Sandia National Laboratories

QUALITY ASSURANCE PROGRAM DESCRIPTION

REV: 5.0

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History of Revisions				
This page is a record of revisions to this document. A description of each revision is also noted.				
Revision	**Effective Date**	**Pages Revised**	**Description**	**Type of Revision**
1.0	07/31/12	N/A	Complete rewrite of the Quality Management System Description	Substantive
2.0	11/30/12	Multiple	Address feedback, editorial, and administrative changes	Administrative
3.0	5/31/13	Multiple	Address feedback, editorial, and administrative changes; modified format; added Table 1; substantive changes to Sections 1.1, 1.2, 2.2, 2.4, 2.5.7, 2.6, 2.7, 3.3.12.	Substantive
4.0	05/30/14	Multiple	Annual review and comment incorporation; update Table in Section 9.0 for NAP-24 applicability; change title to the *Quality Assurance Program Description* (QAPD); and verify currency for all policies, processes, and procedures.	Substantive
4.1	9/11/14	Multiple	FY14 NNSA review comments incorporated; updates made to several broken hyperlinks; correct typographical errors; correct procedure titles in Table 9.0.	Administrative
4.2	5/29/15	Multiple	Updates for 2015 include: changing ILMS references and description to Sandia Management System; Section 9.0 updates for changes to Corporate Policies, Processes, Procedures; updates to the graded approach throughout; updated hyperlinks to key documents; and expanded description of improvements to measures and metrics (Section 1.4).	Administrative
4.3	5/27/16	Multiple	Updates for 2016 include: revisions for changes to the Sandia Management System, and to the Sandia Management Model; revisions to figures and verbiage to match the updated *Performing Work at Sandia*; revisions to the list of entities registered to International Standards; added multi-site procurement language; and added reference to Internal Controls as specified in DOE O 413.1B, *Internal Control Program*, and OMB A-123, *Management Accountability and Control Circular*.	Administrative
5.0	8/1/17	Multiple	Updates for 2017 include: funding statement, titles (SLT, Laboratories Director, ALDs, etc.), 9100, PMUs, programmatic structure, and other formatting and editorial changes.	Substantive

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Foreword

Sandia achieves our national security mission by drawing on a deep foundation of expertise that enables mission delivery and the advancement of the frontiers of science and engineering. As described in our Strategic Plan, Sandia must continue to execute innovative technical approaches while operating efficiently, effectively, safely, and securely. To these ends, Sandia's quality program is structured to accomplish one key outcome—providing "exceptional service in the national interest."

Sandia's quality definition says it all:

Quality is meeting customer and Sandia expectations consistently and predictably through flawless execution of our personal and collective responsibilities.

Quality is meeting customer and Sandia expectations… Sandia's quality expectations are rooted in our mission, vision, and values; quality principles and methodologies; and workflow requirements established by us and our customers. In Sandia's structure, programs are logically grouped into portfolios, with an Associated Laboratory Director (ALD) accountable for a portfolio, and for some or all programs within that portfolio. This is described in more detail in the programmatic structure located in Section 1.2.

…consistently and predictably… Programs and divisions tailor their approach to consistently and predictably execute work and meet unique customer needs, which may involve the application of additional guidance, infrastructure, and government or industry standards.

…through flawless execution… We understand the need to prevent the unacceptable consequences of failing to meet customer and Sandia expectations. Flawless execution is an aspirational goal. It does not mean that mistakes or errors do not occur; it means that when they do occur, they are detected as early as possible and corrected so that our work product is error-free at the end of each activity. We accept the importance of safety and security when planning for and performing all aspects of our work. Success comes by being courageously impatient to discover problems and attacking them head on to foster continual improvements.

…of our personal and collective responsibilities. An empowered workforce, enabled by organization and management systems, renders the quality products and services that our customers expect. Each of us takes personal ownership of our work and responsibility for consistent and predictable outcomes.

It is incumbent upon all members of Sandia's workforce to perform work in a manner that enables these outcomes.

1.0 Sandia's Quality Assurance Program

Effective May 1, 2017, led by a new executive leadership team, Sandia began operating within a new organizational structure. National Technology and Engineering Solutions of Sandia (Sandia's) Quality Assurance Program (QAP) was established to assign responsibilities and authorities, define workflow policies and requirements, and provide for the performance and assessment of work. The QAP is implemented through an integrated set of elements that include the following elements:

- The Laboratory and Programmatic Structure
- The Corporate Policy System (CPS) as part of Corporate Policy Management
- The Laboratory Operating System (LOS)
- The Contractor Assurance System (CAS)
- The Mission Assurance Framework (MAF)

Figure 1, below, visually depicts the QAP. A description of each of the QAP elements is also provided in Section 1.1.

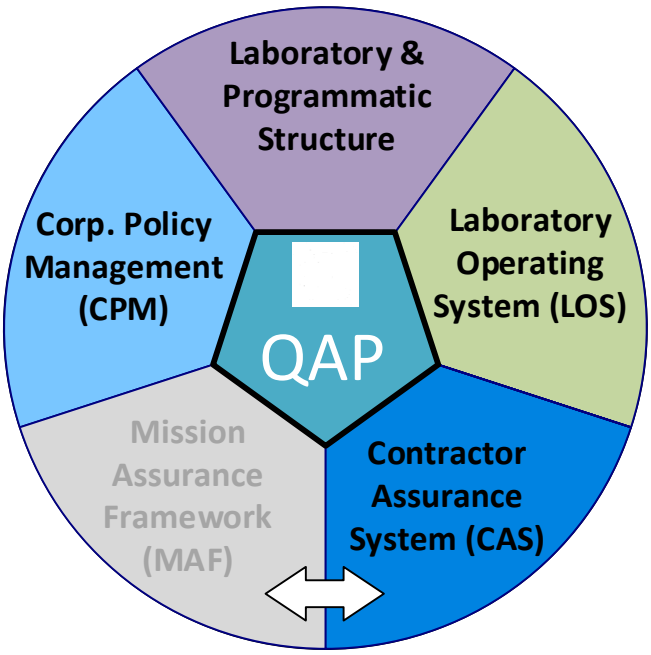

Figure 1: Quality Assurance Program Elements

The QAP was developed through the quality framework defined by the Corporate Procedure CG100.6.20, *Achieve Quality and Mission Success*, and the elements detailed in Section 1.2. CG100.6.20 establishes corporate expectations, authorities, and accountabilities for use of Plan-Do-Check-Act (PDCA) quality principles and defect prevention methodologies to improve mission and service performance while simultaneously fulfilling contractual obligations embedded in the criteria of DOE O 414.1D, *Quality Assurance* and 10 CFR 830, Subpart A, *Quality Assurance Requirements.* Corporate process CG100.6, *Ensure Quality Outcomes,* establishes Sandia expectations, authorities, and accountabilities for action to assess, monitor, and improve Sandia's management processes and operations.

The Mission Assurance Division (9000) is responsible for maintaining the Sandia QAP. More detailed discussions of the distributed approach, requirements flow down, and implementation are found in Section 4.0, *Distributed Approach for Achieving Quality Products and Services*, and Section 7.0, *Implementation of the Quality Criteria*. The information below describes the purpose of the Quality Assurance Program Description (QAPD), the purposes of the Sandia Management Model and Information, the CPS, and the Mission Assurance principles that support QAP implementation, assessment, maintenance, and improvement.

1.1. Sandia's QAP Elements

The QAP is the framework of interrelated policies, processes, procedures, and resources used to manage all work done at Sandia. It reflects the major functions performed by Sandia, and the management structure and management information used to plan, execute, and monitor work. The QAP is used by Sandia to deliver on mission commitments, ensure long-term customer confidence by improving management performance and effectiveness, achieve efficiencies to enhance mission work, and satisfy National Nuclear Security Administration (NNSA) and U.S. Department of Energy (DOE) quality and contractor assurance requirements. It includes the complete set of policies, processes, and procedures that make up the CPS. The Corporate Policy Statement describes the principles used by Sandia to establish business rules. Each of the QAP elements are described in the following sections.

1.1.1. Laboratory and Programmatic Structure

Figure 2, on the following page, details the new Sandia organizational structure and leadership.

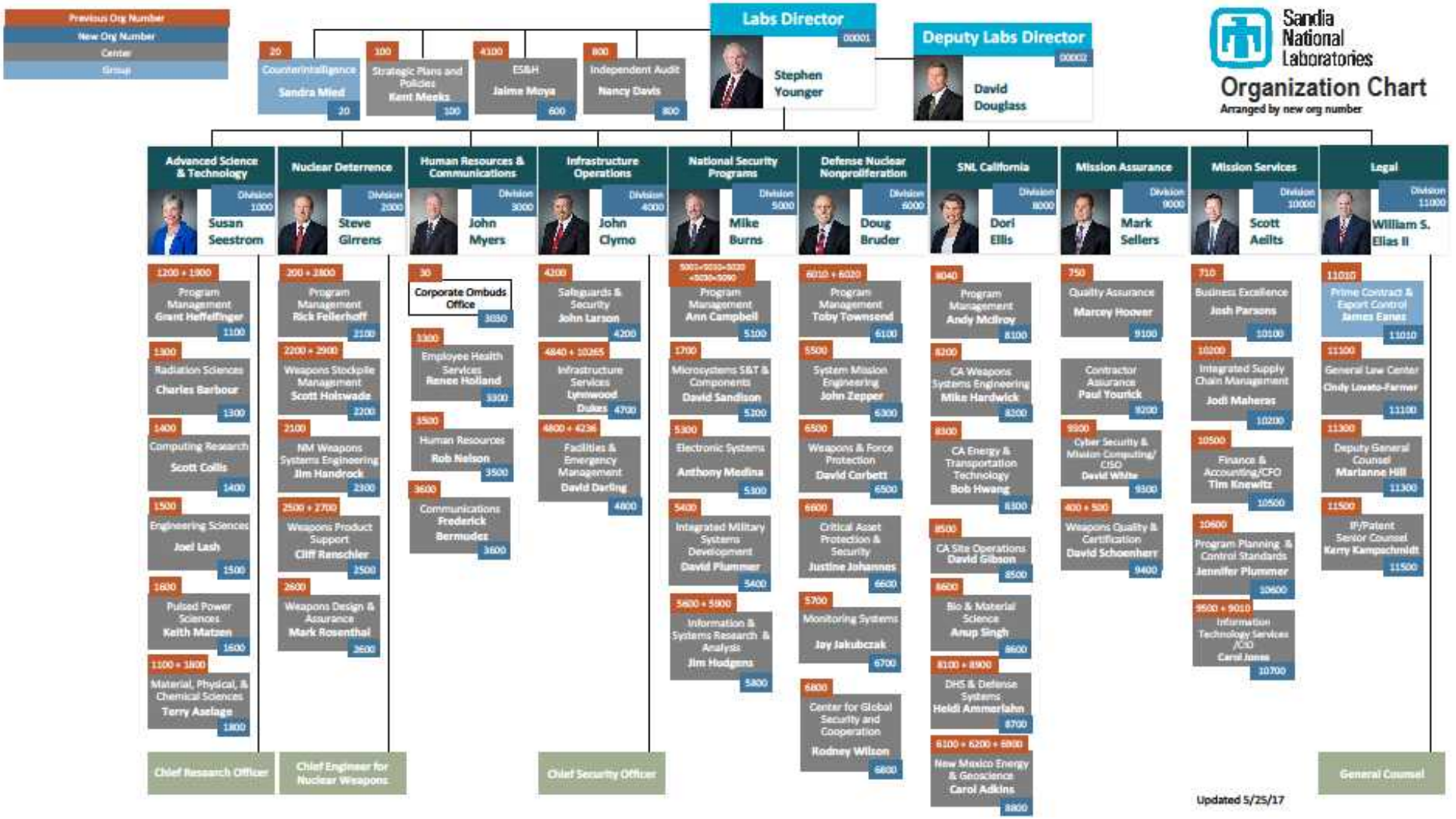

Figure 2: Laboratory Organizational Structure

Programmatic Structure

In conjunction with our organizational structure, the programmatic structure represents the distribution of accountability for developing and managing Sandia's programs. Together, the organizational and programmatic structures set the foundation for critical governance and financial processes and decisions such as

