the event? • Are investigation reports approved by the responsible manager and reviewed by appropriate managers and safety personnel? • Are investigation report lessons shared with appropriate operators, support staff, other facility organizations, and other facilities? • Are events evaluated for inclusion in training programs? • Do processes include a method to train operators on serious events upon their return to work? • Are procedure problems, operator errors, and other appropriate events part of the facility trend analysis program? Are periodic summaries of event analysis and trends provided to managers? Do training programs include appropriate material from event reports and trend analysis?
6	• Is known or suspected sabotage immediately investigated? • Is the condition of potentially affected systems determined, and is safety system operability confirmed?

	• Does management determine whether continued operation is justified, and do they determine if safe shutdown is appropriate? • Does management take action to minimize the impact of sabotage and deter future acts? • Do event investigation procedures establish expectations for the conduct of fact-findings following events to include timeliness standards? • Do event investigation procedures include directions to assure that areas involved in events are secured to avoid any disturbance of critical information relevant to the event investigation? • Do event investigation procedures include requirements for operators involved in events to provide documentation of event recollections immediately following events? • Do corrective action plans label those actions that are specifically intended to prevent recurrence? • Are procedures in place that establish expectations for the conduct of effectiveness reviews after a specified time following corrective action completion?

CO.7: The operator has established and implemented operations practices to ensure appropriate event notification for timely response. (DOE Order 422.1, Attachment 2, Criteria 2.g.)

Criteria:

1. The operator has established and implemented the procedures for internal, DOE, and external notifications, including events, persons to be notified, persons responsible to make notifications, contact information, and recordkeeping. (DOE Order 422.1, Attachment 2, Criteria 2.g.(1))
2. The operator has established and implemented the communications equipment for notifications. (DOE Order 422.1, Attachment 2, Criteria 2.g.(2))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are responsibilities for making notifications specifically assigned to positions or persons? • Are events requiring notification identified and documented? • Are notification timeliness standards established? • Are primary and alternate personnel to be notified for each event identified and documented? • Is contact information for the personnel to be notified kept current and available to notifying personnel? • Are all notifications documented in formal records that include date, time, reason, person notified, and person making notification? • Are related requirements found in DOE O 232.2, *Occurrence Reporting and Processing of Operations Information*; DOE O 151.1, *Comprehensive Emergency Management System*; DOE O 470.4, *Safeguards and Security Program*; and DOE O 205.1, *Department of Energy Cyber Security Program*, and applicable regulatory notification requirements integrated?
2	• Is adequate equipment for making notifications available at the main control area and/or other appropriate location? • Are notification protocols updated when personnel are delegated to address key personnel absences? • Are operators trained in using notification systems and procedures for making notifications?

CO.8: The operator has established and implemented operations practices for initial equipment lineups and subsequent changes to ensure facilities operate with known, proper configuration as designed. (DOE Order 422.1, Attachment 2, Criteria 2.h.)

Criteria:

1. The operator has established and implemented the authorization for, and awareness of, equipment and system status changes. (DOE Order 422.1, Attachment 2, Criteria 2.h.(1))
2. The operator has established and implemented the initial system alignment, maintaining control of equipment and system status through startup, operation, and shutdown, and documentation of status. (DOE Order 422.1, Attachment 2, Criteria 2.h.(2))
3. The operator has established and implemented the use and approval of lockouts and tagouts for administrative control of equipment. (DOE Order 422.1, Attachment 2, Criteria 2.h.(3))
4. The operator has established and implemented the Operational Limits compliance and documentation. (DOE Order 422.1, Attachment 2, Criteria 2.h.(4))
5. The operator has established and implemented the management of equipment deficiencies, maintenance activities, post-maintenance testing, and return to service. (DOE Order 422.1, Attachment 2, Criteria 2.h.(5))
6. The operator has established and implemented the awareness and documentation of control panel and local alarm issues. (DOE Order 422.1, Attachment 2, Criteria 2.h.(6))
7. The operator has established and implemented the control of temporary equipment modifications and temporary systems. (DOE Order 422.1, Attachment 2, Criteria 2.h.(7))
8. The operator has established and implemented the configuration control and distribution of engineering documents. (DOE Order 422.1, Attachment 2, Criteria 2.h.(8))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Is the operations supervisor responsible for maintaining proper configuration and authorizing status changes for major equipment? • May the operations supervisor delegate status change authorizations for support or less-important systems and equipment? • Are status changes communicated to affected operators and organizations? • Are status changes resulting from operations or work reported to cognizant supervisors?
2	• Are components and systems aligned prior to first operation? • Are checklists used to guide initial alignments and rechecks, and do they include equipment identification matching installed labels, required component position, data entry space for actual position and any deviations, and documentation of alignment or recheck? • Do supervisors review and approve completed alignment checklists? • Does management determine the need for alignments and rechecks? Examples of situations that may need alignments or rechecks are startup from complete shutdown, outage recovery, or mode changes. • Does restoration of safety-related systems following maintenance include functional testing of their capability? • Are records of equipment and system alignments retained for operators' reference? • Are deviations from the reference alignment, including lockouts and tagouts, tracked and controlled by a status board or other effective system?

