Last Energy

Quality Assurance Program Description

PWR-5 Reactor Pilot Program

August 2026

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Acronyms and Abbreviations

AP	Administrative Procedure
CAR	Corrective Action Report
DOE	U.S. Department of Energy
FSF	Fundamental Safety Function
IMS	Information Management System
LE	Last Energy
LWR	Light Water Reactor
MPM	Management Procedures Manual
NSDA	Nuclear Safety Design Agreement
PDSA	Preliminary Documented Safety Analysis
PPO	DOE PWR-5 Project Office
PQM	DOE Project Quality Manager
PWR	Pressurized Water Reactor
PWR-5	PWR-5 Project
SQA	Software Quality Assurance
SSC	Structures, systems, and components
QMP	Quality Management Procedure
QA	Quality Assurance
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
QAPP	Quality Assurance Program Plan
QL	Quality Level

Regulatory Note:

This Quality Assurance Program is established in accordance with DOE Order NE O 414.1 and DOE Order NE 414.1D [2]. In developing this program, Last Energy has taken appropriate account of the quality assurance principles contained in ANSI 15.8 [1], which has been used as the consensus standard for the Quality Assurance Program. ANSI 15.8 was chosen due to its strong alignment with the PWR-5 scope.

1. Purpose and Scope

This document describes the actions that personnel within Last Energy are committed to taking to ensure quality assurance is appropriately incorporated into the PWR-5 project. It defines the programmatic framework under which implementing procedures are developed and applied for activities affecting quality.

More specifically, this document establishes the quality assurance (QA) requirements for the planning, design, procurement, construction, testing, operation, and assessment of activities affecting quality for the PWR-5 Project. This includes the management of personnel and contractors; the procurement, installation, and verification of structures, systems, and components (SSCs); and the control of software used in quality-affecting applications

This document is periodically updated. At this stage, Last Energy requests DOE review and approval of this Quality Assurance Program Description, including the graded approach described herein.

2. Quality Assurance Policy and Objectives

Whether for employees, contractors, SSCs, or software, Last Energy defines quality as "the protection of life, safety, environment, and assets – in that order."

It is the policy of Last Energy's management team to implement and maintain an effective Quality Assurance Program. Last Energy's management commits to compliance with DOE quality requirements, continuous improvement, and a culture of safety.

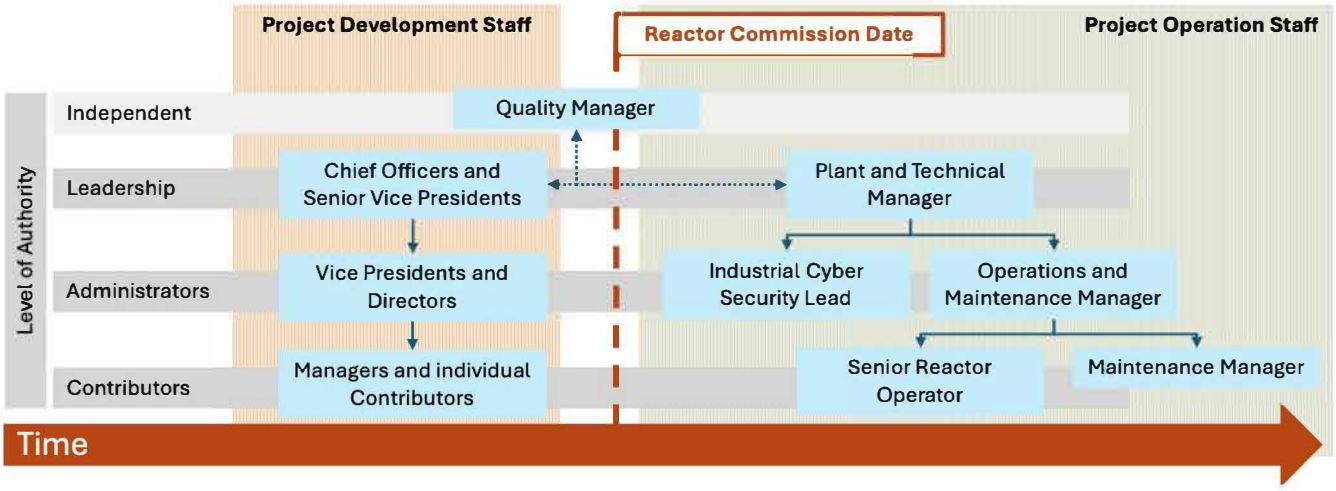
3. Organization, Responsibilities, and Authority

Last Energy's organization is split across different levels of authority, geography, and function. Functions within include Commercial, Engineering, Licensing, Project Development, Procurement, Accounting, Finance, Technology, Legal, Human Resources, and Quality Assurance (QA). QA personnel have sufficient authority, organizational freedom, and direct access to senior management to identify quality issues, recommend corrective actions, and escalate significant issues to senior leadership.

The QA manager supports the incorporation of quality standards into the design process over pre- and post-commission activities. Pre-commission, the project will be under the responsibility of the Project Development Staff. Post-commission, the senior-most authority of the PWR-5 will transition to the Plant and Technical Manager. The appropriate independence and authority of the QA function shall be maintained throughout all project phases. Within the scope of their work, each involved employee, contractor, or vendor is responsible for implementing the QA processes described in this document.

Each employee and contractor performing work under the PWR-5 Project is responsible for complying with applicable QA requirements as defined in this QAPD and associated implementing procedures or procurement documents.

Figure 1: Transition of PWR-5 Authority upon Commission



4. Quality Assurance Program Elements

There are three key elements to the QAPD required by NE O 414.1 [2]: (1) the ten Quality Assurance criteria defined in NE O 414.1, (2) Suspect/Counterfeit Item (S/CI) prevention, and (3) Software QA for Facility Contractors. This section will expand on each of these elements and how they relate to the PWR-5.