- Establishing responsibilities, accountabilities, and authorities for organizational and programmatic roles;
- Guiding the flow of performance assurance information throughout the organization and with other stakeholders;
- Delineating the internal boundaries for setting financial projections (direct funding, costs, and carryover) and workforce planning strategies; and
- Providing a framework for designing a simpler financial model and appropriately defining and sizing specific overhead cost pools.

Moving to a Simplified Programmatic Structure

Sandia has historically operated within a multi-dimensional management model, where programmatic roles and responsibilities are managed through a management entity known as a *Program Management Unit (PMU)*. The PMU is separate and distinct from the management entity responsible for stewardship of Sandia's capabilities (people, facilities, and tools) and execution of work, known as the *division*. Overlaying the PMUs and divisions is a separate construct, known as Sandia's *mission areas*, designed to establish Sandia's strategic priorities.

A cross-functional team consisting of Sandia's Chief Financial Officer, Program Management Unit Office Directors from Divisions 1000, 2000, 5000, 6000, and 8000, and stakeholders from Divisions 4000 (Physical Security) and 9000 (Cyber Security), designed a recommended programmatic structure that reduces the complexity inherent in the current structure, while continuing to enable the agility necessary to meet customer requirements. This recommended structure seeks to achieve the following:

- Eliminate the PMU management entity
- Logically group like programs into a broader portfolio and align them to a single Associate Laboratories Director's (ALD's) sphere of accountability, where optimal
- Streamline and consolidate programmatic and organizational accountabilities to a single ALD

Figure 3 illustrates the recommended programmatic structure; its key characteristics are subsequently described.

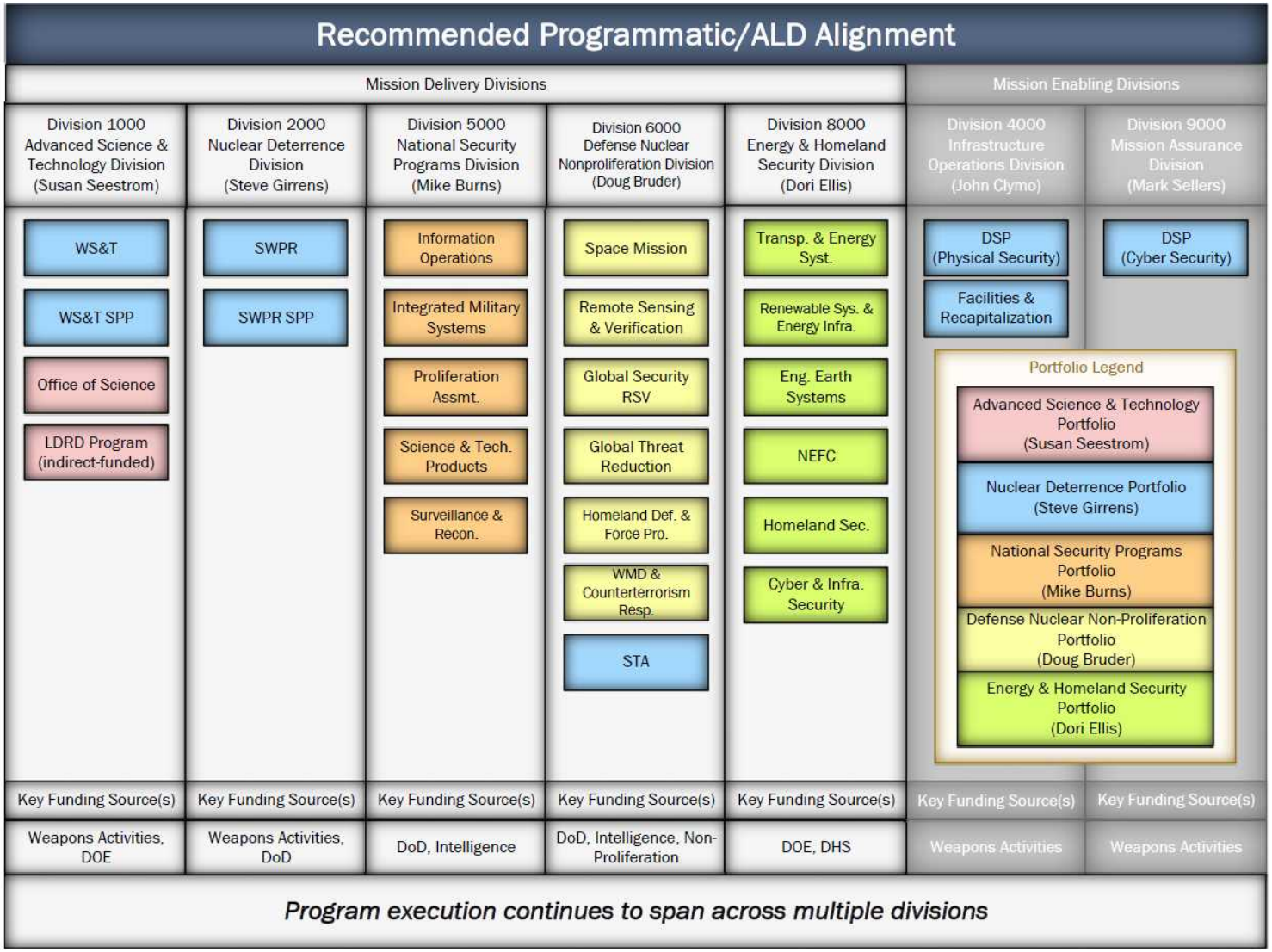

Figure 3: Programmatic/ALD alignment

Common Vernacular

During the programmatic structure design process, there was a recognized need for adopting a common vernacular when describing Sandia's programmatic and organizational structures. Relevant terms are defined below.

Key terms	
Portfolio	A logical grouping of related programs managed in a coordinated way to obtain benefits and control not available when managing them individually
Program	A logical grouping of related sub-programs (which can be further broken down to the project level) managed in a coordinated way to obtain benefits and control when managing them individually
Sub-program	A breakdown of a program into sub-categories
Project	A primary unit of work that can be broken down into one or more tasks
Division	Line organization containing centers responsible for the execution of the work and associated workforce

PMU Entity Elimination and ALD Alignment

To create a simpler management environment, the recommended structure eliminates the PMU management entity and logically groups like-programs into a broader portfolio. As depicted in Figure 3, each ALD is accountable for a portfolio of multiple programs, and some of or all the programs within that portfolio. In the spirit of simplicity, portfolios and their corresponding programs are aligned to a single ALD, where optimal.

Non-Weapons Activities-Funded Programs

For non-weapons activities-funded programs, alignment is more straightforward. In Divisions 5000, 6000, and 8000, a single ALD is accountable for managing an overall portfolio, and the distinct programs within that portfolio:

- The Division 5000 ALD is accountable for the entirety of the National Security Programs Portfolio, and the distinct programs within it.
- The Division 6000 ALD is accountable for the entirety of the Defense Nuclear Nonproliferation Portfolio, and the distinct programs within it.
- The Division 8000 ALD is accountable for the entirety of the Energy and Homeland Security Portfolio, and the distinct programs within it.
- The Division 1000 ALD is accountable for the entirety of the Advanced Science & Technology Portfolio, and the distinct programs within it, including the Laboratories Directed Research and Development Program. The Advanced Science & Technology ALD is also accountable for management of select weapons activities programs within the Nuclear Deterrence Portfolio.

Weapons Activities-Funded Programs

Due to the tremendous breadth of weapons activities-funded programs at Sandia, which comprise the *Nuclear Deterrence Portfolio*, alignment of programmatic accountability is more complex, continues to span across multiple ALDs, and resembles the horizontal structure currently in existence. To mitigate the risks inherent in the broad distribution of nuclear deterrence programs across Sandia, the Division 2000 (Nuclear Deterrence) ALD is accountable for their overall integration and will serve as the primary interface with the NNSA Deputy Administrator for Defense

Programs (NA-10). While the Divisions 1000, 4000, 6000, and 9000 ALDs are accountable for the development and performance of distinct Nuclear Deterrence programs aligned to their respective divisions, they will also be required to integrate within the broader *Nuclear Deterrence Portfolio*.

Specific Nuclear Deterrence programmatic accountabilities are set forth below:

- The Division 2000 ALD is accountable for the entirety of the *Nuclear Deterrence Portfolio* and the following distinct Nuclear Deterrence programs:
    - Stockpile and Weapon Product Realization (SWPR) Program; and
    - SWPR Strategic Partnership Program (SPP) Program
- The Division 1000 ALD is accountable for the following distinct programs and for integrating within the broader *Nuclear Deterrence Portfolio*:
    - Weapons Science & Technology (WS&T) Program; and
    - WS&T SPP Program
- The Division 4000 ALD is accountable the following distinct programs and for integrating within the broader *Nuclear Deterrence Portfolio*:
    - Physical Security component of the Defense Security Programs Program; and
    - Facilities and Recapitalization Program
- The Division 6000 ALD is accountable for the Secure Transportation Asset (STA) Program and for integrating within the broader *Nuclear Deterrence Portfolio*.
- The Division 9000 ALD is accountable for the Cyber Security component of the Defense Security Programs Program and for integrating within the broader *Nuclear Deterrence Portfolio*.