3	• Do supervisors approve lockouts and tagouts in their facility and remain aware of status changes that result? • Are personnel trained in their responsibilities concerning changing system or equipment status and operation of locked or tagged components?
4	• Is compliance with operational limits, including safety basis Limiting Conditions for Operations, established through administrative controls? • Are compliance and actions taken to restore operating within limits documented in facility records? • Are supervisors aware of, and direct completion of, actions to comply with operational limits? • Are operational limit entry conditions and actions documented in appropriate operating records? • Are operating personnel kept informed of any limiting conditions and their required actions? • Do operating personnel periodically review Limiting Conditions for Operation and Action Statements in effect for proper implementation?
5	• Do operators note equipment deficiencies, document them in work control systems for correction, and identify them to other operators by tags, logs, status boards, or other effective method? • Do designated managers authorize in writing the work control documents for all activities, including maintenance on equipment important to safety, on equipment that affects operations, or that changes control indications or alarms? • Is the status of work in progress documented and available for review by operators? • Do work control documents specify retest requirements to ensure proper functioning, effectiveness of the maintenance, and that no new problems were introduced prior to restoration to service? • Do supervisors assure themselves of proper equipment operation before authorizing its return to service after maintenance, testing, or emergency/abnormal event?
6	• Are operators and supervisors aware of inoperable alarms, alarms with temporary set points, multiple-input alarms that do not provide indication of a subsequent condition, or other limitations? • Are deficient alarms documented for information to all affected personnel and entered into work control systems for correction? • Do operators take appropriate actions to monitor conditions when alarms are unreliable? • Are operators and supervisors aware of alarms expected during normal operations?
7	• Do administrative systems control temporary modifications? Examples include electrical jumpers or lifted leads, pulled circuit cards, disabled alarms, piping jumpers or blocks, disabled relief valves, strainers or filters temporarily installed or removed, temporary shielding, blocked drains, and others. • Do administrative systems control temporary systems? • Do administrative controls include appropriate engineering review and approval of the design and safety of the modification before installation? • Do administrative controls include written authorization for installation? • Do administrative controls include independent verification of installation and removal? • Do administrative controls include documentation of the modifications? • Do administrative controls include completion of any training, procedure changes, or labeling required? • Do administrative controls include periodic audits of installed temporary modifications?

8	• Do administrative systems provide for configuration control of engineering documents per applicable DOE directives? • Do processes provide for designating safety structures, systems, and components and their quality assurance requirements to support system engineer and maintenance needs? • Do processes control safety software per applicable DOE directives? • Do operations personnel and all other affected organizations have access to current, approved engineering documents?

CO.9: The operator has established and implemented operations practices for the installation and removal of lockout/tagouts for the protection of personnel. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1))

Criteria:

1. The operator has established and implemented the procedures, roles and responsibilities associated with the development, documentation, review, installation, and removal of a lockout/tagout. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1)(a))
2. The operator has established and implemented compliance with Occupational Safety and Health Administration (OSHA) Rules, 29 CFR Part 1910 and/or 29 CFR Part 1926, requirements for the protection of workers using lockout/tagout. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1)(b))
3. The operator has established and implemented compliance with National Fire Protection Association (NFPA) Standard 70E electrical safety requirements using lockout/tagout. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1)(c))
4. The operator has established and implemented the description and control of the tags, locks, lockboxes, chains, and other components utilized for the Lockout/Tagout Program. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1)(d))
5. The operator has established and implemented the training and qualification in lockout/tagout and special considerations for DOE facilities, e.g., operational limitations, or seismic issues from the mass of locks or chains. (DOE Order 422.1, Attachment 2, Criteria 2.i.(1)(e))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do procedures and/or the Lockout/Tagout Program implement OSHA Rules and are they designed to control hazardous energy and materials during servicing or maintenance or whenever unexpected operation or energization could cause injury? • Do procedures include provisions that only authorized, qualified personnel perform lockout/tagouts? • Are personnel trained on their responsibilities regarding tags and locks? • Do procedures include provisions for documenting lockout/tagouts, including: o an indexing/numbering system, o identification of the reason for the lockout/tagout, o applicable work packages or other documents, o equipment covered, o all components and their position, o authorization for installing the lockout/tagout, o placement and verification of locks/tags, o authorization for removing the entire lockout/tagout or individual locks/tags, o documenting the removal of locks/tags,

	○ designating the component position after clearing locks/tags, and ○ documenting the repositioning of components after clearing locks/tags? • Do procedures designate the manager responsible for lockout/tagout records? • Do procedures include provisions for periodic management reviews of lockout/tagout records? • Do procedures include provisions for checking component positions of equipment outside the lockout/tagout necessary to support restoring locked/tagged equipment to service? • Do procedures include periodic audits of active lockout/tagouts to ensure locks and tags are properly attached, components are in the correct position, all required signatures have been obtained, and other lockout/tagout requirements have been met? • Do procedures include techniques for verifying the position of locked components, with preference for the use of a hands-on check or position indicator? • Do procedures include provisions for authorizing and documenting the repositioning of locked components for a lockout/tagout? • Do procedures include provisions for returning removed tags to the authorizing manager and documenting the manager's final check that all locks and tags are removed? • Do procedures include provisions that permit, but discourage, temporary clearance of locks/tags per OSHA Rules?
2	• Does the Lockout/Tagout Program address compliance with OSHA Rules, 29 CFR 1910 and/or 29 CFR 1926?
3	• Does the Lockout/Tagout Program address compliance with NFPA 70E?
4	• Do procedures contain provisions that when key operated locks are used, access to the keys is restricted to authorized personnel? • Do procedures contain provisions that when key operated locks are used, keys are readily available to appropriate personnel?
5	• Do training programs comply with applicable OSHA Rules and support qualification of personnel to perform lockout/tagouts? • Does training include material on how lockouts can hinder facility operations, particularly when local component operations are necessary while remote controls are locked out? • Does training include material on how the mass of locks or chains may impair seismic design features of components? • Do procedures contain provisions that address the sequence of valve positioning, locking and independent verification?

