Ward250

San Rafael Facility Quality Assurance Program Description

Configuration Classification	:	**QAPD**
Document Number	:	**100474**
Revision	:	**02**
Status	:	**Approved**
Issue Date	:	**October 2025**
Project	:	**Ward250**

EXECUTIVE SUMMARY

Program Overview

Valar Atomics has established a comprehensive Quality Assurance Program (QAP) for the Ward250 research reactor and Fuel Fabrication Facility at the Utah San Rafael Energy Research Center (USREL). This program implements a graded approach informed by ANSI/ANS-15.8-1995 to meet 10 CFR 830 Subpart A requirements, tailored for the facility's research demonstration nature and limited operational duration of approximately 12 months.

Key Facilities

- **Ward250 Research Reactor**: A low-power High Temperature Gas-cooled Reactor (HTGR) utilizing proven WardZero prototype technology, featuring passive safety systems, TRI Structural ISOtropic (TRISO) fuel particles, and helium coolant
- **Valarin Fuel Fabrication Facility**: State-of-the-art TRISO fuel manufacturing facility using proven technology with modern improvements, designed with safe-by-design philosophy
- **Organizational Structure**.

The program establishes clear lines of authority and responsibility:

- **Chief Executive Officer (CEO)**: Ultimate legal responsibility and resource allocation authority
- **Chief Operating Officer (COO)/Chief Nuclear Officer (CNO)**: Direct oversight of nuclear operations, engineering, and quality assurance
- **Facility Director**: Day-to-day management and regulatory compliance
- **Quality Assurance Lead**: Independent QAP implementation and assessment
- **Operations Managers**: Separate managers for reactor and fuel facility operations

Quality Assurance Framework

The QAP encompasses 16 key elements covering the complete lifecycle from design through operations:

Design and Documentation Control

- Comprehensive Ddesign control processes with verification by independent personnel
- Robust Ddocument control ensuring current procedures information are is available where needed
- Change control processes including Unreviewed Safety Question evaluations

Procurement and Supply Chain Management

- Rigorous Ssupplier evaluation and selection processes

- Controls to prevent counterfeit or substandard parts
- Comprehensive Rreceiving inspection and acceptance procedures

Operations and Maintenance

- Formal linspection programs for construction and maintenance activities
- Systematic Ttest control for equipment verification and qualification
- Calibrated measuring and test equipment with traceability to national standards

Quality Assurance and Continuous Improvement (applicable to all stages)

- Nonconformance identification and corrective action processes
- Comprehensive quality records management system
- Regular Aassessments and management reviews to ensure program effectiveness

Implementation Strategy

The program employs a graded implementation approach that:

- Focuses resources on safety-significant activities
- Scales requirements based on risk and complexity
- Accommodates the limited operational scope and 12-month demonstration timeline
- Requires full implementation prior to fuel receipt

Key Benefits

- Ensures safe operation through systematic quality controls
- Provides regulatory compliance with federal requirements
- Establishes clear accountability and responsibility structures
- Enables efficient resource allocation through risk-based grading
- Supports successful demonstration of advanced reactor technology

Conclusion

This Quality Assurance Program establishes the foundation for safe, compliant operation of the Ward250 facility while maintaining efficiency appropriate for a research reactor demonstration. The program's graded approach ensures that quality resources are focused where they provide the greatest safety benefit, supporting Valar Atomics' mission to advance high-temperature gas-cooled reactor technology.

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ABBREVIATIONS

This list contains the abbreviations used in this document.

Abbreviation or Acronym	Definition
AGR	Advanced Gas-Cooled Reactor
ANSI	American National Standards Institute
CEO	Chief Executive Officer
CFR	Code of Federal Regulations (USA)
CNO	Chief Nuclear Officer
COO	Chief Operating Officer
DOE	Department of Energy (USA)
HTGR	High Temperature Gas-cooled Reactor
kWth	Kilowatt thermal
M&TE	Measuring and test equipment
QA	Quality Assurance
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
SSC	Structures, Systems and Components
TRISO	TRI Structural ISOtropic
USREL	Utah San Rafael Energy Research Center
VASR	Valar Atomics San Rafael

1. INTRODUCTION

This document provides the description of the Valar Atomics, Inc. (Valar Atomics) QAP for the design completion, construction, and operation of the Ward250 research reactor and the Valar Atomics Fuel Fabrication Facility at the USREL. Collectively, these installations are referred to as the Valar Atomics San Rafael (VASR) Facility.

The Ward250 Quality Assurance Program Description (QAPD) is the top-level program document that establishes the quality assurance policy and assigns major functional responsibilities for all quality-related activities conducted by or for the VASR Facility.