Continuation of Program Execution Spanning Multiple Divisions

Programs will continue to be able to reach across organizational boundaries to leverage appropriate capabilities, such as people, facilities, and tools, as needed. Program execution will continue to span across multiple divisions in the new organizational and programmatic structures.

ALD Accountabilities

With the elimination of the PMU management entity, relevant ALD accountabilities, which are derived from the existing *Sandia Management Model*, will be consolidated and streamlined. A high-level summary of these accountabilities is provided in the table below. The accountability for the management and allocation of funds will be further defined and clarified as part of a simpler financial model for Sandia. For this reason, funds management is not an aspect of this table.

	ALD Accountabilities
Portfolio*	• Set the strategic direction • Serve as the primary customer interface • Serve as the integrator of all distinct programs and ensure that the impact of decisions made for one program are considered for all programs • Provide funding, cost, and carryover projections to support Sandia's annual operating plan • Monitor, measure, and report on performance, including explanations of significant variances between the annual operating plan and current projections
Program*	• Manage customer relationships • Engage with customers to negotiate agreements and commitments for products and services • Manage customer deliverables • Identify resource requirements and the appropriate capabilities (people, facilities, and tools) within Sandia to accomplish work for customers • Monitor, measure, and report on program performance
Project execution	• Execute work within cost, schedule, and performance expectations
Capabilities stewardship	• Ensure proper stewardship and identify gaps (people, facilities, and tools) to meet program requirements • Attract, develop, and retain members of the workforce • Monitor, measure, and report on the health of organizational capabilities

**Applicable to ALDs with programmatic accountability*

Summary of Simplified Structure

The recommended structure eliminates the PMU as a distinct management entity; logically groups like programs into a broader portfolio and aligns to a single ALD's sphere of accountability, where optimal; and streamlines and consolidates programmatic and organizational accountabilities for ALDs. As Sandia moves toward this structure, several FY18 planning and financial model simplification analyses has commenced and will be further vetted with the Sandia Leadership Team (SLT).

1.1.2. Laboratory Operating System (LOS)

Sandia is committed to developing and deploying a foundational LOS to support a simple and consistent environment that maximizes innovation and effectiveness. A foundational LOS includes the following elements: Tiered Accountability; Leadership Coaching; Strategy Deployment; Data-driven and Visual Management; Velocity Technology Development; User Experience; Rapid Problem Solving; and a Sandia-wide approach to Kaizen/Continuous improvement. The LOS is a combination of behaviors, processes, and tools used to execute work with an emphasis placed on creating customer value and improving efficiency. The core elements include an engaged culture, operational discipline, and continual improvement. The LOS model is provided in Figure 4.

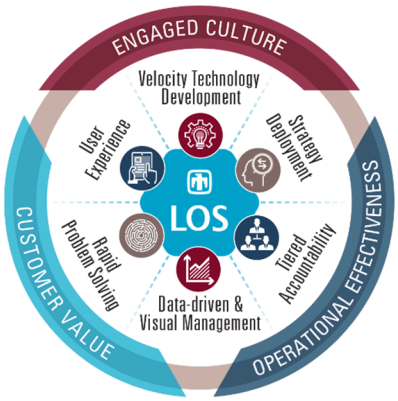

Figure 4: Laboratory Operating System Model

For more information, visit the LOS website: https://info.sandia.gov/los/

1.1.3. Contractor Assurance System (CAS)

An integration of management and assurance systems, processes, and tools, the Sandia CAS is used by our leadership to operate, monitor, and improve all aspects of Sandia's performance and to find and fix problems early. Figure 5, below, outlines how a comprehensive and integrated CAS will support Sandia's mission.

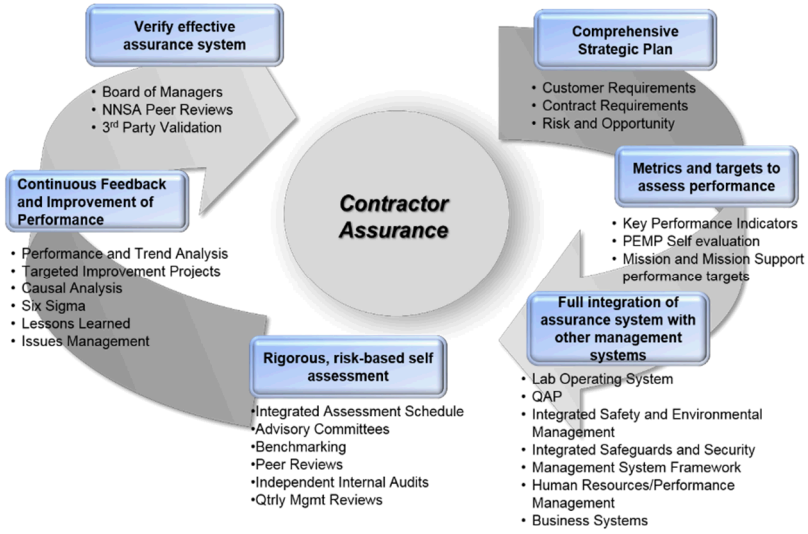

Figure 5: CAS Model

The SLT is actively engaged in implementing CAS site-wide. The information drawn from CAS is an integral part of Sandia management and leadership decision-making. The SLT uses CAS to measure and improve performance; ensure that mission objectives and contract requirements are met, including individual work authorizations; ensure that workers, the public, and the environment are protected; and ensure operations, facilities, and business systems are efficiently and effectively operated and maintained regardless of who performs the work.

Sandia validates the effectiveness of CAS through a variety of approaches defined in the CAS description document, including methods such as review by the Board of Managers, self-assessments, benchmarking, and peer reviews. The CAS provides transparency to support corporate parent assurance and government oversight systems, and supports the NNSA Site Governance Model depicted in Figure 6, below. The initial Sandia CAS description was provided to the Sandia Field Office (SFO) as a contract transition deliverable. Sandia will continue to review and revise this CAS description to incorporate lessons learned and best practices.

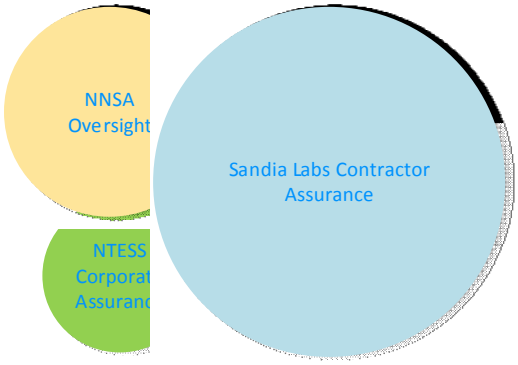

Figure 6: NNSA Site Governance Model

1.1.4. Mission Assurance Framework (MAF)

Mission Assurance (MA) is defined as the disciplined, integrated application of program/project management (PM), quality management (QM), and systems engineering (SE) for the purposes of delivering quality products and services to our customers. MA provides management with clear insight into the health of the project and ultimately, mission success.

Sandia is currently developing a site-wide MAF that will combine and apply best practice PM, QM, and SE principles, processes, and compatible tools that are scalable to meet customer needs.

1.1.5. Corporate Policy Management (CPM)

Sandia develops and disseminates policies, processes, and procedures in alignment with our vision, mission, and values to all employees, organizations, operations, and programs at all our sites and locations. Every member of our workforce is responsible for performing work in accordance with the Corporate Policy Statement and applicable corporate policies, processes, and procedures.

Sandia's Corporate Policy Statement describes the commitment by Sandia's executive leadership to:

Provide outstanding mission performance and customer satisfaction;

Respect, invest in, and develop our people as our most important resource; and

Be excellent managers and stewards of all the resources entrusted to us.

Sandia has identified a list of corporate principles that support the delivery of quality products and services:

- *Our integrity and resulting reputation are of the utmost importance to our continuing to have the opportunity to provide exceptional service to the nation.*
- *We always place national interests above Sandia's interests, Sandia's interests above organizational interests, and organizational interests above our personal interests.*
- *Our leaders are proactive, model the way, and create a visionary and nurturing environment.*
- *Our people are the key to successful achievement of our mission and are our most important resource.*
- *A systems approach to management contributes to our effectiveness and efficiency and enables us to make fact-based decisions.*
- *Identifying, understanding, mitigating, and managing risk is essential for mission success.*
- *Employing appropriate commercial/industrial standards and best business practices improves our productivity.*
- *Agile, cost effective and efficient enabling services are a competitive advantage for our strategic missions.*
- *Providing credible assurance of our performance to employees, customers, suppliers, and stakeholders builds trust and confidence in our governance and stewardship.*

The Corporate Policy System (CPS) is a key mechanism for documenting and communicating Sandia's principles and fundamental values, codifying contractual and legal requirements and management directives, and establishing our boundaries of operations. The CPS provides a system of integrated rules, principles, and operating practices and controls that enable our workforce to perform work in compliance with laws, regulations, contractual obligations, and Sandia executive direction. Management within each division ensures that our workforce meets applicable requirements.

Through the CPS, Sandia has established and maintains a system of internal controls over financial and non-financial processes in accordance with the objectives of the Federal Managers' Financial Integrity Act (FMFIA), DOE Order 413.1B, *Internal Control Program*, and the Office of Management and Budget (OMB) Circular A-123, *Management Accountability and Control*.

After DOE directives are accepted into the Prime Contract per CG100.10.1, *Manage Prime Contract,* and CG100.10.2, *Manage Baseline Directives,* the Contracts organization assigns each directive to the division that owns the given policy. DOE O 414.1D, *Quality Assurance*, is assigned to the Mission Assurance organization that flows down the requirements through CG100.6, *Ensure Quality Outcomes.*

Managers may choose to develop and document a description of their organization's Quality Assurance (QA) program to include the corporate standard plus any additional controls needed due to customer requirements, risks, or other factors. Alternatively, managers may rely on existing documentation—including assurance plans, business plans, project plans, and/or local procedures—to provide this description. Sandia nuclear facilities' QAPs are required to obtain DOE approval, per 10CFR830, Subpart A, and are reviewed for consistency by Mission Assurance prior to submittal to the appropriate DOE approval authority. We provide technical support and assistance to organizations needing additional quality documentation. We proactively work with organizations to identify where such documentation might be needed and work with them to put it in place and to ensure it is being implemented and followed as tailoring and scalability (graded approach) dictate.

The Sandia Software Quality Assurance Program (SSQAP), SS-R89727, specifies national or international consensus standards and establishes and documents grading levels for safety software using a graded approach. Both elements are submitted for approval to the designated DOE approval authority.