CO.10: The operator has established and implemented operations practices for the installation and removal of caution tags for equipment protection or operational control. (DOE Order 422.1, Attachment 2, Criteria 2.i.(2))

Criteria:

1. The operator has established and implemented the roles and responsibilities associated with the development, documentation, review, installation, and removal of caution tags to convey operational information or equipment alignments for protection of equipment. (DOE Order 422.1, Attachment 2, Criteria 2.i.(2)(a))
2. The operator has established and implemented the description and control of the tags. (DOE Order 422.1, Attachment 2, Criteria 2.i.(2)(b))
3. The operator has established and implemented measures to prevent relying on caution tags for personnel protection. (DOE Order 422.1, Attachment 2, Criteria 2.i.(2)(c))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are personnel formally designated to prepare, approve, and install tags? • Are personnel trained on their responsibilities regarding tags? • Do procedures include provisions for documenting caution tags, including: o an indexing/numbering system, o effective date and time, o the precaution or information applicable to the situation or equipment, o location of tags by component name, o number or other identification, o authorization for installing the tags, o documentation of placement and verification of the tags, o authorization for removing tags, and o documentation of removal? • Do procedures designate the manager responsible for caution tag approval and location of records for review by appropriate personnel? • Do procedures contain provisions for management determination that instructions on caution tags comply with facility procedures, technical safety requirements, or other specifications? • Are situations requiring caution tags brought to the attention of responsible managers, who approve them if necessary? • Do procedures contain provisions for a documented periodic review of all active caution tags to determine their continued need, that the records are correct, and that appropriate action is taken to remedy conditions requiring tags for long periods (over three months)?
2	• Do procedures contain provisions for caution tags to be uniquely identifiable and easily distinguished from other tags? • Do procedures contain provisions for caution tag placement so as to not obscure indications or controls, while remaining readily apparent to operators?
3	• Do procedures contain provisions restricting the use of caution tags to situations where a component or system is functional, but some precaution or item(s) of information is necessary, prior to operation? • Do procedures contain provisions for management determination that caution tags are appropriate and that they are not used instead of more appropriate administrative controls or a lockout/tagout? • Do procedures contain direction to ensure that caution tags are not used to compensate for equipment corrective maintenance? • Do procedures contain direction to ensure that caution tags are not used to compensate for procedure shortcomings?

CO.11: The operator has established and implemented operations practices to verify that critical equipment configuration is in accordance with controlling documents. (DOE Order 422.1, Attachment 2, Criteria 2.j.)

Criteria:

1. The operator has established and implemented the structures, systems, components, operations, and programs requiring independent verification. (DOE Order 422.1, Attachment 2, Criteria 2.j.(1))

2. The operator has established and implemented the situations requiring independent verification. (DOE Order 422.1, Attachment 2, Criteria 2.j.(2))
3. The operator has established and implemented the methods for performing and documenting independent verification. (DOE Order 422.1, Attachment 2, Criteria 2.j.(3))
4. The operator has established and implemented situations, if any, allowing concurrent dual verification. (DOE Order 422.1, Attachment 2, Criteria 2.j.(4))
5. The operator has established and implemented the methods for performing concurrent dual verification, if used. (DOE Order 422.1, Attachment 2, Criteria 2.j.(5))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do procedures or other authoritative documents explicitly identify components whose positions must be independently verified? • Does management use accepted safety analysis methods (for example, fault tree or probability risk analysis) and/or expert opinion to develop the list of equipment/components requiring independent verification? • Does facility management consider all safety-related system components for independent verification? • Do procedures allow exemption from independent verification for components whose mispositioning does not affect system performance, whose mispositioning is immediately known to operators, or where significant radiation exposure would be required for verification? Are alternate means of determining position considered, and are any such exemptions approved by senior operations management? • Does management consider independent verification for components whose mispositioning could challenge safety-related equipment, cause shutdowns or other undesirable results, or lead to unintended toxic or radioactive material release? • Does management specify safety management programs and other functions such as training and procedure development that will be independently appraised to verify their continued conformance with regulations and directives?
2	• Do procedures require independent verification when equipment must be available, and it is reasonably possible that components were mispositioned? • Do procedures require independent verification of lineups to take equipment out of service or return it to service, (e.g., isolation boundaries, equipment under maintenance or repair, instrumentation lineups for testing and their restoration, work on backup components and their restoration, etc.)? • Do procedures include appropriate independent verification for system lineups? • Do procedures include appropriate routine periodic verification of critical components during operation, which would not normally need a second check? • Do procedures include provisions for dealing with mispositioned components found during routine periodic checks or lineups, including appropriate management approval for repositioning and subsequent independent verification?
3	• Does management develop and approve verification techniques appropriate to facility-specific equipment, using manufacturer's recommendations and expert operators? • Are operators trained in techniques appropriate to the facility's equipment? • Do procedures provide reference documentation explaining how to perform verification of the facility's components (e.g., manual, solenoid-, motor- and air-operated valves, circuit breakers, blank flanges, and removable links and fuses), control power availability, and any other specific component position or condition required?

	• Do procedures specify how to achieve independence, including having each check include identification of the component and determining both its required and actual position, and minimizing interactions between operators positioning components and those verifying position, except in special situations for throttled valves or to reduce radiation or toxic exposure (concurrent dual verification)? • Do operators receive training on the performance of independent verification versus concurrent verification? • Do procedures favor direct local position checks over remote indications, absent exposure considerations or other overriding factors? • Do procedures favor direct local position checks over process indications such as flow, pressure, or voltage, absent exposure considerations or other overriding factors? Are the use of any such indirect methods specifically authorized in procedures? • Do procedures specify how to check throttled valves? Are local mechanical position indicators, scribe marks, or other authorized methods preferred over shutting and then opening a prescribed number of turns? If shutting/opening is necessary, do facility procedures consider concurrent dual verification? • Do procedures favor direct local position checks over surveillance testing to show component positions? If surveillance tests are used, do they conclusively prove component position and are they specifically approved by operations management? • Do procedures specify that components, danger-tagged per the Lockout/Tagout Program, will not be manipulated for independent verification? • Do procedures specify that verifiers not change component position or status to correct an inconsistency? • Do procedures specify how to document independent verification, including component identification; normal or expected position, desired position, final position, identification and signature or initials of positioners and verifiers for each item, and supervisory review?
4	• Do procedures specify situations where concurrent dual verification is used? Examples are throttled valves that must be repositioned to determine position, or sequential operations such as a bolt torquing pattern.
5	• Do procedures specify how concurrent dual verification is done, if at all? • Do procedures for concurrent dual verification (if used) include provisions for maintaining independence to the maximum extent possible, and do facility policies include provisions preventing the use of concurrent dual verification unless specifically authorized?