This QAPD implements the requirements of 10 CFR 830 Subpart A and the quality assurance criteria of NE O 414.1 Attachment 2 using ANSI/ANS-15.8-1995 (R2013), "Quality Assurance Program Requirements for Research Reactors," as the voluntary consensus standard. This standard is applied with a graded approach appropriate to the VASR Facility's hazard category, operational profile, and limited operational duration, consistent with DOE-STD-1271-2025.

The Quality Assurance Program Description (QAPD) is the top-level policy document that establishes the quality assurance policy and assigns major functional responsibilities for the quality-related activities conducted by or for the VASR Facility. This program implements a graded approach informed by ANSI/ANS-15.8-1995, "Quality Assurance Program Requirements for Research Reactors," to meet the requirements of 10 CFR 830 Subpart A.

The Ward250 is a low-power High Temperature Gas-cooled Reactor (HTGR) research test demonstration reactor utilizing proven technology from the WardZero prototype. The reactor design incorporates passive safety features, TRISO fuel particles in Advanced Gas-Cooled Reactor (AGR) compacts, and helium coolant, resulting in an inherently safe system appropriate for research reactor operations.

The Ward250 Fuel Laboratory represents a state-of-the-art TRISO fuel manufacturing facility designed to produce high-quality coated particle fuel for advanced high-temperature gas-cooled reactors. The facility will manufacture TRISO-coated particle fuel embedded in graphite compacts, leveraging proven German HOBEG technology with modern process improvements. The facility incorporates a safe-by-design philosophy that ensures <HC3 categorization through multiple layers of inherent safety.

The scope of this QAP includes design, construction, and operation phase activities for the VASR Facility. Consistent with common licensing practice, text is written in the present tense, active voice, including discussions of activities and processes associated with a phased implementation of design, construction, and operation.

Valar Atomics establishes the necessary measures and governing procedures to implement the Ward250 QAP as described in this QAPD at the earliest time consistent with the schedule for accomplishing quality-affecting activities. Procedures and instructions that prescribe quality-related activities are developed prior to commencement of those activities. Personnel qualifications, organizational structures,

processes, and systems described herein are requirements to be satisfied before performing the activity, not descriptions of current capabilities.

1.1. SCOPE AND APPLICABILITY

The QAP applies to design completion, construction, and operations-phase activities affecting the quality and performance of safety-related structures, systems, and components (SSC) of the Ward250 research reactor and the Valar AtomicsValarin Fuel Fabrication Facility at the VASR Facility. Safety-related SSC, under the control of the QAP, are identified by design documents and include the reactor safety and protection system, engineered safety features, and applicable radiation monitoring systems as identified in the Technical Safety Requirements.

The QAP provides for the use of a graded approach to quality commensurate with the limited operational duration (approximately 12 months), low hazard category classifications of the VASR Facility. Cost and scheduling considerations have been addressed to ensure proper implementation of the QAP while maintaining efficiency appropriate for a research reactor demonstration.

All requirements of this Quality Assurance Program apply in full to safety-related structures, systems, and components (SSC) as identified in the VASR Facility safety analysis documents. The graded approach applies to the timing of procedure development, the level of documentation rigor for non-safety systems, and resource allocation.

Valar Atomics is committed to implementing this quality assurance program throughout all phases of the project—from site selection and design through construction and operation of the Ward250 research reactor and associated Valar Atomics Fuel Fabrication Facility at the VASR site.

1.2. UTILIZATION OF EXISTING WARDZERO HARDWARE

Ward250 incorporates proven hardware designs and components from the WardZero facility. WardZero operational data, performance history, and lessons learned serve as objective evidence for Ward250 design verification through comparison to similar proven systems per ANSI/ANS-15.8 Section 2.3.3(d).

WardZero components utilized for Ward250 shall:

- maintain identification and traceability to original design documentation, fabrication records, and operational history,
- be evaluated for configuration changes per Section 4.3 with modifications justified and documented, and
- be controlled per Section 9 to ensure proper use and prevent inadvertent installation of non-qualified items.

2. ORGANIZATION

2.1. ORGANIZATIONAL STRUCTURE

The organizational structure and assignment of responsibilities for the VASR Facility are defined and documented such that quality is achieved and maintained by those who have been assigned responsibility for performing work, and quality achievement is verified by persons not directly performing the work.

The VASR Facility operates within the broader Valar Atomics organizational structure, which includes corporate functions supporting multiple projects and facilities. Quality-affecting activities may be performed by both facility-specific and corporate personnel as defined in this section.