4.1. Quality Assurance Criteria

The below criteria are direct requirements for the QAPD as stated in NE O 414.1 [2].

Table 1: Required Quality Assurance Criterion Descriptions

Criterion #	Discipline	Title	Summary
1	Management	Program	Leadership processes and procedures for instilling and upholding high quality standards as appropriate throughout the organization
2	Management	Personnel Training and Qualifications	Processes and procedures for new-hire solicitation, application review, onboarding, and evaluations
3	Management	Quality Improvement	Leadership processes and procedures for corrective action should trends of quality deviance arise
4	Management	Documents and Records	Processes and procedures for the maintenance and retention of documents and records.
5	Performance	Work Processes	Processes and procedures for equipment operation guides, storage, and disposal
6	Performance	Design	Processes and procedures for specifications, drawings, design criteria, and component performance.
7	Performance	Procurement	Processes and procedures for assessing bids, audit suppliers, and recording supplier outcomes
8	Performance	Inspection and Acceptance Testing	Processes and procedures for component-specific inspection protocols including regular, scheduled maintenance, testing, and calibration
9	Assessment	Management Assessment	Processes and procedures for conducting internal audits regarding performance/effectiveness
10	Assessment	Independent Assessment	Processes and procedures for conducting independent audits regarding performance/effectiveness

4.2. Graded Approach

In accordance with DOE quality assurance expectations, the PWR-5 Quality Assurance Program is implemented using a graded approach.

Quality Level (QL) assignments are derived directly from the approved safety basis. Items and activities credited as Safety Class (SC) or Safety Significant (SS) in the safety analysis are assigned QA controls consistent with that designation. Items and activities not credited as hazard controls are managed under a proportionate, commercial-grade level of control.

The graded approach considers the following factors in determining the appropriate level of QA rigor for a given activity, item, or process:

- The relative importance to safety, safeguards, and security;
- The magnitude of any hazard involved;
- The life-cycle stage;
- The programmatic mission;
- Facility characteristics;
- The relative importance of radiological and nonradiological hazards.

The graded approach applies to all activities within the scope of this Quality Assurance Program, including design, procurement, fabrication, testing, operation, software control, and assessment.

For Phase 1 of the PWR-5, the Quality Level (QL) definitions below establish the basis for consistent application of QA requirements across the PWR-5 Project:

- **QL-1**: Items, services, and activities (SSCs, software, and analyses) whose failure would directly prevent the fulfillment of a credited Safety Class (SC) function relied upon in the safety analysis / technical specification requirements to protect the public. Commercial items are subject to Commercial Grade Dedication (CGD) or an equivalent process to ensure performance. If no Safety Class SSCs or activities are identified in the approved safety basis, QL-1 will not be applied.

- **QL-2**: Items, services, and activities (SSCs, software, and analyses) necessary for a credited Safety Significant (SS) function relied upon as a major contributor to defense-in-depth or worker protection exceeding established radiological criteria. Excludes supporting or informational functions unless explicitly credited. Commercial items are subject to graded verification or dedication.

- **QL-3**: All items and activities not explicitly and quantitatively credited as hazard controls in the safety analysis / technical specification requirements. These are non-safety items controlled under the contractor QA program using a graded approach focused on standard commercial/industrial specification control and acceptance.

- **Non-QL Items:** Supplies, such as food, tools, or stationery equipment are not considered QL items.

Assignment of the QL grade is done in accordance with these definitions for the relevant steps in the specific processes. The process diagrams indicate where this is undertaken and at what level.

4.2.1. Grading Determination

Quality Levels will be accurately assessed and assigned to items and activities that affect quality (during design, operation, performance verification, and decommissioning) and which are specifically required by regulations or are required for licensing. Any requests for exemptions shall be documented; and they shall contain sufficient justification to support the exemption request.

The appropriate QA level shall be determined in accordance with the definitions above. The basis for QL-1 assignments shall be documented, traceable to the approved safety basis, and retained as a Quality Assurance record. Individual QL assignments do not require separate DOE approval unless specifically required by contract or by changes to the approved safety basis.

Figure 2: Proper Assignment Process for Quality Level 1 Items and Activities



4.3. Management Criteria

There are four criteria related to Program Management (Program, Personnel Training and Qualifications, Quality Improvement, and Documents and Records).

4.3.1. Criterion 1 – Program

Last Energy Project Development Staff, and subsequently Project Operation Staff, are responsible for the establishment and execution of the Quality Assurance Program (QAP) as described in this document. Last Energy may delegate to others, such as contractors, agents, or consultants, the work of executing the QAP, or any part thereof, but Last Energy retains the responsibility for its administration:

- maintaining a record of delegation,
- performing administrative activities, and
- ensuring QA controls and compliance.

Quality Assurance Organizational Structure

The organizational structure, program responsibilities, and levels of authority of the Last Energy staff performing work on the PWR-5 are separated as Project Development Staff and Project Operation Staff. All organization and

authority presented herein is PWR-5 Project-specific and represents program relationships established to implement PWR-5 Project activities. Notably, the Quality Manager has access to all personnel.

Personnel with QA job functions shall have the responsibility and authority to verify the adequacy and effectiveness of QA plans, requirements, and QA Program implementation by Last Energy and its subordinate organizations. A dedicated Quality Manager position shall be established prior to commencement of operations. Until that time, QA responsibilities shall be assigned to a designated individual who has responsibility for developing and implementing this Quality Assurance Program. Until that time, Figure 1 is a representation of the leadership roles and level of authority granted to those roles pre-commission development and onsite operations of the PWR-5. The following role descriptions highlight the QA job functions of the Project Operation Staff.