CO.12: The operator has established and implemented operations practices to ensure thorough, accurate, and timely recording of equipment information for performance analysis and trend detection. (DOE Order 422.1, Attachment 2, Criteria 2.k.)

Criteria:

1. The operator has established and implemented narrative logs at all key positions, as defined by management, for the recording of pertinent information. (DOE Order 422.1, Attachment 2, Criteria 2.k.(1))
2 The operator has established and implemented the prompt and accurate recording of information. (DOE Order 422.1, Attachment 2, Criteria 2.k.(2))
3. The operator has established and implemented the type, scope, and format for log entries. (DOE Order 422.1, Attachment 2, Criteria 2.k.(3))
4. The operator has established and implemented methods for recording late entries and correcting erroneous entries without obscuring the original entry. (DOE Order 422.1, Attachment 2, Criteria 2.k.(4))

5. The operator has established and implemented periodic supervisory reviews for accuracy, adequacy, and trends. (DOE Order 422.1, Attachment 2, Criteria 2.k.(5))
6. The operator has established and implemented document retention requirements. (DOE Order 422.1, Attachment 2, Criteria 2.k.(6))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do procedures include provisions for narrative logs maintained by the operations supervisor or control area operator (or equivalent) at a minimum? • Do procedures include provisions for narrative logs at stations staffed part-time to provide continuity and information pass-down? • Do procedures include provisions for narrative sections on round sheets when a separate narrative log is not maintained?
2	• Is prompt and accurate recording of information required and recorded?
3	• Does management provide written direction on information to be recorded in each log, including the following elements to be recorded in at least one log, but not necessarily all in the same log: o facility mode changes, o criticalities and criticality information (for reactors or critical experiments), o abnormal facility configurations, o status changes of safety-related or other major equipment, o occurrence of reportable events, o starting and completing surveillance tests, o entering and exiting Limiting Conditions for Operations, o security incidents, o out-of-specification chemistry or process analysis results or measurements o shift reliefs, and o significant information concerning emergencies, abnormal, or unexpected events, but not to interfere with taking appropriate response actions? • Does management provide written direction on the format for log entries, including legible, permanent, smear-proof, and entries capable of machine copying? • Does management provide written direction on electronic log entries, if used?
4	• Does management provide written direction on how to make late entries, including noting the actual time late entries are made and prohibiting rewriting logs to make entries appear timely? • Does management provide written direction on how to make log corrections? (A widely accepted industry standard is to make a single lineout through the incorrect entry without obscuring it and writing the correct entry in a nearby space, with the date and initials of the person making the correction.)
5	• Does management provide written direction for periodic supervisory review of logs for accuracy, completeness, timeliness, trends, and conformance with management direction? • Do log review practices include periodic operations supervisor review of control area logs, and periodic review of operating station logs outside the control area by the control area supervisor or other appropriate manager?
6	• Does management provide written direction on keeping logs available for operator review after return from periods of absence? • Does management provide written direction on log storage and preservation for the expected life of the facility or as directed by DOE and National Archives and Records Administration regulation?

	• Does management provide written direction on how to retrieve stored logs? • Does management provide written direction for establishing ranges for normal readings and limits for out-of-specification readings on logs? • Does management provide written direction for responding to off-normal and out-of-specification readings on logs? • Does management provide written direction for tracking off-normal and out-of-specification readings?

CO.13: The operator has established and implemented operations practices for thorough, accurate transfer of information and responsibilities at shift or operator relief to ensure continued safe operation. (DOE Order 422.1, Attachment 2, Criteria 2.l.)

Criteria:

1. The operator has established and implemented the definitions for all key positions requiring a formal turnover process. (DOE Order 422.1, Attachment 2, Criteria 2.l.(1))
2. The operator has established and implemented turnover of equipment/facility status, duties, and responsibilities that results in the safe and effective transfer of equipment status and in-progress or planned activities from one shift or workgroup to the next. (DOE Order 422.1, Attachment 2, Criteria 2.l.(2))
3. The operator has established and implemented the process for reliefs during a shift. (DOE Order 422.1, Attachment 2, Criteria 2.l.(3))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do procedures contain provisions for using a turnover process for at least the supervisory positions? • Do procedures contain provisions for using a turnover process for key positions, including appropriate stations staffed part-time?
2	• Do turnover procedures contain provisions for documenting a review of checklists or other documents that record key information appropriate for the position, either operational or supervisory, such as: o facility operating mode and status, o key process parameters, o key tank or vessel levels, o status of safety equipment, o operational limits in effect, o Limiting Conditions for Operations in effect, either normal or abnormal, o any procedures, either standard or temporary, in progress, o changes in radiological or hazardous material conditions, o waste management status, o required samples or analyses, and o upcoming or in-progress maintenance, testing, or evolutions? • Do turnover procedures contain provisions for operators and supervisors to complete document reviews, before assuming responsibility for their position, in enough detail to understand status, important history, and plans? (Such reviews normally extend back the shorter of 24 hours or their last shift.)