2.2. FUNCTIONAL RESPONSIBILITIES

2.2.1. Valar Atomics CEO

The VASR Facility operates under the Valar Atomics organizational structure with the Valar Atomics CEO serving as the Level 1 organizational head and holding legal responsibility for the facility authorization. The CEO is accountable for overall management and has the authority to allocate company resources as necessary to protect facility personnel, public health and safety, and the environment.

2.2.2. Chief Operating Officer/Chief Nuclear Officer (COO/CNO)

The COO/CNO reports directly to the CEO and has oversight responsibility for nuclear operations, engineering, and quality assurance functions. The COO/CNO ensures operational excellence and nuclear safety across all facility operations.

2.2.3. VASR Facility Director

The VASR Facility Director reports directly to the COO/CNO and is responsible for the administration, effective management, and safe operation of the facility in accordance with the conditions set forth in the facility authorization. The Facility Director has direct line management responsibility for ensuring full compliance with all regulatory requirements and is accountable for protecting the public, facility personnel, and the environment from any undue exposure to radiation.

2.2.4. Reactor Operations Manager

The Reactor Operations Manager reports to the Facility Director and is responsible for day-to-day operations of the Ward250 reactor. This includes supervising licensed operators, ensuring compliance with procedures and Technical Safety Requirements,

maintaining configuration control, and managing the operator training and qualification program. During routine operations, the reactor facility shall remain under the direct supervision of either the Facility Director, Reactor Operations Manager, or a duly licensed Senior Reactor Operator.

2.2.5. Fuel Facility Manager

The Fuel Facility Manager reports to the Facility Director and is responsible for day-to-day operations of the Valar Atomics Fuel Fabrication Facility. This includes supervising facility personnel, ensuring compliance with procedures and Quality Assurance requirements. During routine operations, the fuel facility shall remain under the direct supervision of either the Facility Director or the Fuel Facility Manager.

2.2.6. Quality Assurance Lead

The Quality Assurance Lead Manager reports to the COO/CNO and is responsible for establishing and implementing the QAP, performing assessments and surveillance and ensuring that activities affecting quality are performed in accordance with approved procedures. The QA Manager has sufficient independence from other priorities to bring forward issues affecting safety and quality. A dotted-line relationship with the CEO ensures appropriate independence.

2.2.7. Radiation Safety Lead

The Radiation Safety Lead Manager function reports to the VASR Facility Director and is responsible for the radiation protection program in accordance with 10 CFR 835. This function may be fulfilled by qualified USREL personnel under appropriate agreements.

2.2.8. Engineering Lead

The Engineering Lead Manager function reports to the COO/CNO and is responsible for engineering design and support services (including document control and records management).

2.2.9. Supply Chain Lead

The Supply Chain Manager function reports to the COO/CNO and is responsible for supply chain management (including supplier evaluation) and procurement.

2.3. STAFFING REQUIREMENTS

Valar Atomics shall provides sufficient resources in personnel and materials to safely conduct operations at the VASR Facility. The minimum staffing for WARDS250 Reactor operations includes qualified Senior Reactor Operators and Reactor Operators as specified in procedures. Technical support staff shall be available as needed for

maintenance, testing, and inspection activities. During reactor operation, staffing shall meet the requirements specified in the Technical Safety Requirements.