Technical, operational, and quality requirements are passed to subcontractors, vendors, and suppliers through formal, documented procurement documents that implement Sandia's corporate procedures, including SCM100.2.12, *Develop the Statements of Work;* SCM100.2.11*, Acquire Quality-Significant Items;* and SCM100.2.13*, Plan for Buyer-Based Procurement*. Requestors and buyers identify applicable quality requirements through Sandia SF 6430-SQA, *Quality Assurance Requirements Document*.

Currently in development, the Corporate Policy System of the Future (CPS-F) project will help transform the current CPS to reduce risk, reduce user frustration, reduce the burden placed on getting work done, and connect what we do to why we do it. The CPS-F has a completed framework and taxonomy, and the project team is now engaging all policy owners to transform current policies, processes, and procedures into the CPS-F format. Additional tools are being considered for procurement and implementation process, such as a Governance, Requirements, and Compliance (GRC) platform aligned with modules for Policy Management and others, as required.

1.2. Purpose of the Quality Assurance Program Description (QAPD)

The Sandia QAPD serves as the QAP document required by DOE O 414.1D and 10CFR830, Subpart A, and describes how Sandia meets these requirements by

- Defining how the requirements of DOE O 414.1D are met (details in Section 7.0, *Implementation of the Quality Criteria)*
- Identifying the individual(s) with the responsibility, authority, and accountability to ensure the development, implementation, assessment, maintenance, and improvement of the QAP (details in Section 4.0, *Distributed Approach for Achieving Quality Products and Services*)
- Describing the graded approach (details in Section 5.0, *Tailoring and the Use of a Graded Approach*)

Section 2.0, *Sandia's Workflow,* describes how expectations are translated into defined work. Implementation of Sandia's quality expectations relies on the Plan-Do-Check-Act (PDCA) principles and defect prevention methodologies. Consistent implementation of PDCA and defect prevention enables the achievement of mission success in a consistent, predictable, and integrated manner.

Section 4.0, *Distributed Approach for Achieving Quality Products and Services,* defines Sandia's approach to delivery of quality products and services by fulfilling the requirements of DOE O 414.1D and 10CFR830, Subpart A. Where more stringent controls are needed for nuclear safety management or quality assurance purposes, additional expectations can be defined in individual program or project QAPs and their associated implementing procedures.

Section 9.0, *Corporate Policy System Cross-Map to DOE O 414.1D*, provides a cross-mapping between the requirements of DOE O 414.1D and the applicable Sandia procedures. CG100.6.20 specifies the responsibility of management executives to ensure that division-level quality delivery expectations are translated into local requirements applicable to product and service realization expectations, to establish workflow requirements for work, and to oversee and support policy implementation applicable to work.

1.3. Sandia Management Model and Information

Sandia management is responsible for ensuring the quality of products and services; assessing operations, programs, projects, and business systems; identifying deficiencies; and effecting continual improvements. Accordingly, the roles and responsibilities of management include applying expertise and ingenuity to effectively and efficiently accomplish Sandia's work in compliance with the approved CAS.

Sandia has developed a Sandia Management Model (SMM), an interactive website that describes Sandia's structure and how we manage work and assure success. The information conveyed by the SMM is at a high level, intended for viewing by a broad audience for a comprehensible and dynamic understanding of how Sandia operates. Detailed information about each aspect of the QAP is contained within an information repository called Sandia Management Information (SMI). The SMM coupled with SMI provides a comprehensive view of the entire Sandia QAP.

1.4. Mission Assurance Division

The Mission Assurance division was created to partner across Sandia to proactively prevent defects and secure our technological environments. Mission Assurance consists of four centers that govern and direct quality assurance activities with the operational priorities of Safety and Security, collaboration, quality, and efficiency. The centers include 9100 Quality Assurance, 9200 Contractor Assurance System, 9300 Cyber Security, and 9400 Weapons Quality and Certification. Each of these centers has defined their responsibilities in the table below.

Center	Mission
9100 Quality Assurance	We provide quality systems, technical expertise, and tools that facilitate consistent and successful mission execution.
9200 Contractor Assurance System	A system of consistent and efficient capabilities, processes, and tools for Sandia's leadership to evaluate and report Sandia's performance to the NNSA and our parent company Board of Managers.
9300 Cyber Security	We engineer, deploy, and maintain Sandia's critical information infrastructure, including data and voice networks, scientific and administrative computing servers and applications, desktop computing platforms and services, and computer security services.
9400 Weapons Quality and Certification	We provide technical assurance, analysis, and assessment for Sandia's Nuclear Weapon and technical missions. The surety of the Nuclear Weapon stockpile is the core of our mission.

Mission Assurance manages and maintains the processes and procedures that govern elements of Sandia's QAP, including meeting prime contract requirements, baseline directives, the CPS, employee and business conduct, quality and performance assurance, unique contractual arrangements for enabling work, and project management expectations for performing work.

2.0 Sandia's Workflow

The opportunity to serve our nation begins with Sandia's Mission Strategy, which provides the basis for prioritizing our work. Customer and Sandia expectations are translated into defined work, which is enabled through our people, research, facilities, tools, and capabilities that provide the infrastructure to perform our work. Performing work safely and securely and meeting cost, schedule, and performance commitments relies on applying PDCA quality principles and

defect prevention methodologies, as well as practices such as Work Planning and Control (WP&C) criteria for safe design, operations, and project management.**Error! Reference source not found.**

Work is planned, controlled, authorized, executed, accepted, and documented using the CPS, applicable local processes that integrate quality-related requirements, and using the guidance contained in *Performing Work at Sandia* (SAND 2014-3629P), and, for activity-level work, ESH100.1.WPC.1, *Plan and Control Work.*

Values and principles provide the motivation for proper work execution and for being personally accountable for meeting customer and Sandia expectations. Sandia's leadership is committed to communicating and fulfilling these expectations across all levels. The QAP, which includes associated quality practices and business controls, ensures:

- Exceptional mission performance and customer satisfaction
- Exceptional science, engineering, and operational performance
- The future vitality of Sandia through stewardship of the human, physical, and financial resources entrusted to us
- Continual performance improvement through measurements, assessments, and reviews of quality measures

2.1. Quality is a part of exceptional service in the national interest

Sandia defines quality as *meeting customer and Sandia expectations consistently and predictably through flawless execution of our personal and collective responsibilities.* Our quality definition encompasses Sandia's values for service, excellence, teamwork, integrity, and respect for one another. Quality is an attribute inherent in our products and services. It is achieved purposefully from inception to conclusion of every endeavor; it is neither an add-on nor an item that can be inspected or created by check-the-box activities. There are many reasons why it is important for Sandia to deliver quality products and services. In addition to providing "exceptional service in the national interest," focusing on the delivery of quality products and services allows us to maintain business opportunities, funding, a positive reputation, national impact, efficiencies and effectiveness, an engaged workforce, and stakeholder confidence.

2.2. Performing work using quality principles and methodologies

Sandia's approach to performing work is to apply PDCA quality principles and defect prevention methodologies throughout design, development, and execution, and not rely solely on inspection or verification after these activities are complete.

2.3. Quality principles

The PDCA cycle is shown in Figure 9, below. PDCA can be applied to the overall management system cycle and can be briefly described as follows:

Plan: Establish the objectives and capabilities necessary to deliver results in accordance with customer and Sandia expectations.

Do: Implement the plan; perform the work.

Check: Monitor and measure performance of the work against requirements, policies, and objectives for the product or service, and report the results.

Act: Take actions to continually improve performance results to ensure the delivery of quality products and services.

PDCA is how work activity (e.g., research, operations, production, mission support) is performed at Sandia. PDCA can be applied to each step in the product and service realization workflow to help ensure effective, consistent, predictable, and defect-free inputs to the next step.

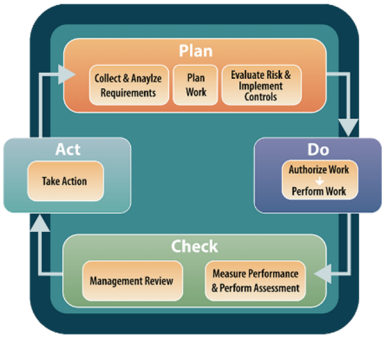

Figure 7: Plan-Do-Check-Act (PDCA) approach to performing work

2.4. Defect prevention methodology

Sandia's quality outcomes strategy seeks to prevent problems at every phase of our work and detect issues as early as possible. This approach is well-established as the most effective to maintain high quality. Our strategy relies on a culture open to collaboration and critique, and on a personal commitment to identifying issues that may have been missed.

A defect is a deviation, issue, problem, harm, or other undesired outcome that becomes an attribute of our work output. When we apply *defect prevention*[1] we identify defects or potential defects, and prevent them from being introduced into a product or service, or from being passed to subsequent work steps before being corrected.

Because of the importance of Sandia's missions, the quality of the research underpinning our technical accomplishments must be of the highest standards. Consequently, we have developed a set of *Research Quality Standards SAND 2013-8402P,* with the intent of enhancing our leadership in research and innovation while preventing undesired defects.

[1] More information on defect prevention can be found on the Microsystems Science, Technology and Components defect prevention website.

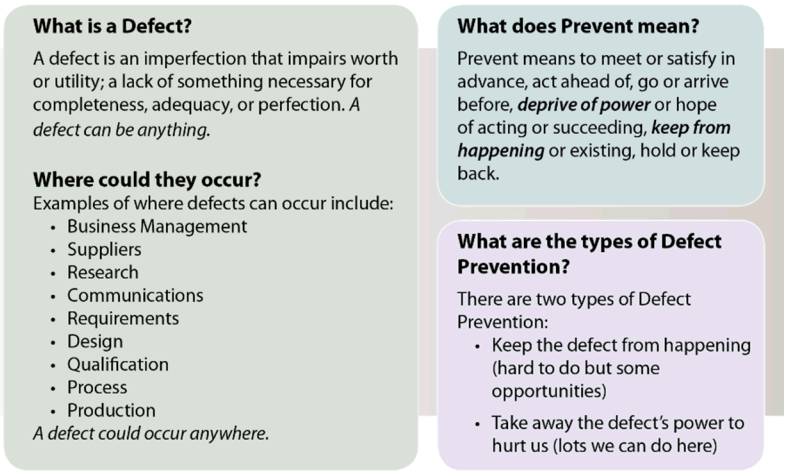

Figure 8: Defects and defect prevention (Source: *Performing Work at Sandia*)

A defect prevention method includes the following actions:

- Engage experienced workers to consider and identify recurring problems in research, product, or service areas
- Identify the two or three problems that are most frequent and that cause the most pain
- Choose and working on the most difficult, recurring problem(s)
- Review best practices to determine if there are existing methods for preventing the problem
- Innovate or customizing a preventive method to avoid a problem, if best practices do not appear adequate
- Focus on one problem and implementing a robust, well-thought-out, systemic, preventive solution and executing it as simply as possible
- Continue to seek out defects
- Implement rigorous and scaled risk & opportunity management
- Engage early in planning and design to ensure we get it right the first time
- Conduct lessons learned evaluations at the start of new efforts to anticipate where problems are likely to occur
- Fix problems by understanding true root causes and extent of conditions

The application of PDCA principles and defect prevention methodologies helps ensure the delivery of quality products and services. This does not mean that mistakes or errors will not occur; it means that when they do occur, they are detected and corrected as early as possible so that work products are error-free.