Plant and Technical Manager

The Plant and Technical Manager is responsible for direction of the PWR-5 operation. This management function includes responsibility for the PWR-5 Program, including final Last Energy resolution of conflicts and disputes involving quality arising from differences of opinion between QA Office personnel and technical/administrative personnel.

Quality Manager

The development and verification of the PWR-5 QA Program is directed by the Quality Manager. The Quality Manager is organizationally independent of programmatic or budgetary constraints, and reports to the senior leadership. The Quality Manager maintains a direct line to the Chief Executive Officer and remains organizationally independent of the Plant and Technical Manager and the operating line both before and after reactor commissioning, consistent with the independence required for quality assurance functions under NE O 414.1 Criterion 1 and 10 CFR 830.122(a)(1). This person will:

- Serve as a focal point in developing and verifying the PWR-5 QA Program;
- Maintain liaison with Last Energy US CEO and the Plant and Technical Manager to assure adequate compliance with the PWR-5 QA Program;
- Provide and direct QA support (QA Office staff) for the PWR-5;
- Have review and approval authority as outlined in this document and other implementing procedures;
- Have authority to escalate work that does not meet QA standards to Senior Leadership; and
- Elevate unresolved quality-related disputes to the appropriate management level in accordance with established escalation processes.

Operations and Maintenance Manager

The Operations and Maintenance Manager is responsible for the direct day-to-day operations, ensuring all operational activities meet safety, security, and regulatory requirements. This includes:

- Develop and implement preventive, predictive, and corrective maintenance schedules;
- Assure effective coordination between operations and maintenance teams for facility performance;

- Review maintenance and operation logs, approve work orders, and lead troubleshooting efforts with technical personnel; and
- Oversee personnel training and qualification to maintain operational readiness.

Maintenance Manager

The Maintenance Manager is responsible for maintaining, calibrating, and repairing instrumentation and control systems. This includes:

- Analyze system performance data to detect early signs of failure;
- Implement upgrades to meet evolving technical and cyber security standards;
- Develop testing procedures and provide hands-on training for operating staff; and
- Collaborate with the cyber security team to secure I&C from threats and vulnerabilities.

Senior Reactor Operator (Training Manager)

The Senior Reactor Operator will serve as the licensed operator-in-charge during the operational phase, including reactor startup, shutdown, and transient operations. These responsibilities include:

- Complete necessary training and acquire DOE SRO license;
- Lead training programs, ensuring all operational staff are qualified and certified per DOE O 426.2A [3]
- Prepare, review, and update procedures for safe reactor operation;
- Evaluate operator performance during drills and actual operations, recommending further training as needed; and
- Coordinate with plant management on investigation and documentation of operational events.

Quality Assurance among Project Development Responsibilities

Project Development Staff fall under many disciplines, including engineering, legal, accounting, commercial, and product. The persons performing QA functions shall have sufficient authority, access to work areas, and organizational freedom:

- to identify quality problems;
- to initiate, recommend, or provide solutions through designated channels;
- to verify implementation of these solutions; and
- to assure that further processing, delivery, installation, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.

This authority includes the ability to stop (or cause to be stopped) unsatisfactory work through established channels. Notably, all staff will be empowered to raise concerns to QA leadership as quality and safety are integral parts of the culture and operating procedures at Last Energy.

Quality Assurance Levels of Authority

The authority for the resolution of disputes involving quality arising from a difference of opinion between QA personnel and others shall be identified and resolved by the next highest level of authority – Contributors, to

Administrators, to Leaders (Figure 1). This authority shall include the ability of QA personnel to elevate the resolution of disputes to progressively higher organizational levels through established channels .

Contractor Management

If organizations other than Last Energy are involved in the execution of activities affecting quality, then the responsibility and authority of that organization relative to Last Energy shall be established clearly. The external interfaces between organizations and the internal interfaces between organizational units and changes thereto shall be documented. All interface responsibilities shall be defined and documented. The Last Energy Quality Assurance Procedures (QAPs) provide the implementing interface controls used by all the PWR-5 Participants while the Last Energy and any pertinent Support Contractor QMPs describe the methods of conducting inter-organizational interfaces.

Review and Approval of Subcontractor Quality Assurance Programs

Last Energy shall perform oversight of the QA activities of all organizations (including subcontractors doing supportive work) under its purview. Oversight activities include the following as appropriate:

- Review of subcontractor quality assurance arrangements, as appropriate to the safety significance of the work.
- Surveillance of subcontractor activities affecting quality to verify compliance with requirements.
- Performance of quality audits to verify the adequacy and compliance of QA programs where appropriate for the Quality Level.

On a contract-to-contract basis, as appropriate, procedures shall be established by Last Energy for the review of subcontractor QA programs documentation for adequacy, completeness, and relevance.

4.3.2. Criterion 2 – Personnel Training and Qualifications

All personnel will receive training on the basis of, need for and content of the Quality Assurance Program. Last Energy shall establish requirements for the selection and training of personnel performing or verifying activities that affect Quality Level 1 and Quality Level 2 items and activities to ensure that personnel are qualified for the tasks they are undertaking. Consistent with the Privacy Act of 1974 [4], these selection and training requirements shall (1) establish position descriptions, (2) set forth minimum personnel qualifications, and (3) provide for appropriate training prior to initiation of activities that affect Quality Level 1 and Quality Level 2 items and activities. In addition, personnel performing activities that specifically require certification by applicable codes and standards shall be certified in accordance with those specific requirements and applicable implementing procedures and shall receive continuing training as appropriate to maintain job proficiency.

Personnel that are onboarded and maintained to perform activities or affect items at Quality Level 1 and Quality Level 2 will meet or exceed the application, onboarding and routine evaluation components of employment. Training and qualification requirements for QL-3 activities shall be commensurate with the nature of the work and applicable commercial or industrial standards. Personnel Qualification records will be retained as lifetime QA records.