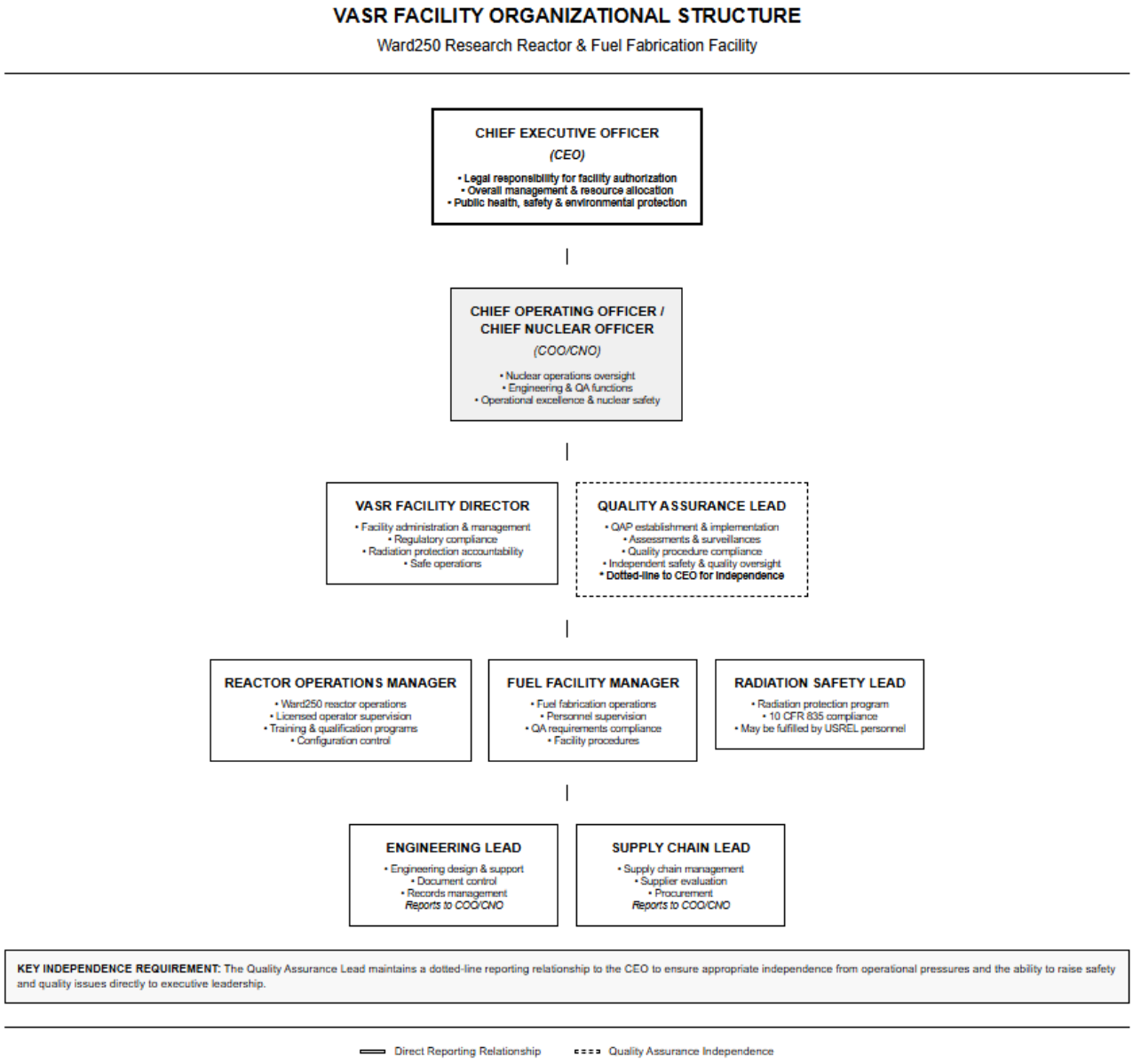

Figure 11: VSAR Facility Organizational Structure

3. QUALITY ASSURANCE PROGRAM

3.1. PROGRAM IMPLEMENTATION

Valar Atomics establishes this quality assurance program by implementing a policy for safe facility operation. The program requirements specified herein are detailed in implementing procedures that provide instructions for conducting quality-affecting activities. Valar Atomics establishes the necessary measures and governing procedures to implement QAP at the earliest time consistent with the schedule for accomplishing quality-affecting activities. Personnel assignments and progress toward achieving operational goals shall be documented.

The QAP is applied in a graded manner to quality-related items and activities which could affect the quality of SSC. Activities affecting quality include designing, purchasing, fabrication, handling, shipping, receiving, storing, cleaning, erecting, installing, repairing, maintaining, modifying, inspecting, testing, and operating. The program considers schedule delays and facility availability while ensuring safety requirements are met.

Personnel assigned to implement elements of the QAP shall be capable of performing their assigned tasks. Valar Atomics establishes and maintains indoctrination and training programs for personnel performing, verifying, or managing activities within the scope of the QAP to ensure that suitable proficiency is achieved and maintained. Personnel shall be qualified in accordance with applicable requirements as established in implementing procedures.

The measures applied to a particular engineered or administrative control will be graded commensurate with the reduction of the risk attributable to that control. This approach to achieving levels of quality is administered through Valar Atomics implementing documents.

The requirements of this QAPD are implemented through a hierarchy of controlled documents including implementing procedures, work instructions, and technical specifications. These implementing documents translate QAPD commitments into actionable requirements for personnel performing quality-affecting activities. Implementation is governed by the licensing basis for the VASR Facility and the Ward250 code of record which includes industry consensus standards (such as ASME, ASTM, AWS, and IEEE standards) incorporated into the facility design and operational baseline.

3.2. PERFORMANCE ASSESSMENT

Management shall periodically observe operations and identify deficiencies. Valar Atomics shall assess deficiencies to ensure the execution of corrective actions that prevent recurrence. When appropriate, trend analysis shall be performed to indicate where improvements or lessons learned could be implemented. Violations of operating practices shall be addressed and documented as appropriate.