Sandia's approach to flawless execution is based on minimum quality criteria. Section 7.0, *Implementation of the Quality Criteria,* describes our minimum quality criteria and attributes of implementation, including approaches for preventing defects.

2.5. Sandia's expectations for performing work and preventing defects

Sandia's quality requirements start with what is specified in the CPS. All members of the workforce must recognize, accept, and fulfill their roles and responsibilities as defined in the CPS.

Policy managers are accountable for both ensuring that policies are adequate for monitoring their implementation.

Programs engage the customer and identify the specific customer-based needs that must be met.

Programs and divisions may also apply additional guidance and infrastructure, along with government or industry standards, so that deliverables and services meet customer requirements, best work practices, laws, regulations, and contractual obligations.

Examples of national or international quality standards implemented at Sandia include:

- ISO 9001:2008, *Quality Management System–Requirements*
- AS9100C, *Quality Management Systems–Requirements for Aviation, Space, and Defense Organizations*
- ASME NQA-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*
- Malcolm Baldrige Criteria for Performance Excellence

Divisions are responsible for stewarding Sandia's capabilities and for performing work in accordance with applicable expectations (e.g., safety and security) to satisfy customer and Sandia expectations.

Management is responsible for clearly communicating program and project requirements and expectations and for ensuring that all work nuances are properly understood before, during, and after completing the assigned work. Organizations, working with divisions, have the necessary flexibility and direct responsibility to use a graded approach for applying the appropriate quality criteria and level of rigor required to meet work expectations.

Members of the workforce are responsible for engaging with their management to know the requirements associated with their work assignments, for using PDCA quality principles implemented through a defect prevention methodology, and for providing assurance to themselves and others that Sandia is fulfilling its obligation to satisfy our customers. Members of the workforce must recognize that multiple work requirements may apply, depending on the specific work assignments that support different programs.

Program and division management, with assistance from the workforce, is responsible for conducting routine management reviews that provide transparency and assurance. The SLT reviews progress on mission deliverables, operations, and customer satisfaction feedback through multiple venues, including the quarterly Executive Management Review.

3.0 Roles and Responsibilities

Roles and responsibilities for managing corporate quality-related policy and systems to provide adequate oversight and support, including division-level implementation, are detailed in CG100.6.20. Specific roles, responsibilities, accountabilities, and authorities (R2A2) at all levels of Sandia are defined for the workforce, including the Laboratories Director, in the CPS.

CG100.6.20 also defines the relationship of that procedure to the QAP, and assigns responsibilities and actions required for development, maintenance, and approval of the QAP.

General authorities and accountabilities for the workforce are defined in the Sandia Management System (SMS) Individual Role definitions. Authorities and accountabilities for the workforce pertinent to ESH100.1.GP.3, *Implement the Integrated Safety Management System*, are defined in in GN470108, *ES&H General Requirements*.

4.0 Distributed Approach for Achieving Quality Products and Services

The Laboratories Director is ultimately responsible for Sandia's delivery of quality products and services, as well as our mission success. The Corporate Governance Executive Policy Sponsor is the delegated authority to ensure that processes

needed for the QAP are established, implemented, and maintained. Additionally, he or she reports on the performance of the QAP and any need for improvement. The Corporate Governance Executive Policy Sponsor has established a quality framework in CG100.6.20 that includes the roles and responsibilities described in the CPS.

Programs and divisions apply customer and Sandia expectations to define and assign mission work and to ensure that the capabilities exist to perform that work safely and securely (Plan). Divisions with policy implementation responsibilities provide mission support for enabling work through policies, processes, and procedures. All work performed is consistent with assignment-specific expectations (Do). Together with the workforce, management assures that the products and services meet customer and Sandia expectations (Check), and that opportunities for improvement are identified and implemented (Act). Members of the workforce apply PDCA quality principles and defect prevention methodologies to perform work safely and securely and leverage practices such as sound WP&C and project management techniques. DOE O 414.1D quality criteria establish the foundational expectations for this framework. Section 7.0 describes Sandia's minimum quality criteria and attributes for implementation, including approaches for preventing defects.

All members of the workforce apply PDCA quality principles and defect prevention methodologies to perform work safely and securely and leverage practices such as sound WP&C and project management techniques. Specific quality criteria provide the foundation. The Strategic Framework drives decisions about the totality of our work, which is conducted through elements of program and division organizations, including policy management functions. Members of the workforce perform the work while preventing defects to deliver exceptional performance.

As workers **Plan** and **Do** each step of the overall workflow, they **Check** to see if the expected results are being achieved. If they encounter the unexpected, such as an event, unanticipated or abnormal condition, or unforeseen system response, they apply a questioning attitude and critical thinking to understand why it occurred. Then, following appropriate protocols, they **Act** on the results to adjust and improve performance as needed.

5.0 Tailoring and the Use of a Graded Approach

Sandia performs a wide variety of work in numerous circumstances for many different customers. As such, Sandia must employ diverse mechanisms that allow sufficient flexibility in implementation approaches while still meeting all requirements and objectives. *Tailoring* refers to alterations in processes to better align with other division activities and customer interface requirements. *Graded approach* refers to the different levels of rigor based on the significance and risk of the work being performed. Sandia is working to develop a common approach to perform tailoring and apply a graded approach consistently across the divisions.

5.1. Tailoring

Because Sandia is a multi-program and multi-customer laboratory, our work requires various implementation approaches for ensuring and achieving the delivery of quality products and services for both internal and external customers. Programs employ multiple means to engage their unique customers and bring work to Sandia. For example, some programs may have one customer with major programs, and smaller projects as a subset of those programs. Other programs are a collection of smaller projects and programs that are aligned by overall strategy and purpose. Because of these variations, each program requires management processes that enable their unique method of conducting business. While corporate requirements apply to all work, programs are expected to tailor the details of their implementation in a way that best suits their business needs.

5.2. Graded Approach

Sandia employs a graded approach to ensure that the level of analysis, documentation, and actions used to comply with a requirement are commensurate with

- the relative importance to safety, safeguards, and security;
- the magnitude of any hazard involved;
- the life cycle stage of a facility, project, or activity;
- the programmatic mission of a facility, project, or activity;
- the characteristics of a facility, project, activity, or item;
- the relative importance of radiological and non-radiological hazards; and
- any other relevant factor, including, but not limited to
    - the relative significance to the mission, the program, or to the customer's needs;
    - the customer's own specified requirements for the product, process, or service;
    - the potential of failure; and
    - legal, regulatory, or contractual requirements.

Sandia uses a graded approach to ensure the level of rigor applied to work is commensurate with the concerns listed above. The graded approach process includes the following elements:

- Customer specifications, including customer-approved QAPs, establish appropriate work-specific requirements (e.g., a separate QAP for a nuclear facility) that build on this QAPD to apply additional required rigor.
- Corporate requirements in the CPS specify requirements applicable across Sandia for all work and routinely provide a range of controls based on the significance of the work (e.g., more stringent procurement rules for safety significant items than for non-safety significant items).
- Actions specified by division management, based on knowledge and experience, including consideration of the graded approach factors listed in Section 7.0. Division management is responsible and accountable for specifying the workflow requirements necessary to produce the quality outcomes (e.g., WP&C requirements are based on the entities' determination of the degree of hazard in the work).

The results of the graded approach process are incorporated into the Sandia-generated procedures for performing work. Work procedures can provide a range of controls for a given range of conditions, but should not expect the worker to make the graded approach evaluation of what level of rigor is required for a specified task.

The adequacy of Sandia's graded approach process (that is, the adequacy of the rigor with which different types of work are performed) is checked through assessments, metrics, problem reporting, management review, performance data, and customer feedback.

Consistent with determining the appropriate rigor for work performed, Sandia uses a graded approach to evaluate the adequacy of the QAP of a subcontractor, vendor, or supplier. SCM100.2.11, *Acquire Quality-Significant Items*, identifies the appropriate methods for this evaluation.

Additional considerations for applying a graded approach to each individual DOE O 414.4D quality criterion are included in Section 7.0.

6.0 Use of Standards

Sandia's diverse work and customers, along with some of our products, processes, and services, require QA programs based on several external standards. It is required that the QA programs based on external standards meet, as a minimum, the requirements of DOE O 414.1D and 10CFR830, Subpart A.

- Sandia's Quality Manual for ISO 9001:2008, *Quality Management System – Requirements*, references the QAP processes and procedures and provides access to operational information. The following organizations, programs, and policy areas are included as part of the scope of Sandia's corporate certificate as meeting the requirements of ISO 9001:2008:
    - Corporate Governance Policy Area
    - Facilities Policy Area
    - Human Resources Policy Area
    - Information Management & Cyber Security Policy Area
    - Integrated Safeguards & Security Policy Area
    - Nuclear Weapons Program Management Unit (NWPMU)
    - Responsive Neutron Generator Product Deployment Center
    - Microsystems Science, Technology, & Components Center
- The following organizations and programs quality management systems are registered to ISO 9001:2008 through third-party auditors:
    - Supply Chain Management
    - High Energy Density Experiments Department 01688
- The following organization's and program's quality management systems are registered to other directives or international consensus standards through third-party auditors:
    - Sandia's Environmental Management System is registered to ISO 14001:2015, Environmental Management.
    - Center 2500 (Energetic Components), Department 6781 (Ground Burst Detection III), and Department 6794 (ICADS/UGNT development project) quality management systems are registered to AS9100C, Quality Management Systems - Requirements for Aviation, Space and Defense Organizations.
    - Nuclear Deterrence executes product realization to a separate QAP (Weapons Quality Assurance Program) in addition to Sandia's SMS description document and this QAPD to demonstrate compliance with NNSA Weapon Quality Policy, NAP-24A.
    - Group 1380 (Nuclear Facilities and Applied Technologies) specifies in the Technical Area V (TA-V) Management System documents ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications Version 2015 (NQA-1), as TA-V's official consensus standard.
    - Group 6210 (Defense Waste Management Programs), which provides scientific advice to the DOE Carlsbad Field Office at the Waste Isolation Pilot Plant (WIPP), uses ASME NQA-1-2008 for their workflow.
    - The Primary Standards Laboratory (PSL) is accredited to ISO 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories.
    - Health, Benefits, and Employee Services (HBE) is accredited from the Accreditation Association for Ambulatory Health Care.