The continuing training program shall be established and maintained to ensure personnel retain and improve the knowledge, skills, and abilities necessary to safely and effectively perform assigned duties. The program shall be implemented using a systematic approach to training or an approved alternative process and shall incorporate a graded approach.

Continuing training shall be provided to qualified and certified personnel, including operators, operations supervisors, technical personnel, maintenance personnel, and other personnel whose duties may affect nuclear safety, quality assurance, or compliance with the documented safety basis.

The continuing training program shall include, as applicable:

- Significant facility system and component changes
- Procedure changes
- Applicable recent industry operating experience
- Changes in the safety basis documentation
- Other training as needed to correct identified performance gaps
- Normal, abnormal and emergency procedures
- Use of facility systems to control or mitigate accidents
- Refreshers on topics covered as part of initial training and qualification
- Operational drills

Continuing training requirements, attendance, examination results, evaluations, and qualification status shall be documented and maintained as lifetime quality records.

4.3.3. Criterion 3 – Quality Improvement

Day-to-day behaviours are steered by four core Last Energy values, which contribute to this overall safety culture. These values are:

- Challenge Culture: every individual is encouraged to question decisions and surface concerns, a hallmark of mature nuclear-safety and security cultures.
- Ownership: staff accept personal accountability for the consequences of their work, reinforcing single-point responsibility for safety and environmental outcomes.
- Practicality: risk-informed trade-offs are expected, ensuring that safety, environmental and security considerations are weighed explicitly in each decision.
- Continuous Improvement: a “no-blame” philosophy underpins learning-from-experience, encouraging prompt reporting of errors and near-misses.

Last Energy commits to a risk informed, graded approach to identification, evaluation, disposition and correction of quality deviations, which is set out in the ‘Nonconformance, Corrective Action and Improvement’ procedure [5]. Last Energy also recognises the importance of raising opportunities for improvement and areas of good

practice, to strengthen the safety culture and improve overall performance. All personnel are empowered to raise quality deviations, opportunities for improvement and areas of good practice, which are systematically reviewed and actioned where appropriate.

The process for identification, evaluation, disposition and correction of nonconformances uses a graded approach based on risk, categorizing an issue as either a significant condition adverse to quality (category 1), a condition adverse to quality (category 2), or a minor condition (category 3).

- Category 1 issues attract the most rigorous resolution, with a required investigation, root cause analysis, evaluation of extent of condition, and corrective action.
- Category 2 issues require an investigation with an apparent cause analysis and corrective action.
- Category 3 issues may result in corrective action, but in some cases, a minor condition may be acceptable without rectification if the cost/effort is disproportionate.

This is defined in more detail in the Nonconformance of Process or Product SOP [8]

The effectiveness of the Quality Assurance Program and corrective action trends shall be periodically assessed by QA leadership. The frequency and scope of such assessments shall be commensurate with the safety significance and maturity of the program. Results shall be documented and reported to senior management, as appropriate

4.3.4. Criterion 4 – Documents and Records

Per the Document and Records Control [7] procedure, a controlled document is any document that prescribes processes, specifies requirements, or establishes design activities within the scope of the Quality Assurance Program. This includes, but is not limited to: supporting safety basis documents; quality assurance procedures; technical procedures and work instructions; design documents, specifications, drawings, and calculations.

Controlled document status is applicable to all Quality Levels, including Quality Level 3, under proportionate controls. This ensures a single coherent system for all documents within the program scope, consistent with the graded approach in the Quality Assurance Program Description.

The preparation, review, approval, and issuance of documents for use including changes thereto, shall be controlled through the implementation of methods that assure that only correct documents are used.

A graded approach to controlled document review and approval is taken, with QA management involvement as appropriate relative to the Quality Level of the document. Controlled documents will then be maintained in an appropriate database (accessible to relevant parties) underneath a document tracker ensuring the revision status and completion of updated documents.

Records retention periods shall be established based on regulatory requirements, safety significance, and contractual obligations. Records important to safety shall be retained for the life of the facility unless otherwise authorized by applicable requirements.

Last Energy Records Database

A records system or systems shall be established by Last Energy at the earliest practicable time, consistent with the schedule for accomplishing work activities. The implementing Quality Assurance Procedure shall:

- Identify the types of records to be generated, purchased, or maintained, including records referenced in pertinent final reports and other documents.
- Identify the methods to be used to comply with all applicable records requirements, including those to be used to control in-process records.
- Identify and define the responsibilities of the PWR-5 Participants as they are relevant to components in the Database.
- Identify retention requirements, that shall include duration, location, and assigned responsibility.

4.4. Performance Criterion

In accordance with NE O 414.1 [2], four Quality Assurance criteria address Program Performance: Work Processes, Design, Procurement, and Inspection and Acceptance Testing.

4.4.1. Criterion 5 – Work Processes

Activities affecting quality shall be performed in accordance with documented instructions, procedures, drawings, or other appropriate controls commensurate with the assigned Quality Level. For all Quality Levels, as applicable, work shall be performed consistent with industry codes, standards, and/or regulatory requirements and references will be made to quantitative or qualitative acceptance criteria as appropriate.

As it pertains to Quality Level 1 or Quality Level 2 items, item-specific protocols for use, maintenance, storage, and disposal will be followed to prevent damage, loss, or deterioration. This includes calibration and maintenance of equipment used for monitoring, testing, inspection, or data collection that affects quality.

4.4.2. Criterion 6 – Design

Design refers to specifications, drawings, design criteria, and component performance requirements for the PWR-5. Design information and design activities refer to data collection and analysis activities that are used to support design development and verification.

Design activities affecting QL-1 and QL-2 items shall be subject to design verification by qualified personnel other than the individual(s) who performed the original design. The extent of verification shall be commensurate with the safety significance and complexity of the design activity.