	• Do turnover procedures contain provisions for operators and supervisors to walk down appropriate control panels and computer displays to determine facility status, alarms, lineups, and equipment configuration? For control areas, do the oncoming and offgoing personnel jointly walkdown the control panels and displays? Do supervisors and operators walkdown panels early in the shift and preferably before turnover? • Do turnover procedures contain provisions for offgoing and oncoming operators and supervisors to discuss, during stable facility conditions whenever possible, turnover documentation and clarify any questions? • Do turnover procedures contain provisions that when all turnover items are complete and the oncoming person understands the status, they formally state that they assume responsibility and make a narrative log entry to that effect? • Do turnover procedures contain provisions for operations supervisors to conduct briefings, as needed, for their oncoming shift operators and appropriate support personnel (vendors, maintenance, crafts) to review status, problems, upcoming work, or other appropriate topics?
3	• Do turnover procedures contain provisions for conducting operator and supervisor reliefs during shifts? (These turnovers may include a less exhaustive process than the regular shift changes as long as the oncoming person is at least as knowledgeable as they would be from a regular turnover.)

CO.14: The operator has established and implemented operations practices to ensure that interrelated processes do not adversely affect facility safety or operations. (DOE Order 422.1, Attachment 2, Criteria 2.m)

Criteria:

1. The operator has established and implemented the defined responsibilities with respect to the control of interrelated processes. (DOE Order 422.1, Attachment 2, Criteria 2.m.(1))
2. The operator has established and implemented operator training and qualification to understand interrelated processes, to interpret instrument readings, and provide timely corrective action for process-related problems. (DOE Order 422.1, Attachment 2, Criteria 2.m.(2))
3. The operator has established and implemented establishing lines of communication between operating personnel, process support personnel, and other interrelated process operators for coordination of activities. (DOE Order 422.1, Attachment 2, Criteria 2.m.(3))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Are all the interrelated processes identified? (Processes or activities that can affect operations but are under the control of persons other than the affected operators, such as shared support systems or special testing.) • Does a memorandum of understanding or other formal agreement exist which defines roles and responsibilities for all parties for each of the interrelated processes identified?
2	• Is formal training on interrelated processes documented? • Do procedures provide for timely corrective action of process-related problems? • Is training of the operators of the interrelated processes required in a memorandum of understanding or other similar formal agreement of roles and responsibilities?
3	• Are the methods of communication specified in a formal agreement of roles and responsibilities?

	• Are the points of contact for each organization specified in a formal agreement of roles and responsibilities? • Are the events requiring communication specified for each party in a formal agreement of roles and responsibilities? • Does operations management routinely verify that all parties involved in the control of interrelated processes understand their roles and responsibilities? • Are methods in place to verify that interrelated processes will function as expected when needed?

CO.15: The operator has established and implemented operations practices for an effective required reading program to keep operators updated on equipment or document changes, lessons learned, or other important information. (DOE Order 422.1, Attachment 2, Criteria 2.n.)

Criteria:

1. The operator has established and implemented the identification of material to be distributed via required reading. (DOE Order 422.1, Attachment 2, Criteria 2.n.(1))
2. The operator has established and implemented the identification of which personnel are required to read specific required reading items. (DOE Order 422.1, Attachment 2, Criteria 2.n.(2))
3. The operator has established and implemented the distribution of required reading to appropriate personnel and documentation of their timely completion. (DOE Order 422.1, Attachment 2, Criteria 2.n.(3))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do directives contain provisions for a required reading program, including, as appropriate, procedure changes, equipment design changes, operating experience information, and other facility-specific items? • Do directives for the required reading program include provisions for listing designated items, screening them for appropriate content, and procuring copies of the documents?
2	• Do directives for the required reading program include provisions for designating specific items for specific operators or groups of operators? • Do directives for the required reading program include provisions for ready access to required reading materials?
3	• Do directives for the required reading program include provisions for assigning due dates for items, including, where appropriate, completion before operators go on shift again? • Do directives for the required reading program include provisions for documenting and tracking completion of designated specific items for specific operators or groups of operators? • Do directives for the required reading program include provisions for retaining documentation of completion and for periodic management review for timely assignment completion? • Do directives for the required reading program include provisions for removing completed items from distribution? • Does operations management monitor the backlog of required reading material that has not been completed? • Is required reading used as a substitute for operator training?

CO.16: The operator has established and implemented operations practices for timely written direction and guidance from management to operators. (DOE Order 422.1, Attachment 2, Criteria 2.o.)

Criteria:

1. The operator has established and implemented the appropriate circumstances for the use of timely instructions/orders. (DOE Order 422.1, Attachment 2, Criteria 2.o.(1))
2. The operator has established and implemented the designated levels of review and approval prior to issuance. (DOE Order 422.1, Attachment 2, Criteria 2.o.(2))
3. The operator has established and implemented the configuration control of timely instructions/orders. (DOE Order 422.1, Attachment 2, Criteria 2.o.(3))
4. The operator has established and implemented the distribution of timely instructions/orders to appropriate personnel and documentation of their receipt and understanding. (DOE Order 422.1, Attachment 2, Criteria 2.o.(4))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do directives for timely instructions/orders specify appropriate information items such as special operations, administrative directions, special data collection campaigns, or notification of expected visitors? • Do directives for timely instructions/orders specify appropriate orders such as direction to perform special evolutions or tests, limitations on performing certain operations, direction to perform maintenance actions, or other direction? • Do directives for timely instructions/orders include provisions to prevent the use of timely instructions/orders as a substitute for administrative or operational procedure revisions?
2	• Do directives for timely instructions/orders include designation of review and approval authorities?
3	• Do directives for timely instructions/orders include segregation of timely instructions/orders into daily and long-term categories? • Do directives for timely instructions/orders include provisions for removing or canceling superseded or outdated items? • Do directives for timely instructions/orders include provisions for periodic management reviews that only appropriate and current items are distributed, and that appropriate personnel review them within time limits?
4	• Do directives for timely instructions/orders include provisions for distribution of timely instructions/orders to appropriate operators? • Do directives for timely instructions/orders include provisions for appropriate operators to review items before or early in their shift? • Do directives for timely instructions/orders include provisions for documenting operator reviews every shift for daily items, including those that are delayed or remain in force longer than a day, and periodic and as-changed reviews of long-term items?