The Facility Director shall conduct periodic management reviews to assess QAP effectiveness. These reviews shall examine performance indicators and corrective action status. The frequency of reviews shall be established in implementing procedures commensurate with operational activities and safety significance. Process improvement shall be achieved through operating experience reviews, trending of nonconformances, assessment findings, and continuous improvement initiatives.

4. DESIGN CONTROL

4.1. DESIGN PROCESS

Valar Atomics has established and implements a process to control the design, design changes, and temporary modifications of items that are subject to the provisions of the QAP. The design process includes provisions for the development, verification, approval, release, status, distribution, and revision of design inputs and outputs.

Applicable design inputs, such as design bases, performance requirements, regulatory requirements, codes, and standards have been identified and documented in sufficient detail to permit design traceability and verification. Design interfaces have been identified and controlled, with coordination among the participating design organizations. The design shall employ sound engineering and scientific principles, including application of applicable codes and standards, use of validated analytical methods, and consideration of operating experience from WardZero and similar research reactor facilities.

In most applications, computer programs used to develop portions of the facility design or to analyze a design for acceptability are fully documented, validated, and controlled to ensure the correctness of their output. When developing design programs, Valar Atomics controls these programs to ensure full documentation and validation. Valar Atomics requires documented revalidation for changes to previously validated computer programs. Valar Atomics verification of design-unique computer programs includes appropriate benchmark testing.

In some cases, more modern and efficient computational codes for HTGR applications may be used prior to their complete validation. This is consistent with one of the primary research objectives of Ward250. For these cases, Ward250's significant safety margins and inherent safety features provide substantial conservatism that accommodates potential code uncertainties while maintaining public and worker safety. Ward250 operational data will validate these modern codes and demonstrate whether they provide equal or superior accuracy to established codes.

4.2. DESIGN VERIFICATION

The adequacy of design is verified by qualified individuals other than those who performed the original design. Design verification is accomplished by one or more methods such as design reviews, alternate calculations, or qualification testing. For Ward250, WardZero operational data may support design verification for certain systems and components.

Design documents and records, which provide evidence that the design and design verification process were performed, shall be collected, stored, and maintained for the life of the safety-related item. These documents form the design basis for future modifications and operational decisions.

Valar Atomics verifies design adequacy through independent design verification using one or more of the following methods:

1. performance of design reviews,
2. use of alternate calculations,
3. performance of qualification tests, or
4. comparison of similar proven systems (such as WardZero).

The responsible Valar Atomics design organization identifies and documents the verification method(s) applied. Valar Atomics conducts design verification through competent individuals or groups other than the original designers, who may be from the same organization.

Valar Atomics completes design verification prior to operational reliance on components, systems, structures, or computer programs to perform their intended functions.

For Ward250, WardZero operational data and performance history may be used as one method of design verification (comparison to similar proven systems per ANSI/ANS-15.8-1995 Section 2.3.3(d)). WardZero operational data may also be used to confirm design margins after initial verification, provided such use does not constitute reliance on unverified Ward250 designs to perform safety functions in operations.

4.3. DESIGN CHANGES

Modifications to safety-related structures, systems, and components shall be based on the defined "as-exists" design. Valar Atomics documents and justifies changes to verified designs, applying design control measures commensurate with those applied to the original designChanges to verified designs shall be documented, justified, and subject to design control measures commensurate with those applied to the original design. These control measures include assurance that design analyses remain validThe control measures shall include assurance that the design analyses remain valid.

Valar Atomics evaluates design changes using the 10 CFR 830.203 Unreviewed Safety Question process to determine if prior DOE approval is requiredDesign changes shall be evaluated using the 10 CFR 830.203 Unreviewed Safety Question process to determine if prior DOE approval is required. Where a design change is necessary, the design process and verification procedure shall be reviewed and modified as appropriate.

4.4. COMMERCIAL GRADE ITEMS

Valar Atomics reviews commercial-grade equipment for safety-related applications to ensure adequate performance of intended functions. When commercial grade items undergo modification or special selection through inspection/testing to requirements exceeding the supplier's published product description, Valar Atomics represents these

items as distinct from standard commercial grade items with traceable documentation defining the differences.

Commercial grade dedication provides reasonable assurance that commercial grade items will perform their intended safety function through: identification of critical characteristics, selection of appropriate verification methods (source verification, receiving inspection, commercial grade survey, testing, or combination), and documented acceptance approved by Engineering and Quality Assurance.

5. PROCUREMENT DOCUMENT CONTROL

These procurement documents identify the documentation required from suppliers for Valar Atomics' information, review, or approval at each procurement level.Procedures shall be established to ensure that procurement documents contain sufficient technical and quality requirements to ensure that items or services satisfy Valar Atomics’ needs. Procurement documents at specified procurement levels shall identify the documentation required to be submitted by the supplier for information, review, or approval by Valar Atomics.