Design activities shall incorporate applicable codes, standards, regulatory requirements, and relevant prior design information, as appropriate to the scope and Quality Level of the work. As mentioned in Criterion 4, the Records Database will be accurately maintained for version control as a source of quality and accuracy. Design reviews and approvals shall be conducted in accordance with documented procedures appropriate to the assigned Quality Level, with defined roles for design authority and QA review.

Anticipated Design Inputs

Design inputs can include many characteristics and functions of an item or system. These inputs vary depending on the application; however, the following three categories capture the anticipated PWR-5-specific design inputs that may require QA assessment:

- Functional and Performance Requirements
- Environmental and Physical Boundary Conditions
- Programmatic, Regulatory, and Assurance Requirements

Configuration Control

Effective configuration control ensures that the approved design, the installed plant configuration, and the documentation describing that configuration remain consistent throughout the life of the facility. Work performed during design, manufacture, construction, maintenance, operations, or decommissioning may introduce changes that affect configuration. Implementation of this Quality Assurance Program Description, through the Quality Assurance processes ensures that such changes are properly evaluated, reviewed, approved, implemented, verified, and documented so that the configuration baseline accurately reflects the current state of the plant.

The Quality Assurance procedures ensure production and maintenance of a controlled baseline of design documents, equipment data, and safety-basis information, and implements a formal change control process. Changes arising from design maturation, vendor information, or field conditions are assessed for impact.

A graded approach is applied to focus the highest level of control on the items and activities attracting the highest Quality Level. Roles and responsibilities, including design authority, engineering, safety, quality assurance, procurement, and construction, are defined to ensure effective interface management and clear ownership of configuration information. The Quality Assurance procedures integrate across design, procurement, manufacture, construction, and operation to ensure that installed configurations match approved designs and that documentation is updated to reflect as-built conditions.

Design Change Control

A need for a design change may arise from updates to regulatory requirements, interface changes between systems, audit findings, or test feedback. Changes shall follow the steps laid out in the Design Control and Engineering Change Management quality assurance procedure [6].

Design changes affecting QL-1 or QL-2 items, or that could impact credited safety functions, shall be evaluated to determine whether a revision to the approved safety basis is required prior to implementation. As appropriate, communication on the changes, revised logic, and/or updated operational procedures will be communicated to the appropriate staff. Communication and revised standards will be logged and implemented.

4.4.3. Criterion 7 – Procurement

Procurement controls shall be applied commensurate with the assigned Quality Level, with the highest level of scrutiny applied to QL-1 items and services and graded controls applied to QL-2 and QL-3.

The following subsections are pertinent to solicitations for Quality Level 1 and Quality Level 2 items and activities.

Commercial items procured for QL-1 and QL-2 applications shall be subject to Commercial Grade Dedication or an equivalent verification process to ensure they meet safety basis requirements.

Procurements will be performed as described in Procurement and Supplier Quality Procedure [9].

Table 2: Required Components of Procurement Documentation

Required Component	Description/Purpose
Scope of Work (Services Only)	A statement of the scope of work to be performed by the supplier shall be in the procurement documents.
Technical Requirements	The end user shall identify the relevant codes and standards applicable to the content being purchased when requesting a purchase through procurement. The purchaser will ensure the relevant technical requirements will be met,which could include specific drawings, codes, standards, certifications, etc.
Documentation Requirements	The procurement documents at all tiers shall identify the documentation required to be submitted to the purchaser (e.g. Certificates of Conformance, Material Test Reports). The time of submittal also shall be established.
Control of Purchased Items and Services	Establish measures to confirm items/services conform — source evaluation, objective quality evidence, source inspection, audit, and delivery examination as appropriate.
Counterfeit, Fraudulent or Suspect Item Prevention	Our terms and conditions shall be embedded in our PO's, which will be issued as necessary, and shall state, "If Vendor discovers or suspects that any Goods or components supplied to Last Energy contain or may contain [counterfeit, fraudulent, or suspect items] CFSI, Vendor shall immediately notify Last Energy in writing and cooperate fully with Last Energy's investigation.
Visibility to their Quality Program and Rights of Access	Our terms and conditions shall be embedded in our PO's, which will be issued as necessary to govern purchases, and shall state, "Last Energy and its authorized representatives shall have the right, upon reasonable prior written notice and during normal business hours, to inspect, audit, and copy Vendor's books, records, and facilities relating to the performance of the Work under a Purchase Order, including quality control records, financial records relating to Fees and expenses, and compliance records. Vendor shall retain such records for the period required by Applicable Law and shall cooperate fully with Last Energy's audit activities."
Notification Of Nonconformances	Our terms and conditions shall be embedded in our PO's, which will be issued as necessary to govern purchases, and shall state, "Vendor represents and warrants that: (a) the Goods will be new and free from defects and Non-conformances in workmanship, materials, manufacture, and design"

Bid Evaluation and Selection

A review of the procurement documents and changes thereto shall be made to assure that documents transmitted to the prospective supplier or suppliers include appropriate provisions to assure that items or services will meet the specified requirements.

Bid submission reviews shall be performed and documented prior to contract award. Reviews shall be performed by personnel who have access to pertinent information, and who have adequate understanding of the requirements and intent of the procurement documents – including the appropriate QA staff for Quality Level 1 and Quality Level 2 items and activities.

The selection of suppliers shall be based on evaluation of their capability to provide items or services in accordance with the requirements of the procurement documents, before the award of contract. Measures for evaluation and selection of procurement sources, and the results thereof, shall be documented; they shall include one or more of the following items:

- Evaluation of the supplier's history of providing an identical or similar product that performs satisfactorily in actual use; the supplier's history shall reflect current capability;
- Supplier's current QA records, supported by documented qualitative and quantitative information, that can be evaluated objectively; and/or
- Supplier's technical and quality capability as determined by a direct evaluation of the supplier's facilities, personnel, and QA program implementation.