7.0 Implementation of the Quality Criteria

The following sections describe the elements of DOE O 414.1D as implemented at Sandia. The elements include the 10 DOE criteria and the additional sections addressing the prevention, detection, and reporting of suspect/counterfeit items, as well as the additional controls necessary for controlling safety software quality at nuclear facilities (DOE O 414.1D, Attachments 3 and 4).

Each sub-section includes objectives that may be used to measure performance against each criterion, as well as factors to consider when establishing the appropriate rigor for the performance of work. They also reference corporate tools and documents that either describe how Sandia is meeting the objectives or providing guidance for effective implementation. In most cases, these references consist of documents within the CPS (see the QA cross-mapping table in Section 9.0).

Sandia's prime customer, the DOE, specifies minimum quality requirements applicable to our work.[2] Sandia's 10 quality criteria ensure these requirements are met (Figure 9). The 10 criteria, with example attributes provided, do not represent a linear workflow. A layered defense of defect prevention is needed at every phase of research, operations, service, design, development, and product/service realization. The ten criteria are presented in the order in which they appear in DOE O 414.1D, *Quality Assurance*.

Quality Criteria DOE O 414.1D	PLAN				DO				CHECK / ACT	
	Criterion 1 Program	Criterion 2 Training / Competence	Criterion 3 Quality Improvement	Criterion 4 Documents / Records	Criterion 5 Work Processes	Criterion 6 Design	Criterion 7 Procurement	Criterion 8 Inspection / Acceptance Testing	Criterion 9 Management Assessment	Criterion 10 Independent Assessment

Figure 9: Sandia's minimum quality criteria

7.1. Criterion 1: Management/Program

Criterion

1. Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work.
2. Establish management processes, including planning, scheduling, and providing resources for work.

Objectives

- Workflow is planned in a way that provides all workers with clear expectations and sufficient resources to focus on mission, programmatic, and operational success.
- Fundamental management processes are described. These processes include planning, scheduling, performing work, and feedback and improvement.

[2] Sandia has adopted the quality criteria contained in DOE Order 414.1D, *Quality Assurance*, as the basis for our quality program. These criteria, and Sandia's expectations for using principle-based quality methodologies to improve mission and service performance, are defined in Corporate Policy CG100, *Corporate Governance,* and Corporate Procedure CG100.6.20 *Achieve Quality and Mission Success.*

- Clear policies and workflow processes are executed to support performance excellence. Policies define overall expectations and processes provide the minimum and necessary controls to ensure consistent implementation. Managers hold their personnel accountable for meeting expectations.
- Roles, responsibilities, and ownership are clearly defined. This includes defining the organizational structure, defining levels of authority over any activity or facility, and clarifying organizational interfaces and expectations for all work.
- Commitments are clearly defined and communicated. These include all contractual commitments that have been negotiated with the customers and stakeholders. Clear communication of these commitments helps to ensure that they are met.
- Objectives and goals are established for all work. These are based on customer requirements, requirements derived from line-of-sight to mission objectives, contractual and legal requirements, corporate commitments, and improvement goals. Goals should be specific, measurable, achievable, relevant, and timely. These goals are the basis for measuring and improving performance.

Implementation Attributes

- Understanding roles and responsibilities for the work that is assigned including any relevant cost and schedule considerations
- Understanding customer requirements or knowing where to access that information, and whom to contact when help is needed
- Establishing the cost, schedule, and technical baselines for each effort
- Translating customer requirements using project management techniques to define the necessary planning, work breakdown structure, risk management, and schedule for performing the customer's work
- Understanding the necessary project performance monitoring (for example, earned value management) and cost estimating requirements
- Integrating WP&C for safe design and operations considerations, as well as integrated safeguards and security approaches into the plan for doing work
- Identifying and preventing deficiencies or defects throughout work processes, and understanding the risks associated with the work
- Feeling comfortable bringing issues and concerns to management (line management or program management) and peers

Graded Approach

The amount of rigor and level of detail for planning work, assigning roles and responsibilities, assessing workflow activities, and communicating expectations depends on several factors. Some factors to consider include the complexity of the work, the customer's needs and requirements, the criticality of the tasks, the number of organizations that contribute to the work, the work-related risks, and consequences of failure. These types of factors determine the level of detail needed for the work, the type and frequency of reviews and approvals conducted for the work, and the planning process rigor level required for the work.

There are a variety of methods available for documenting or referencing workflow requirements. Developing a local quality assurance plan is an option, but often not necessary unless required by the customer, stakeholder, or work complexity. For most activities, work-related objectives can be met through a combination of project plans, budget and

staffing plans, documentation of local processes (where they add value), organization charts, and individual performance management goals.

It may not be necessary to create additional documentation if it can be demonstrated that all elements described above are addressed in a way that ensures they are understood and communicated to management and employees.

Tools and References

The following tools and references provide information on defining and maintaining the management structure and R2A2:

- The About the Management System webpage provides a detailed description of Sandia's overall management structure, including a description of the relative R2A2 for the three types of management entities and the nature of their interfaces.
- Corporate Procedure FIN100.4.1, Use a Graded Approach to Project Management, was developed to define project management requirements using a standards-based Project Framework methodology to enable the consistent, predictable, efficient, and effective management of projects across Sandia.
- Content in the CPS defines specific roles and responsibilities within each process or procedure.
- Sandia maintains an online Organization Finder that provides the division management structure and identifies the names and managers of all organizations within Sandia. It also links to descriptions of the roles, responsibilities, and functions of the various Sandia organizations.
- Sandia's Strategic Plan provides information on Sandia's mission, vision, and values, as well as the current fiscal year objectives, goals, and milestones.
- Corporate planning for real property assets occurs at many levels. The Long-Range Development Framework provides a sound strategic framework for decisions pertaining to capital investments in real property assets and site infrastructure. The Twenty-Five-Year Site Plan, FY 2013 describes the integrated site, facility, and infrastructure plans and investments required for Sandia to fulfill its mission objectives, support the NNSA Program of Record, and effectively execute stewardship of real property assets from FY13 through FY17.

7.2. Criterion 2: Management/Personnel Training and Qualification

Criterion

1. Train and qualify personnel to be capable of performing their assigned work.
2. Provide continuing training to personnel to maintain job proficiency.

Objectives

- To meet performance and operational goals and objectives, all workers will have the necessary, skills, knowledge, and talent to perform their tasks effectively and safely.
- The qualifications necessary for performing work are defined. These include a mix of education, experience, and other demonstrated skills and competencies.
- Managers can demonstrate that their personnel meet the necessary qualifications to perform their assigned work effectively and safely.
- Personnel are provided continuing training to maintain and improve job proficiency and to meet evolving needs. Managers and personnel also identify additional training that is necessary and/or useful in the performance of current or future work.

Implementation Attributes

- Receiving appropriate training to safely and securely perform the work, including knowing what to do when the unexpected occurs.
- Having opportunities to obtain the necessary education, training, proficiency, or certification required for the job.

Graded Approach

To determine the content and means of ensuring personnel competency, several factors must be considered. These include complexity of the work, the work's importance, how much supervision is needed, and how much discretion personnel have in making work-related decisions.

Additional factors consider the requirements imposed by the nature of the work itself, including the hazards and customer requirements. For example, reactor operators and weapons production personnel have clearly defined training and certification programs. Personnel who operate forklifts must have current certification. Other professional positions, by their very nature, often require evidence of formal training and competency. For other types of work, the needed skills and knowledge may be met through evidence of education and experience, informal mentoring, and/or required reading. Certain work functions may require, or at least benefit by, certification from professional societies.

Tools and References

The following tools and references provide information on personnel training and qualifications:

- TEDS Everyone contains a catalog of currently available in-house training and provides the tools for registration, tracking course completions, etc.
- The Mentoring website provides tools, guidance, and support for those seeking mentors (as well as those who would like to be mentors).
- The Performance Management Form (PMF) provides managers and employees an additional tool for documenting individual training and career development needs.

7.3. Criterion 3: Management/Quality Improvement

Criterion

1. Establish and implement processes to detect and prevent quality problems.
2. Identify, control, and correct items, services, and processes that do not meet established requirements.
3. Identify the causes of problems and include prevention of recurrence as a part of corrective action planning.
4. Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.

Objectives

Effective improvement is positive, measurable change, sustained over time that raises the average level of quality delivery and workflow performance while decreasing variation. Sandia delivers quality products and services through PDCA principles and defect prevention methodologies. Assurance activities provides confidence (through visible, documented evidence) that PDCA is executed as intended, and is generally considered the check and act portions.

Products and services, process implementation, and other quality-related information are monitored through established processes to identify opportunities for improvement. These include:

- Identifying items, services, and workflow processes that do not meet performance requirements as identified through self-assessments, independent reviews, product and process audits, peer reviews, or other measures.
- Detecting and preventing quality problems. These are identified through performance indicators (i.e., measures and metrics) and are based on programmatic/project goals and objectives. Performance indicators may be either leading (predictive) or lagging (results), and provide data that can be analyzed for trends, or for developing a questioning attitude.
- Identifying and responding to customer concerns. Feedback solicited directly from customers provides valuable information and verifies whether Sandia is meeting their needs.
- Product and service realization data are used to make real improvements, such as providing options to find, fix, and learn from errors. This data can also be used to assign appropriate owners, set milestones, verify activity completion, and validate effectiveness of corrective actions.
- Applicable lessons learned are identified and incorporated to improve performance. Whether generated internally or externally, lessons learned provide a means to help ensure that the same mistake is not repeated.
- Identifying the causes of problems and working to prevent recurrence are vital to ensuring the ongoing quality delivery of products and services.

Implementation Attributes

- Monitoring performance against customer and Sandia expectations, including the use of measures and metrics where warranted
- Rigorous and appropriately scaled implementation of risk and opportunity management
- Seeking customer feedback on performance results
- Challenging the status quo, asking "what if" questions, and seeking ways to prevent problems before they occur
- Checking to verify that actions taken to prevent errors or mistakes are indeed working, and seeking appropriate feedback on those actions
- Using data in a productive and meaningful way to help identify, fix, and prevent problems or unintended consequences
- Validating that the solutions are effective and being sustained to prevent recurrence of problems
- Sharing learnings and experience with others as a means of continual improvement

Graded Approach

The criteria for identifying and reporting issues should depend on the importance of the products and services and the associated risks. Once issues are identified, their relative importance can be ranked by determining the consequences of not fixing or preventing the problem, and their costs, benefits, and/or potential savings. Finally, the risks to determine the appropriate level for reporting should be evaluated.