Valar Atomics' procurement documents define requirements for supplier reporting and disposition approval of non-conformances.Procurement documents shall include Valar Atomics’ requirements for reporting and approving disposition of supplier non-conformances associated with the items or services being procured. For safety-related structures, systems, and components, procurement documents prohibit sub-standard or counterfeit parts or materials.The procurement documents for safety-related SSC/services shall prohibit the supply/use of sub-standard or counterfeit parts or materials.

Valar Atomics procurement documents provide for access to supplier plant facilities and records for inspection or audit by Valar Atomics personnel, designated representatives, or other authorized parties. At each level of procurement, the procurement documents shall provide for access to the supplier's plant facilities and records for inspection or audit by Valar Atomics, a designated representative, or other parties authorized by Valar Atomics. For commercial-grade items in safety-related applications, procurement documents specify the critical characteristics requiring verification.For commercial-grade items used in safety-related applications, the procurement documents shall specify the critical characteristics to be verified.

6. PROCEDURES, INSTRUCTIONS, AND DRAWINGS

Valar Atomics performs quality-affecting activities in accordance with documented instructions, procedures, or drawings appropriate to each circumstance. Activities affecting quality shall be performed in accordance with documented instructions, procedures, or drawings appropriate to the circumstances. These documents include or reference quantitative or qualitative acceptance criteria for determining satisfactory

activity completion.These documents shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that activities have been satisfactorily accomplished.

Operating p Valar Atomics procedures provide direction to ensure facility operation within the design basis and in compliance with Technical Safety Requirements.rocedures shall provide appropriate direction to ensure that the facility is operated within its design basis and in compliance with Technical Safety Requirements. The Valar Atomics procedure development and control process ensures operating procedures are written, reviewed, approved by appropriate management, controlled, and monitored for technical correctness, clarity, and conciseness.Operating procedures shall be written, reviewed, approved by appropriate management, controlled, and monitored to ensure that the content is technically correct, and the wording and format are clear and concise.

Valar Atomics determines procedure detail based on task complexity, user experience and training, and potential significance of error consequences.The extent of detail in a procedure shall depend on the complexity of the task, the experience and training of the users, and the potential significance of the consequences of error. Valar Atomics develops procedures for activities commensurate with their safety significance, including reactor operations, maintenance, surveillance testing, and emergency response as appropriate.Procedures shall be developed for activities commensurate with their safety significance, including reactor operations, maintenance, surveillance testing, and emergency response as appropriate. A controlled copy of current operating procedures shall be maintained in the control room.

7. DOCUMENT CONTROL

VTalar Atomics controls the preparation, issue, and change of documents that specify quality requirements or prescribe quality-affecting activities to ensure correct document usehe preparation, issue, and change of documents which specify requirements that affect quality or prescribe activities affecting quality shall be controlled to ensure that correct documents are used. The Valar Atomics document control system provides for: identification of controlled documents and their distribution; assignment of responsibilities for document preparation, review, approval, and issuance; and review of documents for adequacy, completeness, and correctness prior to approval.The document control system shall be documented and provide for identification of documents to be controlled and their specified distribution, identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents, and review of documents for adequacy, completeness, and correctness prior to approval and issuance.

Valar Atomics reviews and approves major changes to controlled documents through the same organizations that performed original review and approval, unless specifically designating other organizations for this function.Major changes to controlled documents shall be reviewed and approved by the same organizations that performed the original review and approval unless other organizations are specifically designated. The Valar

Atomics document control system ensures obsolete or superseded documents are removed from use.The document control system shall ensure that obsolete or superseded documents are removed from use and that current documents are available at the location where the prescribed activity is performed. Controlled copies of documents shall be maintained in the electronic document management system and distributed to work locations as necessary for performance of quality-affecting activities.

8. CONTROL OF PURCHASED ITEMS AND SERVICES

The procurement of items and services shall be controlled to ensure appropriate procurement planning, source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services for acceptance upon delivery or completion.

8.1. SUPPLIER SELECTION

Valar Atomics selects suppliers based on evaluation of their demonstrated capability to provide items or services meeting procurement document requirements.The selection of suppliers shall be based on evaluation of their capability to provide items or services in accordance with requirements of the procurement documents.