For QL1 and, as appropriate QL-2, items and activities, the review by the organization shall assure that the following requirements are met:

- QA requirements are clearly and correctly stated and are inspectable and controllable;
- Adequate acceptance and rejection criteria are provided;
- Any procurement document changes have been substantiated, recorded, and approved; and
- Procurement documents have been prepared, reviewed, and approved in accordance with this QA program description.

Notably, should there be any unacceptable QA conditions, Last Energy shall resolve or obtain commitments from the supplier to resolve unacceptable QA conditions before the award of the contract.

4.4.4. Criterion 8 – Inspection, Acceptance Testing, and Qualification Testing

As referenced in the previous criterion on procurement, all Quality Level 1 and Quality Level 2 items and activities shall undergo inspection and acceptance testing protocols relevant to their nature – including control measurement and calibration. Quality Level 3 items and activities will be assessed as appropriate to their manufacturing standards and purpose.

Records of inspections, tests and calibrations and will include:

- Details of the item
- Date of inspection/test/calibration
- Name of personnel involved
- Description of inspection/test/calibration
- Results against acceptability criteria
- Reference to information or action taken in connection with nonconformances.

Inspection

Measures shall be established by Last Energy to provide inspections required to verify conformance of an item or activity to specified requirements if necessary. These measures shall provide for:

- Inspections to be performed in accordance with written procedures by qualified personnel, who did not perform the work being evaluated;
- Criteria for determining when inspections are required, or how and when inspections are to be performed;
- Acceptance criteria for the inspection being undertaken shall be taken from approved technical documents;
- Specification of any environmental control requirements;
- Specification of any calibrated measuring or test equipment required;
- Specification of any provisions required for data acquisition;
- Identification of mandatory hold points; and
- Identification of inspections requiring special expertise.

Results of all inspection activities shall be documented by the inspecting organization and shared with Last Energy.

Test Control

Tests required to verify conformance of an item to specified requirements, and/or to demonstrate that items will perform satisfactorily in service shall be planned and executed. The following are required:

- Tests to be performed in accordance with written procedures by qualified personnel;
- Criteria for determining when tests are required, or how and when tests are to be performed;
- Acceptance criteria for the test being undertaken shall be taken from approved technical documents;
- Specification of any environmental control requirements;
- Specification of any calibrated measuring or test equipment required;
- Specification of any provisions required for data acquisition;
- Identification of mandatory hold points; and
- Identification of tests requiring special expertise.

Results of all test activities shall be documented by the testing organization and shared with Last Energy.

Control of Measuring and Test Equipment

Measures shall be established to ensure that tools, gauges, instruments, and other measuring and test equipment used in activities that affect quality are controlled, calibrated, and adjusted properly at specified periods to maintain accuracy within necessary limits.

Calibration reports and certificates will be stored in line with Criterion 4 and will include sufficient data to ensure a retrospective verification of conformance.

The control program shall apply to measuring and test equipment used in activities affecting quality, where accuracy is necessary to verify conformance to specified requirements. Last Energy shall describe the establishment, implementation, and assurance that the calibration program is effective.

Qualification Testing and Methodology

Qualification testing shall be performed to provide objective evidence that a Structure, System, or Component (SSC) or software application is capable of fulfilling its safety-related design basis functions under simulated operational and environmental conditions. To minimize operational risks and ensure technical accuracy, all qualification testing for safety-related applications shall adhere to a "Test-Like-You-Fly" methodology. This philosophy mandates that test configurations, environments, inputs, and operational sequences must duplicate the actual expected facility operational profiles as closely as technically practicable. Test results shall be documented and evaluated by the responsible design organization to assure that test requirements have been met.

Qualification testing is specifically required under the following circumstances:

1. First-of-a-Kind (FOAK) or New Designs: When an SSC utilizes a new design, unproven technology, or a novel application of an existing technology within the PWR-5 scope.
2. Commercial Grade Dedication (CGD) Critical Attributes: When Method 1 (Special Tests and Inspections) is selected to verify critical characteristics that cannot be verified through standard post-receipt inspections alone.
3. Environmental or Operational Boundaries: When an item is required to perform a credited safety function while exposed to harsh environmental conditions (e.g., extreme radiation, seismic hazards, thermal cycles, or high pressure).
4. Design Changes or Modifications: When an engineered change or modification to an existing QL-1 or QL-2 item introduces new variables that could impact its established safety-basis performance.

4.1. Assessment Criterion

4.1.1. Criterion 9 – Management Assessment

Line management shall perform periodic assessments of activities for which they are responsible to evaluate the effectiveness of work processes, compliance with established procedures, and the adequacy of resources and controls. Management assessments may include reviews, surveillances, performance metrics, and self-assessments, and shall be conducted at a frequency commensurate with the safety significance and complexity of the work.

Conditions adverse to quality identified during management assessments shall be entered into the corrective action process and resolved in accordance with Criterion 3.

4.1.2. Criterion 10 – Independent Assessment

The Last Energy audit program, which focuses on assurance of the quality management system, shall be supplemented by independent assessment activities. The purpose of an independent assessment is to monitor or observe items or activities to verify conformance to specified requirements. Independent assessments shall be conducted by personnel who are qualified in the area they are assessing and organizationally independent of the work being evaluated. Independent assessments shall be scheduled at a frequency commensurate with the safety significance, complexity, and performance history of the activities being evaluated.

Conditions adverse to quality identified during management assessments shall be entered into the corrective action process and resolved in accordance with Criterion 3.