CO.17: The operator has established and implemented operations practices for developing and maintaining accurate, understandable written technical procedures that ensure safe and effective facility and equipment operation. (DOE Order 422.1, Attachment 2, Criteria 2.p.)

Criteria:

1. The operator has established and implemented the expectations for the use of procedures to perform operations. (DOE Order 422.1, Attachment 2, Criteria 2.p.(1))
2. The operator has established and implemented the process for procedure development. (DOE Order 422.1, Attachment 2, Criteria 2.p.(2))
3. The operator has established and implemented the procedure content, including consistent format and use of terms (e.g., prerequisites, warnings, cautions, notes, hold points, etc.), detail sufficient for accomplishing the operation, technically accurate procedures capable of performance as written, and procedure conformance with the facility design and manufacturer documentation. (DOE Order 422.1, Attachment 2, Criteria 2.p.(3))
4. The operator has established and implemented the process for procedure changes (pen and ink or page changes) and revisions (complete reissues). (DOE Order 422.1, Attachment 2, Criteria 2.p.(4))
5. The operator has established and implemented the process for training personnel on new, revised, or changed procedures. (DOE Order 422.1, Attachment 2, Criteria 2.p.(5))
6. The operator has established and implemented the process for approval of new, revised, or changed procedures. (DOE Order 422.1, Attachment 2, Criteria 2.p.(6))
7. The operator has established and implemented the initial-issue and periodic review and testing of procedures. (DOE Order 422.1, Attachment 2, Criteria 2.p.(7))
8. The operator has established and implemented the availability and use of the latest revisions of procedures. (DOE Order 422.1, Attachment 2, Criteria 2.p.(8))
9. The operator has established and implemented the specified and defined procedure use requirements, i.e., reader-worker method, reference use only, use-each-time, and emergency response. (DOE Order 422.1, Attachment 2, Criteria 2.p.(9))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do management policies establish the expectation that operators will use written procedures for operations, will perform them as written, and will stop work and notify management when procedures cannot be executed as written?
2	• Do directives include a written process for procedure development, including format, clear language standards, and configuration control? • Do management policies designate procedures to be developed for all anticipated operations, evolutions, tests, and abnormal or emergency situations? • Do management policies direct alarm/annunciator response procedures to be developed for all alarm panels? • Do directives designate a senior manager responsibility for procedure development, and include provisions for the capabilities and experience of procedure writers? • Do directives include a process for completing and documenting procedure review and approval of both hard-copy and electronic procedures? • Do directives specify that procedures will provide administrative and technical direction to effectively conduct the operation, using detail appropriate to the complexity of the task, the experience and training of the operators, the frequency of performance, and the significance of the consequences of error? • Do procedure preparation records contain documentation of the reason for key steps so they are not inadvertently deleted or changed in revisions and changes?
3	• Is procedure scope and applicability readily apparent? • Are procedures for multiple equipment trains clearly distinguishable from each other? • Are emergency procedures clearly distinguishable from normal operating procedures?

	• Do procedures incorporate appropriate information from applicable source documents, including design, safety basis, and vendor technical documents? • Are prerequisites and initial conditions clearly specified? • Are tools, equipment, and materials specified and do procedures provide measures to document their calibration or condition before use? • Are hold-points requiring independent verification or approval clearly indicated? • Is procedure language clear, definitions are explained, and detail is appropriate for the operators' skill, experience, and training? • Are procedure format standards defined? o One action per step. o Warnings, notes, and cautions are clear, do not contain actions, and precede the applicable step. o Warnings, notes, cautions, and headings appear on the same page as the applicable step. • Are procedures technically and administratively accurate? o Are instructions and information correct? o Are referenced documents correctly identified? o Are instructions for transferring between procedures clear? • Do critical steps include signature/initial/checkoff blocks, with only one action per block? • Are instrument readings and tolerances specified and conform to instrument scales or readability? • Do procedures contain explicit parameters and not require mental arithmetic to determine acceptability? Are any calculations clearly explained and do procedures provide space to record them? • Does the procedure step sequence conform to the normal operational sequence? • Do procedures reflect human factors considerations such as procedure callouts exactly matching equipment labels, units in procedures match instrument markings, charts and graphs easily read, and important steps or information highlighted? • Do emergency procedures provide guidance for both single and multiple casualties? • When procedures use or refer to other procedures or steps, are they clearly identified with the exact identification to prevent confusion in transferring to or from them? • Do procedures specify the restoration or shutdown steps for equipment following tests or other operations?
4	• Do directives include a documented process for review and approval of revisions and changes? (Directives may also use only a revision process or may use an electronic publishing process. In all cases, configuration control must be maintained.) Does the selected process maintain configuration control? • Are procedure changes intended for more than one-time use documented in a location readily available for operator reference and noted in timely orders/instructions and/or turnover documents? • Do directives contain provisions for initiation of changes or revisions if procedure problems are found, including provisions for emergent changes or revisions necessary to proceed with operations when a procedure is faulty? • Do directives contain provisions for initiating a procedure revision when changes remain in effect for extended periods (e.g., more than 6 months) or when several changes have accumulated (e.g., more than 5)? • Do directives contain provisions for including all outstanding changes in any procedure's revision?