8.2. VERIFICATION ACTIVITIES

Valar Atomics procurement processes require suppliers to be responsible for product quality, with verification and documented evidence of that quality. Valar Atomics controls, handles, and approves supplier-generated documents through established methods. The Valar Atomics procurement program provides for acquisition, processing, and recorded evaluation of technical, inspection, and test data against defined acceptance criteria. Based on product complexity and safety importance, Valar Atomics independently verifies supplier product quality through source surveillances, inspections, audits, or review of supplier non-conformances, dispositions, waivers, and corrective actions.The supplier shall be responsible for the quality of its product and shall verify and provide evidence of that quality. Supplier-generated documents shall be controlled, handled, and approved in accordance with established methods. Based on complexity of the product and importance to safety, Valar Atomics shall independently verify the quality of a supplier's product through source surveillances, inspections, audits, or review of objective evidence.

8.3. ITEM ACCEPTANCE

Valar Atomics provides assurance that purchased items and services conform to procurement specifications through an established acceptance system. Valar Atomics shall establish a system to provide assurances that purchased items and services conform to procurement specifications. Item and service acceptance methods include implementing procedures, source verification, receiving inspection, post-installation testing, or combinations of these methods as appropriate to the procurement.Methods used to accept an item or related service from a supplier shall be established in implementing procedure, source verification, receiving inspection, post-installation test, or a combination thereof. Receiving inspection shall verify proper configuration, identification, cleanliness, and absence of shipping damage.

8.4. SUSPECT AND COUNTERFEIT ITEM PREVENTION

Valar Atomics prevents suspect and counterfeit items in safety-related SSC through: qualified supplier selection, receipt verification for fraud indicators, personnel training on S/CI identification, and S/CI reporting per NE O 414.1 Attachment 2, Part B. Confirmed S/CIs shall be segregated, reported to DOE per NE O 232.2 and NE O 221.1B, and dispositioned in coordination with DOE.

8.4.8.5. IDENTIFICATION AND CONTROL OF ITEMS

When specified by codes, standards, or specifications that include identification or traceability requirements, the item identification and control process shall be capable of providing identification and traceability control. Items' identification shall be maintained from the initial receipt or fabrication of the items up to and including installation and use. Where physical identification on the item is either impractical or insufficient, physical separation, procedural control, or other appropriate means shall be employed. Identification markings shall be applied using materials and methods which provide clear and legible identification and do not detrimentally affect the function or service life of the item. Markings shall be transferred to each part of an identified item when the item is subdivided and shall not be obliterated or hidden by surface treatment or coatings unless substitute means are provided. Where specified, items having limited calendar or operating life shall be identified and controlled to preclude use of items whose shelf life or operating life is expired.

9. INSPECTIONS

Inspections to verify conformance of an item or activity to requirements shall be planned, documented, and performed. The inspection program shall apply to procurement, construction, modification, and maintenance. Inspection of items in process or under construction shall be performed for work activities where product quality cannot be determined by inspection of the completed product.

Inspection results shall be documented. Inspection shall be performed by persons other than those who performed the work being inspected, but they may be from the same organization. Each person who verifies conformance of work activities for purposes of acceptance shall be qualified to perform the assigned inspection task. The need for formal training shall be determined, and training activities conducted as required to qualify personnel who perform inspections and tests. On-the-job training shall be included, with emphasis on firsthand experience gained through actual performance of inspections. Records of inspection personnel's qualification shall be established and maintained by the employer.

Acceptance of items shall be documented and approved by authorized personnel. Inspection shall be performed by persons other than those who performed the work being inspected but they may be from the same organization.

10. CONTROL OF SPECIAL PROCESSES

Special processes include those in which the results are highly dependent on the control of the process or skill of the personnel, and those in which specified quality cannot be readily determined by inspection or non-destructive testing of the product. Valar Atomics implements necessary measures and governing procedures to ensure that special processes requiring interim process controls (such as welding, heat treating, and nondestructive examination) are controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means. The requirements of applicable codes and standards, including acceptance criteria for each process, shall be specified or referenced in the procedures or instructions that control the process. Records shall be maintained for currently qualified personnel, processes, and equipment associated with special processes.

11. TEST CONTROL

Formal testing shall be required to verify conformance of designated SSC to specified requirements and demonstrate satisfactory performance for service. Testing shall include prototype qualification tests, proof tests prior to installation, and functional tests.

Test requirements and acceptance criteria shall be provided in approved test procedures. Test results shall be documented and evaluated to ensure that test requirements have been satisfied. Test procedures shall include provisions for assuring that prerequisites for the given test have been met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions.

In the event that qualification testing is needed to verify design, the use of qualification tests is defined in a formal test plan that shall include appropriate acceptance criteria and shall demonstrate the adequacy of performance under conditions that simulate the most adverse design conditions. Test results are documented and evaluated by the responsible design organization to ensure that test requirements have been met.