5. Quality Assurance for Suspect/Counterfeit Item (S/CI) Prevention

This section will expand on the second element: quality assurance for suspect/counterfeit item prevention. Processes for the prevention, detection, control, reporting, and disposition of Suspect/Counterfeit Items must be identified, established, and implemented in accordance with NE O 414.1 [2]. This plan consists of five areas that, when appropriately combined, will support effective prevention of counterfeit items. These are delivered through the Quality Assurance Procedures.

Table 3: S/CI Prevention Strategy Summary

Area	Description
Oversight and Prevention	Establish oversight processes to prevent the introduction of S/CIs into Safety Significant (SS) and Safety Class (SC) Structures, Systems, and Components (SSCs).
Inspection, Identification, and Disposition	Inspection, Identification, and Disposition – Develop processes for the inspection, identification, evaluation, and disposition of installed S/CIs in SS and SC SSCs. These processes will consider potential hazards, environmental and worker risks, cost/benefit impacts, and appropriate schedules for replacement. S/CIs that remain in use must be clearly marked.
Training	Define training requirements for managers, supervisors, and workers on S/CI prevention, detection, and disposition. The implementing procedure will specify the appropriate audience, frequency, and delivery methods.
Information Management	Ensure provisions are in place for the collection, dissemination, and use of accurate and current S/CI information.
Reporting	Incorporate applicable reporting provisions, including: a. DOE O 210.2A, "DOE Corporate Operating Experience Program" b. DOE O 221.1B, "Reporting Fraud, Waste and Abuse to the Office of Inspector General" c. NE O 232.2, "Occurrence Reporting and Processing of Operations Information"

Notably, coordination with the DOE Office of Inspector General will be required prior to the destruction or disposition of S/CIs and associated documentation where fraud, intentional misrepresentation or other criminal activity is suspected.

6. Software Quality Assurance for Facility Contractors

The final quality assurance element for this QAPD required by NE O 414.1 [2] is Software Quality Assurance for Facility Contractors. This requirement includes guidance for software that is (1) government-owned and contractor-operated and (2) privately-owned and privately-operated.

6.1. Government-Owned and Contractor-Operated

Not applicable for the PWR-5.

6.2. Privately-Owned and Privately-Operated

Computer software used to perform QA Level 1 and 2 analyses to support a license application for the PWR-5 shall be controlled to ensure that the software is acquired, and maintained in an orderly, systematic, and traceable manner.

Last Energy follows a software QA procedure that provides for the application of the requirements in this section based on the nature, complexity, importance, and intended application of that software to the PWR-5.

The Last Energy software QA procedure is to be based on the concept of the software life cycle. Relevant documentation necessary to support the intended application shall be obtained from the software supplier, where available.

Last Energy shall prepare and implement a Software Quality procedure that defines controls commensurate with the safety significance and intended application of software used for QL-1 and QL-2 activities. The procedure shall:

- Provide criteria for the application of the requirements of this section based on the nature, complexity, and importance of the software used to perform site characterization activities that support design and performance analyses for the PWR-5.
- Identify the software configuration management methodology for establishing software baselines and baseline updates (changes) and for tracking changes throughout the life of the software.
- Specify the process to be used for verification and validation of the software developed or acquired for and applied to site characterization activities supporting design and performance analyses for the PWR-5.
- Identify the procedure for reporting and documenting software defects and deficiencies, including the sources, evaluating impacts of defects and deficiencies on previous calculations, and determining appropriate corrective action.

6.2.1. Configuration Management

Software shall be placed under configuration management as each baseline is identified. Software baseline elements shall be uniquely identified to assure positive control of all revisions; the identification of each software configuration item shall be directly related to the associated documentation.

6.2.2. Software Documentation

Computer programs developed and/or modified shall be documented in accordance with applicable internal procedures and recognized industry practices appropriate to the software's safety significance. This requirement may be met in part by existing documentation that is properly referenced and related to the requirements.

6.2.3. Software Testing

Testing of QL-1 and QL-2 rated software, including new or modified software, shall be performed to identify boundary conditions, and to provide a suitable benchmark or sample problem of installation. The goal of testing is to develop a set of test cases that have the highest probability of detecting the most errors to identify under what conditions the software does not perform properly.

6.2.4. Software Verification and Validation

Verification and validation of computer software used for QL-1 and QL-2 applications shall be performed prior to reliance on such software for technical or safety-related calculations. The extent of verification and validation shall be commensurate with the software's safety significance and complexity. In all cases, the verification and validation of software shall be completed prior to relying on the software to support the license application. Verification and validation procedures shall assure that the software adequately and correctly performs all numerical and logical operations, that the functional requirements and capabilities are implemented properly in the software design, and that the software does not perform any unintended function that either by itself or in combination with other functions can degrade the entire system.

6.2.5. Software Qualification

Existing software shall be qualified for use. This qualification shall be based on the ability of the software to provide acceptable results for specific applications and compliance with the requirements of this section as well as an IT Security Review and compliance audits.

Software Implementing Procedures

Methods for determining the applicability of requirements and managing interfaces involving software documentation, configuration management, change, qualification, verification, and validation, shall be described in the Last Energy Software Quality and Digital Tools procedure.

6.2.6. Documentation of Computer Software

Documentation of software intended for engineering applications shall include the following as a minimum:

- Software functional requirements specification;
- Software design and related change documentation;
- Software verification and validation documentation;
- User documentation;
- Code assessment and support;
- Continuing documentation and code listings; and
- Software summary

This documentation is a QA record and is subject to the requirements of this QAPP. The Last Energy Software Quality procedure will provide detailed requirements on the documentation of computer software used on the PWR-5.