	• Do directives include provisions for implementing revisions for permanent equipment modifications or replacements, and implementing changes for temporary equipment modifications? • Do directives include provisions to review procedure development records of the reason for key steps to prevent inadvertent deletion or change? • Do directives include provisions to use walkthroughs (procedure execution with actual or simulated operation of components by subject matter expert(s)) to validate procedure changes and revisions?
5	• Do directives include provisions for communicating important procedure changes and revisions to operating personnel through required reading or other appropriate method? • Do directives include provisions for communication of procedure changes and revisions to the training department to update training courses? • Do directives include provisions for communication of procedure changes and revisions to the organizations responsible for personnel qualification to update qualification requirements?
6	• Do directives include provisions for operations supervisor or manager approval of new or revised procedures prior to use, with reviews of revisions to at least the depth as the initial version? • Do directives include provisions for a safety committee or safety manager or equivalent, and, if applicable, emergency manager, review of procedures that affect safety-related equipment or emergency response? • Do directives include provisions defining appropriate circumstances for expeditious approval of minor procedure changes and the process, with a minimum of at least one designated senior qualified operator and one senior operations manager approval, followed up by standard review and approval within a short period, up to 2 weeks? • Do directives include provisions for using the standard review and approval process for changes that do not meet the facility's criteria for minor changes?
7	• Do directives include provisions for review of new and revised procedures prior to use and periodically for technical accuracy and human factors considerations? • Do directives specify the frequency of periodic procedure reviews, considering the complexity of the operation, maturity of operations, and facility life cycle? • Do directives include provisions for reviewing procedures after a significant occurrence, either human error or equipment upset? • Do procedure reviews include comparison to source documents to verify accuracy? • Do procedure reviews include validation walkthroughs?
8	• Do directives include provisions for maintenance of a controlled copy of all operating procedures at the control area for operator reference, and selected procedure-controlled copies at appropriate locations outside the control area? • Do directives include provisions for verifying working copies of procedures against controlled copies for use during evolutions, and controlling working copies to prevent using outdated procedures? • Do directives include provisions for maintenance of controlled copies of alarm and annunciator response procedures readily accessible to operators for alarm response? • Do directives detail how operators obtain current copies of electronic or hard-copy procedures for performing evolutions, and detail how to determine procedure approval and revision status?
9	• Are operators trained in procedure use requirements and does management oversight reinforce the expectations?

	• Do directives and management policy contain provisions for operators to report deficient procedures and initiate changes or revisions to correct them? • During emergency conditions, may operators take necessary action to place the facility in a safe condition, and to protect equipment, personnel, and public safety without first initiating a procedure change? • Do directives define applicable procedure use methods and specify when to use them? (Options include reader-worker, reference, fill out steps as a checklist, and others.) • Do directives include provisions for use of procedures for emergency response? (Normally, immediate actions are committed to memory and may be executed without reference to the procedure. When conditions permit, operators use the procedure to check completion of the immediate actions and continue with follow-up actions.) • Does operations management monitor the backlog and aging of procedure change requests? • Does operations management monitor the number and aging of temporary procedure changes? • Are qualifications established for operations procedure writers?

CO.18: The operator has established and implemented operations practices to provide accurate, current, and approved operator aids. (DOE Order 422.1, Attachment 2, Criteria 2.q.)

Criteria:

1. The operator has established and implemented the technical evaluation and management approval of operator aids. (DOE Order 422.1, Attachment 2, Criteria 2.q.(1))
2. The operator has established and implemented that operator aids serve as conveniences, not operational requirements. (DOE Order 422.1, Attachment 2, Criteria 2.q.(2))
3. The operator has established and implemented the operator aids do not obscure equipment. (DOE Order 422.1, Attachment 2, Criteria 2.q.(3))
4. The operator has established and implemented the administrative control of installed operator aids. (DOE Order 422.1, Attachment 2, Criteria 2.q.(4))
5. The operator has established and implemented the periodic review for adequacy and correctness. (DOE Order 422.1, Attachment 2, Criteria 2.q.(5))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do directives contain a process for developing, approving, and controlling operator aids? • Are operators, maintenance staff, and other facility staff trained on the operator aids process? • Are operator aids approved by operations management prior to posting? Do approving authorities determine the accuracy and necessity of operator aids? • Do directives and management practice not allow operator aids to alter procedures, but instead initiate procedure revisions or changes if necessary?
2	• Do directives and training provide that operator aids serve as a convenient reminder or quick reference source for information, not a substitute for procedures?
3	• Do directives call for posting operator aids close to the point of use in a manner that does not obscure indications or controls? • Do directives call for operator aids to be sturdy, and securely mounted or stowed, and waterproof where necessary?

4	• Do directives controlling operator aids include provisions for maintaining a master list and copy of all approved operator aids in the control area or other appropriate area? Does the listing include: o unique identification numbers for each operator aid, o listing of source documents for operator aid content, including revision status, and o date of approval, revision, and posting location for operator aids? • Do directives controlling operator aids include provisions to update operator aids when their source material is updated?
5	• Does the review verify the accuracy, necessity, and condition of posted operator aids? • Does the review verify only approved operator aids are posted? • Does the review verify agreement between the master list and actual postings; remove or replace operator aids and update the master list as needed? • Does the review verify operator aids reflect the latest revisions of source material? • Does the review focus on the number of operator aids and its potential impact on operator performance?

CO.19: The operator has established and implemented operations practices for clear, accurate equipment labeling. (DOE Order 422.1, Attachment 2, Criteria 2.r.)