Tools and References

The following tools and references provide information on quality improvement:

- A Customer Satisfaction Survey can provide a snapshot of Sandia's customers' perception and inputs for product and service improvements.
- Group 10110 (Operational Innovation Organization) drives increased integration and efficiencies across Sandia by exploring opportunities and ideas for new business techniques; by benchmarking and researching outside of Sandia; by providing tools, measures, and Lean Six Sigma (LSS) services to enable and monitor changes; and by

communicating results for continual improvement. The Operational Innovation System is the corporate-accepted repository for tracking and reporting efficiencies and cost-savings activities (both direct and indirect funded) across Sandia. The system acts as the repository of ideas, approved opportunities, historical opportunities/projects, and their related savings.

- There are many quality tools available to monitor and enhance process improvement. The LSS process provides a rigorous tool for making and measuring real improvements, both in terms of productivity and costs. Sandia's LSS website provides additional information and resources. The Sandia Performance Scorecard (SPS) provides measures and metrics to assist Sandia in monitoring performance and provide data for informed decision-making.
- Sandia's Lessons Learned page provides data to help employees identify relevant best practices and information based on the practical experience of others. This site also guides people on how to submit and share lessons learned with others.
- Help Numbers for computer support, facility issues, OOPS, and Security Incident Management Program provide a means for reporting problems and the opportunity to monitor performance.
- The Common Engineering Environment provides resources on a wide variety of quality-related and analysis tools and training, and additional resources to ensure continual improvement in work flow development in areas such as product realization, defect prevention, and suspect/counterfeit items awareness.
- The Assurance Information System (AIS) tool provides organizations with a management review application that documents identified risks, the mitigation activities to manage that risk, schedule and track control activities such as assessment, and track corrective actions when mitigation activities are found to be ineffective or not performing as required.

7.4. Criterion 4: Management/Documents and Records

Criterion

1. Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.
2. Specify, prepare, review, approve, and maintain records.

Objectives

- To effectively fulfill job responsibilities, members of the workforce must be able to access information that is current, complete, and correct.
- Documents that describe processes, specify requirements, or establish design are appropriately prepared, reviewed, approved, issued, used, controlled, and revised. These include program and project plans, policies and procedures, and any document that prescribes expectations for what to do and how to do it.
- Operations, tasks, and processes are evaluated to determine if they will benefit from documented procedures. Documented procedures may add value for when precision is necessary, for activities that are not performed frequently or are subsequent to significant personnel turnover, and for situations that may present other types of risk.
- The required records for a program or activity must be specified. As examples, records may include reports, facility logs, lab notebooks, correspondence, decision papers, results from analyses, drawings, meeting minutes, copies of presentations, assessment results, and corrective action plans. Records provide history and data, as well as evidence that actions have been completed and/or approved. Programmatic records should be identified during project planning and supplement other required records, such as procurement, training, human resources, environment, safety and health, or finance.

- Managers ensure that expectations and roles and responsibilities regarding how records will be prepared, reviewed, approved, and maintained are clearly communicated.

Implementation Attributes

- Understanding the need to properly prepare, approve, use, and revise well-written documents in all facets of work
- Understanding the importance of providing proof of work results and providing evidence of activities performed by maintaining accurate and accessible records

Graded Approach

There are several factors to consider when determining whether a process or task should be documented:

- Consequences of performing the tasks incorrectly (is it a key or critical process or task?)
- Likelihood of performing tasks incorrectly (is it a complicated or new process?)
- Level of personnel skill and experience
- Amount of personnel turnover
- Number of personnel performing the task, and consistency requirements
- Contractual or legal requirements for documenting procedures

These factors may also be used to determine the appropriate level of detail in the documentation, as well as the resources necessary for adequate document development, review, and approval.

Determining what records to keep and how the records will be controlled can depend on several factors. Some records are required by the customer, some will depend on the business need, and others are required per corporate procedures. Managers should consider whether future program participants need to understand project decisions and what data should be retained so that trends can be identified.

Specific local controls for programmatic records, such as numbers of reviews, levels of approval, instructions for use, and retention schedules, are applied using a graded approach, depending on the importance of the work involved.

Other procedures in the CPS may identify, as necessary, specific records that are required to demonstrate that the procedures in question have been correctly implemented.

Tools and References

The following tools and references provide information on documents and records:

- The Recorded Information Management home page contains information and links to policies, procedures, systems, tools, templates, and assistance to appropriately and effectively manage Sandia's information.
- The Records Management Manual emphasizes individual responsibility for the management of recorded information in accordance with corporate and programmatic policies, procedures, and standards.
- Where to Store Your Information provides guidance on where to store information in the form of documents, records, drawings, etc.
- The Sandia Records Retention and Disposition Schedule provides guidance on records retention, storage, disposition, and archival.

- The Records Decision Tree is a guidance tool to assist users in determining if the information being considered is indeed a record.

7.5. Criterion 5: Performance/Work Processes

Criterion

1. Perform work consistent with technical standards, administrative controls, and hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, etc.
2. Identify and control items to ensure their proper use.
3. Maintain items to prevent their damage, loss, or deterioration.
4. Calibrate and maintain equipment used for process monitoring or data collection.

Objectives

- Appropriate controls are established for work processes and for managing items and equipment to mitigate any operational or programmatic risks associated with the performance of work.
- Work is performed to established technical standards and controls using approved instructions, procedures, or other appropriate means.
- Managers ensure that employees under their supervision have the appropriate knowledge, skills, competencies, equipment, resources, and documentation (including procedures) that are necessary to accomplish their tasks. Documents are controlled in a way that ensures personnel use only the most recently approved version.
- All managers hold their personnel accountable for following workflow procedures.
- Equipment used for process monitoring or data collection is calibrated and maintained.
- Items are identified and controlled to ensure their proper use, and maintained to prevent their damage, loss, or deterioration.

Implementation Attributes

- Integrating WP&C for safe design and operations considerations, and integrated safeguards and security approaches into work planning
- Invoking customer requirements, technical standards, management expectations, risk understandings, and other appropriate requirements (e.g., regulatory) when planning work
- Applying a questioning attitude, premised on analytical and critical thinking skills, during the work to avoid surprises
- Taking full responsibility and committing always to "do the right thing"
- Being an unrelenting safety advocate by challenging assumptions
- Being eternally vigilant to identify and eliminate, or mitigate, all hazards

Graded Approach

When working to a procedure, the level of control can vary from referencing the procedure only occasionally to using a line-by-line checklist that shows the completion of each step. Factors to consider when executing procedures include the complexity of the process, the criticality of the outcome, the hazards involved, and the experience of the worker.

In controlling items, factors to consider include: How critical is the item to the activity? Is it replaceable? How fragile is it? Is it easily lost or stolen? Is misuse likely? If an item is nonconforming, what is the impact? Will misuse have serious

consequences? These factors should determine how carefully the item is labeled and controlled. The Sandia *Research Quality Standards* provides considerations applicable to research and development work activities.

The frequency and rigor of calibration of measurement devices are tailored to the potential programmatic and/or safety impact, the required accuracy of the data, and equipment calibration tolerance.

Tools and References

- The Sandia Primary Standards Laboratory (PSL) aids in obtaining calibration and maintenance of metrology instruments throughout Sandia. The PSL website provides links to pertinent CPS procedures, purchasing guidelines, calibration requests, and documentation of their capabilities and services.
- The Environment, Safety &Health (ES&H) LiveSafe site provides a shared environment to help all members of the workforce adopt a safe work environment, both at home and at work.
- CG100.6.20, *Achieve Quality and Mission Success*
- ESH100.1.WPC.1, *Plan and Control Work*

7.6. Criterion 6: Performance/Design

Criterion

1. Design items and processes using sound engineering/scientific principles and appropriate standards.
2. Incorporate applicable requirements and design bases in design work and design changes.
3. Identify and control design interfaces.
4. Verify/validate the adequacy of design products using individuals or groups other than those who performed the work.
5. Verify/validate work before approval and implementation of the design.

Objectives

Whether designing products, processes, or software, controls must be in place and followed to ensure that designed products and services perform as intended:

1. Design requirements are sufficiently defined. Requirements will incorporate all customer expectations; other necessities for the intended use, if known; statutory and regulatory requirements; and any applicable technical and/or industrial standards.
2. Design requirements are reviewed. Reviews ensure the design requirements are accurately defined, confirmed by the customer or user, and that the prerequisite resources are available to meet expectations.
3. The design process is planned and controlled. This includes defining the roles, responsibilities, and interfaces for the design work; identifying the appropriate design stages, or phases; and determining the review, verification, and validation activities that are appropriate to each design stage.
4. Design is verified and validated. Verification ensures that the design requirements have been met; validation ensures that the resulting product or service can fulfill its expected use.
5. Design is approved. The final design is approved at an appropriate level before release and will contain (or reference) appropriate acceptance criteria.

6. Design changes are identified and documented. Changes are reviewed, verified, and validated, as appropriate, and approved before implementation. The review should include evaluating how the changes may affect other parts of the design.

Implementation Attributes

- Designing with defect prevention in mind
- Applying safe-by-design considerations in WP&C activities
- Conducting research and design using engineering/scientific principles and standards
- Considering how the product will be used (e.g., prototype only used in lab, a fielded item to be used in real environments, or item that could make its way to production)
- Ensuring designs incorporate applicable requirements and design bases into the work and subsequent changes, and engineering/technical interfaces are identified and controlled
- Valuing and seeking independent peer reviews to verify and validate the adequacy of design through all phases of product and service realization

Graded Approach

Technical risks are some of the key factors to consider in managing a design process. How complex is the design? How new is the technology? How many different organizations or functions are participating? How critical is the process or item that is being designed? Answers to these types of questions should influence the number and frequency of design reviews and approvals, the needed level of rigor in communicating roles and responsibilities, the control of designs and design changes, and the documentation required for verification and validation.

Customers may specify the types and levels of control over design activities they require. Nationally recognized technical and design standards, whether developed by governmental or non-governmental agencies, should be incorporated where applicable. Sandia's Technical Library maintains links to Standards and Specifications from a wide variety of sources. The Technical Library staff can aid in locating specific standards.

Tools and References

Management entities have undertaken significant efforts to eliminate defects in performance and design using training and tools. These tools provide division-specific training and references that address design and defect prevention, and are capabilities within Sandia that provide best practice examples.

- Research Quality Standards
- Defect Prevention Microsystems Science, Technology and Components website
- Nuclear Security Quality Training (NQT) SharePoint site
- Nuclear Weapons (NW) Knowledge Development Program (KDP)
- Common Engineering Environment

7.7. Criterion 7: Performance/Procurement

Criterion

1. Procure items and services that meet established requirements and perform as specified.
2. Evaluate and select prospective suppliers based on specified criteria.