6.2.7. Software Configuration Management System

Last Energy shall institute a software configuration management system and shall provide documentation of this system to the Records Management System. The minimum requirements for the configuration management system shall be:

1. Inclusion of a unique identification, including software version numbers, in the output and listings of the software;
2. Source code listings of the software, if available; and
3. A traceable chronology of software versions, including descriptions of the changes made between versions that will permit the history of the development or acquisition of software and the testing of software to be reconstructed.

References

[1] American Nuclear Society, ANSI/ANS-15.8-1995: Quality assurance program requirements for research reactors

[2] U.S. Department of Energy. (2020). DOE Order NE O 414.1: Department of Energy nuclear energy quality assurance order.

[3] U.S. Department of Energy. (2024, January 29). DOE O 426.2A Chg 1 (AdminChg), Personnel selection, training, qualification, and certification requirements for DOE nuclear facilities [Order]. DOE Directives System. https://www.directives.doe.gov/directives-documents/400-series/0426-2-border-a-chg1-admchg

[4] Privacy Act of 1974, 5 U.S.C. § 552a (1974).

[5] Last Energy. (2026). Nonconformance, Corrective Action, and Improvement (US0200-QA-PRO-0036).

[6] Last Energy. (2026). Design Control and Engineering Change Management Procedure (US0200-ENG-PRO-0001).

[7] Last Energy. (2026). Document and Records Control (US0200-QA-PRO-0038).

[8] Last Energy. (2026). Nonconformance of Process or Product SOP (US0200-QA-PRO-0054).

[9] Last Energy. (2026). Procurement and Supplier Quality Procedure (US0200-QA-PRO-0034).

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Appendix A: Quality Assurance Procedures and Additional Context

1. Document Structure

This QAPD is structured to align with the ten Quality Assurance criteria identified in Attachment 2 of NE O 414.1 [2]. The program requirements described in this document are implemented through a consolidated suite of ten Quality Assurance Procedures (QAPs).

The ten QAPs collectively address all ten NE O 414.1 criteria [2]. The procedures are not organized as a strict one-to-one correspondence with individual criteria. Instead, they are structured as integrated management processes that reflect how work is actually planned and performed within the PWR-5 Project. This approach improves usability, reduces fragmentation of related requirements, and supports effective implementation by a small organization operating under a graded, risk-informed framework.

Table A1 provides a clear mapping between the ten NE O 414.1 criteria [2] and the ten implementing QAPs. This table demonstrates that each criterion is addressed within the procedure suite, even where a single QAP supports more than one criterion.

Table A1: Quality Assurance Procedures Mapped to QAPD Criteria

Quality Assurance Procedure	Document Number	Relevant QAPD Criteria
Assessment	US0200-QA-PRO-0041	Criterion 9 - Management Assessment Criterion 10 -Independent Assessment
Design Control and Engineering Change	US0200-ENG-PRO-0001	Criterion 3 - Quality Improvement Criterion 5 - Work Processes Criterion 6 - Design
Document and Records Control	US0200-QA-PRO-0038	Criterion 4 – Documents and Records
Inspection, Testing and Calibration	US0200-QA-PRO-0040	Criterion 9 – Management Assessment
Reporting, Corrective Action, and Improvement	US0200-QA-PRO-0036	Criterion 3 - Quality Improvement Criterion 9 – Management Assessment
Organization, Roles, and QA Program Control	US0200-PLT-PRO-0001	Criterion 1 – Program Criterion 4 – Documents and Records Criterion 5 - Work Processes
Personnel Qualification and Training	US0200-QA-PRO-0039	Criterion 2 – Personnel Training and Qualifications
Procurement and Supplier Quality	US0200-QA-PRO-0034	Criterion 7 – Procurement Criterion 8 – Inspection and Acceptance Testing

Quality Assurance Procedure	Document Number	Relevant QAPD Criteria
Software Quality and Digital Tools	US0200-QA-PRO-0037	Criterion 5 - Work Processes Criterion 6 - Design
Work Planning, Instructions, and Field Changes	US0200-PLT-PRO-0002	Criterion 4 – Documents and Records Criterion 5 - Work Processes Criterion 6 - Design

- Use of Terms: "Shall," "Should," and "May

In this Quality Assurance Program Description, the following conventions are used to indicate the degree of obligation associated with statements of requirement or guidance:

- Shall — Indicates a mandatory requirement. Statements using "shall" are binding and must be implemented as written to ensure compliance with this Quality Assurance Program and applicable regulatory or contractual commitments.
- Should — Indicates a recommended practice or guidance. Implementation is expected unless an alternate method provides an equivalent or improved result and is documented as such.
- May — Indicates a permissive or optional provision. This action is acceptable within the bounds of this program but is not mandatory.

3. Interpretation of Requirements

In the event of ambiguity or conflict among requirements contained within this Quality Assurance Program Description (QAPD), implementing procedures, or referenced standards, the following principles apply:

1. Hierarchy of Requirements:

   - Regulatory and contractual requirements take precedence over this QAPD.
   - This QAPD takes precedence over implementing procedures and subordinate documents.
   - Where this QAPD references standards or guides (e.g., DOE Orders, or ANSI/ISO standards), those references are binding to the extent identified herein.

2. Resolution of Conflicts:

   - When a conflict exists between this QAPD and a referenced document, the more conservative or stringent requirement shall apply unless a documented technical justification for deviation is approved by the responsible QA authority and the appropriate management level. Clarifications or interpretations affecting compliance shall be formally documented and approved prior to implementation.

3. Equivalency and Alternate Methods:

- Alternate methods or approaches may be used when they achieve an equivalent or greater level of quality assurance and are justified, reviewed, and approved in accordance with established QA procedures. Such alternatives shall be documented and retained as QA records.

4. Authority for Interpretation:

- The Quality Manager (or designee) is the final authority for interpretation of QA requirements within this program unless otherwise directed by contractual or regulatory authority.

Audit trail

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