12. CONTROL OF MEASURING AND TEST EQUIPMENT

Measuring and test equipment (M&TE) used in activities affecting quality shall be controlled, calibrated, and adjusted at specified intervals to maintain accuracy within required limits. The M&TE control program shall provide for calibration standards traceable to nationally recognized standards, calibration status identification, and evaluation of validity of previous inspection or test results when M&TE is found to be out of calibration.

M&TE shall be labeled or tagged to indicate calibration status. Records identifying M&TE, calibration data, and actual usage shall be maintained. The level of control shall be commensurate with the importance of the measurements being made. Out-of-calibration devices shall be tagged or segregated, and not used until they have been recalibrated.

13. HANDLING, STORAGE, AND SHIPPING

Handling, storage, and shipping of items shall be in accordance with work and inspection instructions, drawings, specifications, shipping instructions, or other pertinent documents or procedures for conducting the activity.

14. INSPECTION, TEST, AND OPERATING STATUS

The status of inspection and test activities shall be identified on the items or in documents traceable to the items in order to ensure that required inspections and tests are performed and to ensure that items which have not passed the required inspections and tests are not inadvertently installed or operated.

15. CONTROL OF NONCONFORMING ITEMS AND SERVICES

Items and services that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use. Controls shall provide for identification, documentation, evaluation, segregation when practical, and disposition of nonconforming items, and for notification to affected organizations.

Nonconformances shall be documented and dispositioned by authorized personnel. The disposition may be to use-as-is, reject, repair, or rework. Technical justification shall be provided for use-as-is or repair dispositions. Repaired and reworked items shall be reinspected in accordance with applicable procedures.

16. CORRECTIVE ACTIONS

Conditions adverse to quality shall be identified promptly and corrected as soon as practicable. For significant conditions adverse to quality, the cause shall be determined and corrective action taken to preclude recurrence. The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management.

17. QUALITY RECORDS

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.

Quality records include results of reviews, inspections, tests, audits, monitoring of work performance, materials analyses, qualification of personnel, procedures, and equipment.

Record retention periods shall comply with applicable regulatory requirements and shall be specified in implementing procedures.

17.1. RECORD RETENTION

Some records shall be maintained for the life of the facility while items are installed or stored for future use. Such records include those:

1. of value in demonstrating capability for safe operation;
2. of value in maintaining, reworking, repairing, replacing, or modifying an item;
3. of value in determining the cause or results of an accident or malfunction of a safety-related item;
4. that provide required baseline data for in-service inspections; or
5. of value in planning for facility decommissioning.

Other records shall be retained for shorter periods as determined by Valar Atomics.

17.2. RECORD STORAGE AND PROTECTION

Records shall be stored in locations that prevent damage from moisture, temperature, and pestilence. Additional provisions shall be made for special processed records such as radiographs, photographs, negatives, microfilm, and magnetic media, to prevent damage from excessive light, stacking, electromagnetic fields, temperature, and humidity. Records maintained by a supplier shall be accessible to Valar Atomics.

18. ASSESSMENTS

Periodic assessments shall be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness. Management shall assess management processes consistent with NE O 414.1 to evaluate effectiveness in achieving organizational objectives, identify problems, and implement corrective actions. Assessments shall be performed in accordance with written procedures or checklists by personnel who do not have direct responsibility for performing the activities being assessed.

Assessment results shall be documented and reviewed by management having responsibility in the area assessed. Follow-up action shall be taken where indicated. Personnel selected for assessment assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be assessed.

An independent assessment of QA program implementation shall be performed prior to initial fuel loading. This assessment may be conducted by qualified personnel from

another research reactor facility or by independent consultants familiar with research reactor operations.

19. IMPLEMENTATION

This QAP becomes effective upon approval by the VASR Facility Director and Valar Atomics President. Implementation shall be phased to support the project schedule, with full-scale implementation required prior to receipt of fuel. The QA Manager is responsible for maintaining this program and ensuring its continued adequacy and effectiveness throughout the operational period of the facility.

19.1. GRADED IMPLEMENTATION APPROACH

The provisions of this QAP shall be implemented as needed based on the actual work activities being performed. Not all sections of this program will require implementation if the associated activities are not conducted during the project. This graded implementation approach recognizes the limited scope and duration of the Ward250 demonstration.

19.2. IMPLEMENTATION DETERMINATION

The QA Manager, in consultation with the Facility Director, shall determine which QAP provisions require implementation based on planned work activities and their safety significance, actual procurements and modifications required, regulatory requirements, and risk-based assessment of quality impacts. Implementing procedures shall be developed for QAP sections requiring implementation prior to performing the associated activities.

This approach ensures that resources are focused on quality activities that directly support safe operation of the VASR Facility while avoiding unnecessary administrative burden for activities that are not performed.