Criteria:

1. The operator has established and implemented the components that require a label. (DOE Order 422.1, Attachment 2, Criteria 2.r.(1))
2. The operator has established and implemented the label information that uniquely identifies components and is consistent with regulations, standards, and facility documents. (DOE Order 422.1, Attachment 2, Criteria 2.r.(2))
3. The operator has established and implemented durable and securely attached labels that do not interfere with controls or equipment. (DOE Order 422.1, Attachment 2, Criteria 2.r.(3))
4. The operator has established and implemented the administrative control of labels, including a process for promptly identifying and replacing lost or damaged labels, preventing unauthorized or incorrect labels, and control of temporary labels. (DOE Order 422.1, Attachment 2, Criteria 2.r.(4))

Lines of inquiry for each of these criteria are shown in the table below:

Criteria	Lines of Inquiry
1	• Do directives contain provisions for component labeling, including identification of components and standardized label format and colors? Labeled components include: o Valves o Major equipment o Switches o Circuit breakers o Fuse panels or locations o Instruments and gauges o Busses and motor control centers o Cabinets, including, where appropriate, listing major components inside o Room doors o Emergency equipment o Fire protection systems o Piping o Any named SSC, item, or operator control

2	• Do directives for component labeling contain provisions for label information to match facility documentation, including design and safety basis documents, procedures, lineup sheets, and other documents that refer to components? • Are label nomenclature, abbreviations, and identification codes standardized and included in operator training? • Do labeled components have unique identification numbers? • Are color codes consistent and unambiguous? • Do piping labels indicate the fluid and normal flow direction? • Is piping color coded per OSHA/ANSI standards and is piping for hazardous and explosive materials uniquely identified?
3	• Are labels, adhesives, and fasteners made of durable materials compatible with the material to which they are attached? • Are labels securely attached? • Are labels oriented for easy reading and located as close as practical to the labeled item? • Do labels not interfere with equipment operations or indicators?
4	• Do directives prohibit informal labels and provide a process for replacing labels? • Do directives provide for deliberate inspections for missing or damaged labels, such as post-maintenance checks, operator tours, lineup sheets, or other appropriate means? • Do directives include a process to document lost, damaged, or incorrect labels and procure replacements? • Do directives include provisions for temporary replacement labels, including: documentation of senior operations supervisor approval, verification of proper placement, and documenting temporary labels in the facility? • Do temporary labels have the same information content as permanent labels?

REVIEW APPROACH

Record Review:

- Site Contractor assessment records associated with the Conduct of Operations program, the operator training and qualification program, operational responses to off-normal events, and procedure compliance
- Site Contractor Conduct of Operations Matrix and associated implementing procedures
- Documented Safety Analysis (DSA)
- Technical Safety Requirements (TSR)
- Routine assessments and oversight of Conduct of Operations program implementation in support of facility operations
- Site Organization Charts
- Procedure for the development, preparation, revision, and use of procedures
- Temporary procedure changes
- Procedure feedback program
- Procedure feedback backlog
- List of piping and instrumentation diagram (P&ID) drawings for safety-class (SC), safety-significant (SS), and defense-in-depth system(s) and supporting subsystems that are deemed SC, SS, or important to safety (defense in depth)
- List of SR test procedures for safety systems
- List of completed SR test packages for safety systems for the previous 18 months or previous three performances, if there have been less than three tests in the previous 18 months

- List of SS and defense-in-depth system modifications for the past 3 years
- Temporary modification control procedure and list of current temporary modifications, and any related impairment or out of service procedures or records
- Operator, Maintenance, and Cognizant System Engineer (CSE) staff training programs and procedures
- Operator and CSE training procedures, courses and lessons plans, and operator and CSE qualifications requirements
- Operator and CSE qualification cards
- List of operating procedures
- List of operator round sheets, TSR surveillance recording documents, and normal, abnormal, alarm response, and emergency procedures
- Completed operator round sheets
- Completed operator logbooks
- Operator required reading program
- Required reading backlog
- System operability determination process/procedure and a list of completed operability determinations conducted within the last two years
- Operations related Condition Reports for the past two years
- Fact findings associated with operational events
- Causal Analysis associated with operational events for the past two years
- Open operations related condition reports (backlog)
- Operational related corrective action plan effectiveness reviews for the past two years
- Operations Metrics
- Corrective action plans for missed Operations Metrics
- Operations Manager Standing Orders
- Operations Manager Night Orders

Interviews:
- Facility Manager
- Operations Manager
- Assistant Operations Manager
- Training Department Manager
- Procedure Development Lead
- Shift Supervisors
- Field Supervisors
- Shift Technical Advisors/Shift Engineers
- Control Room Supervisors
- Control Room Operators
- Field Operators
- Training Instructors
- Procedure Writers
- Work Control Lead for the facility
- Work Planners who support the facility
- Cognizant System Engineer(s) who support the facility

Observations:

- Facility operational demonstrations
- Facility and building walkdowns and reviews
- Facility operational rounds
- Lockout/Tagout operations in the facility
- Review of completed logbooks
- Review of Temporary Modification Log with comparison to facility conditions
- Review of Administrative Lock Records with comparison to facility conditions
- Inspection of Operator Aids in the facility, including evidence of periodic review
- Entry and exit of limiting conditions for operation (LCO)
- Designation of personnel to minimum staffing assignments
- Recording of qualification hours for selected positions
- Simulator training for off-normal conditions
- Inspection of facility for uncontrolled/unapproved/out-of-date procedures; especially in shift operating bases
- Plan of the Day meetings
- Shift turnovers
- Start of Watch meetings
- Control Room Protocols
- Pre-job briefs
- Equipment manipulations (startups and shutdowns)
- Valve lineups
- Tagout applications
- Tagout removals
- Independent verifications of tagouts and valve lineups
- Conduct of Post Maintenance Testing
- Conduct of TSR surveillances
- Communication equipment routine checks
- Log keeping
- Operational evolutions
- Procedure use
- Tabletop or walkthrough demonstrations of selected above activities when actual performance opportunities are not available