3. Establish and implement processes to ensure that approved suppliers continue to provide acceptable items and services.

Objectives

To meet commitments, Sandia requires a reasonable level of confidence that our suppliers will meet and continue to meet requirements for cost, schedule, and performance, and that procured items and materials will perform as specified.

- Procured items and services meet established requirements and perform as specified. Expectations and specifications for items and services must be correct, specific, clear, and unambiguous.
- Prospective suppliers are evaluated and selected based on specified criteria.
- Processes to ensure that approved suppliers continue to provide acceptable items and services must be established and implemented.

Implementation Attributes

- Specifying exactly what is required when procuring items and services required for the work, and verifying that what is received meets specifications.
- Working closely with the buyer to ensure that the technical requirements for the items and services needed, including special performance requirements, are specified on the purchase order.
- Ensuring that the selected supplier can meet quality and performance requirements by evaluating and selecting prospective suppliers based on specified criteria.
- Establishing and implementing processes in consultation with the supply chain to ensure that approved suppliers continue to provide acceptable items and services.

Graded Approach

These requirements govern all aspects of product and service procurement.

The corporate procurement requirements invoke a graded approach. For common, frequently purchased products, the Procurement organization has provided the Just in Time (JIT) procurement method. For items and services identified as Quality-Significant (Q-Sig), more stringent requirements and controls afford greater confidence that the item or service will perform as specified. Approval levels based on cost are an example of graded approach.

Potential suppliers of critical, complex, or costly items and services may undergo an evaluation prior to contract award to determine if they consistently can meet requirements. This evaluation may include a review of the supplier's performance history for providing similar items or services, a review of shared supplier quality information, an evaluation of third party certifications or registrations, or a supplier quality assessment.

Tools and References

Most supply chain management (SCM) procedures list requirements and processes for procurement when the products or services are external to Sandia. With internal suppliers, expectations and requirements should be just as clear, although the methods for communication may vary. Most of Sandia's service organizations have developed specific methods for their customers to communicate requirements. Sandia's programs each develop their own means of defining and controlling the work that divisions will perform on their behalf.

The Q-Sig home page provides much more information about the Q-Sig process, a tool to determine whether an item or service is Q-Sig, frequently asked questions, and more.

Multi-Site Procurements

The Supply Chain Management Center (SCMC) builds upon existing capabilities, activities, and organizations within the NNSA's eight M&O Prime Contractors, known as the Nuclear Security Enterprise (NSE). The purpose of the SCMC is to ensure improved efficiencies and economies in NSE acquisitions by implementing strategically driven integrated functions that ensure maximum value for every acquisition dollar spent. The SCMC oversees creation and execution of commodity agreements and infrastructure. The SCMC is primarily staffed by employees of the Kansas City National Security Campus (KCNSC), managed and operated by Honeywell FM&T with support from procurement staff from the NSE. The Sandia Contracting Representative (SCR) may use various SCMC agreements that are available for obtaining discounted pricing.

Sandia participates in bi-weekly meetings with complex-wide representatives, receives SCMC specific data monthly, informs the SCMC performance scorecard, and manages the Procurement Guideline 5.2.G, *Ordering/Corporate Agreements*.

NNSA Supply Chain Management Center (SCMC) website

DOE Integrated Contractor Purchasing Team (ICPT) website

7.8. Criterion 8: Performance/Inspection and Acceptance Testing

Criterion

1. Inspect and test specified items, services, and processes using established acceptance and performance criteria.
2. Calibrate and maintain equipment used for inspections and tests.

Objectives

To meet our customers' needs and maintain safe operations, it is essential to verify that items, services, and processes perform as intended.

- The requestor determines acceptance and performance criteria. These criteria can address form, fit, and/or function (e.g., product identification, physical and performance characteristics, or personnel qualification).
- Inspection and testing of specified items, services, and processes are performed using established acceptance and performance criteria**.**
- Equipment used for inspections and tests is calibrated and maintained.

Implementation Attributes

- Avoiding surprises throughout the entire product and service realization cycle by establishing acceptance and performance inspection and testing criteria for specified items, services, and processes required of the work
- Ensuring that the measuring equipment required for the work (e.g., inspections and tests) is calibrated and maintained

Graded Approach

In ascending order of rigor, the inspection/testing methods are: acceptable supplier/item performance record; standard receipt inspection; source verification/surveillance; and special test and inspections. The frequency or amount of testing may also vary, from statistical sampling to full testing of 100 percent of the incoming items. The requester may use these methods individually or in combination to provide an appropriate level of assurance that the items or services meet the critical requirements.

Tools and References

The Sandia Primary Standards Laboratory (PSL) aids in obtaining calibration and maintenance of metrology instruments throughout Sandia. The PSL website provides links to pertinent CPS procedures, purchasing guidelines, calibration requests, and documentation of their capabilities and services.

Primary Standards Laboratory

7.9. Criterion 9: Assessment/Management Assessment

Criterion

Ensure that managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives**.**

Objective

Management assessment is a collective term that includes all the activities that determine and improve the effectiveness of management related processes and operations, regardless of the type of work that is being conducted. Effectiveness is measured by progress towards established performance related goals and objectives, which as a minimum include compliance with contractual and legal requirements as well as meeting customer cost, schedule, and performance expectations.

Managers assess their programs and operations to find and fix problems to avoid surprises that could affect the progress towards established goals and expectations. Problems that hinder the organization from achieving its objectives are identified and corrected, and learning opportunities acknowledged.

An effective management assessment provides

- a regular, systematic evaluation process for assessing management related processes and operations against established performance objectives;
- a set of methodologies to evaluate performance such as surveillances, audits, and comprehensive effectiveness evaluations; and
- the information managers use to make decisions that will continually improve performance.

Implementation Attributes

- Valuing checks of the work through assessments and formal peer reviews to discover and correct issues that could prevent achieving objectives.
- Acting promptly on assessment results to correct discovered problems, prevent recurrence of similar issues, and continually improve.

Graded Approach

The depth, rigor, and frequency of assessments depend on several factors including the risks associated with the work, the results from past assessments (favorable or unfavorable) and effectiveness evaluations, the needs of the customer, the determination of extent of conditions, and the information needed by management to aid in understanding the conditions.

Assessments may be focused on areas that represent the greater programmatic or operational risks, have caused past problems, or represent new or significantly changed scopes of work.

Tools and References

The Assurance Information System (AIS) tool provides organizations with a management review application that documents identified risks, the mitigation activities to manage that risk, schedule and track control activities such as assessment, and track corrective actions when mitigation activities are found to be ineffective or not performing as required.

7.10. Criterion 10: Assessment/Independent Assessment

Criterion

1. Plan and conduct independent assessments to measure item and service quality and the adequacy of work performance, and to promote improvement.
2. Establish sufficient authority and freedom from line management for independent assessment teams.
3. Ensure that persons conducting independent assessments are technically qualified and knowledgeable in the areas to be assessed.

Objectives

Management must be assured an objective evaluation of Sandia's effectiveness in meeting programmatic, contractual, and legal commitments and requirements is known.

Independent assessments are planned and conducted to measure product and service quality, to measure adequacy of work performance, and to promote continual improvement. Management must ensure they receive objective feedback that can be used to confirm acceptable performance and identify improvement opportunities.

Independent assessors:

- Have sufficient authority and freedom from the line organization to carry out their responsibilities, and
- Are technically qualified and knowledgeable in the areas assessed.

Members of the workforce evaluate and respond to the results from independent assessments by analyzing findings to determine causes, and develop and assign appropriate corrective and preventive actions.

Implementation Attributes

- Enlisting the help of independent or outside reviews to identify improvement opportunities.
- Providing sufficient authority and freedom to independent review teams to ensure the results are accurate and unbiased.

Graded Approach

Factors in determining a graded approach for independent assessments include the risk level, time and results from the last audit (internal or external), major changes (change of management, scope of work, high employee turnover, increased visibility), performance concerns, and validation of effectiveness of completed corrective actions.

Management should consider using outside, independent evaluators to evaluate processes managed by their organizations. These may be internal or external peer reviews, consultants, or counterparts from other organizations or laboratories, if they have the requisite expertise and sufficient independence from the program being assessed.

Tools and References

The AIS tool provides organizations with a comprehensive means to identify risks, find problems, and implement sustainable corrective actions.

External independent assessments, special management reviews, external advisory boards, and other internal independent assessments are routinely performed. Some are conducted by Center 800 (Independent Audit, Ethics, and Business Conduct) to provide risk-based, objective audits and reviews designed to add value and improve Sandia operations.

7.11. Suspect/Counterfeit Items (S/CI) Prevention

DOE O 414.1D, Attachment 3, Suspect/Counterfeit Items Prevention

Objectives

Allowing items that are counterfeit into the supply chain can have significant impact on our products and may create unsafe working conditions. The S/CI Prevention Program has the following objectives:

- Prevent S/CI from entering the supply chain
- Identify legacy S/CI to prevent their use
- Report S/CI to:
    - Share information with other potential users
    - Notify authorities of potential criminal activity

Implementation Attributes

- Implementing processes for detection, control, reporting, and disposition of suspect/counterfeit items.
- Approved, vetted suppliers; common suppliers for common items.
- Purchasing directly from original equipment manufacturer (OEM) with approved and rigorous counterfeit prevention programs.
- Rigorous traceability to OEMs when not purchasing directly from OEM or an authorized distributor.
- Processes to independently verify critical components or devices with unsure pedigrees.

Graded Approach

Procurement requesters should analyze the potential consequences if the product or service should fail. This risk-based approach will inform the level of controls over the purchase and the inspection requirements.

Tools and References

The Suspect/Counterfeit Items webpage identifies the owner of the S/CI program and provides links to guidance and procedures, training, examples, points of contact, quarterly meeting events, and the S/CI Newsletter.

7.12. Safety Software Quality Assurance Requirements for Nuclear Facilities

DOE O 414.1D, Attachment 4, Safety Software Quality Assurance Requirements for Nuclear Facilities

Objective

The objective is to assure that the software we rely on for the safety of our nuclear facilities is managed (designed, developed, tested, and maintained) with sufficient rigor.

Group 1380 (Nuclear Facilities and Applied Technologies) specifies in the Technical Area V (TA-V) Management System document that ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications Version 2015 (NQA-1) as TA-V's official consensus standard. While TA-V follows IM100.3.5, *Provide Quality Software*, which uses ASME NQA-1,

subpart 2.7 to meet its software quality assurance requirements, TA-V also uses IAEA Specific Safety Requirements No. SSR-2/1, *Safety of Nuclear Power Plants: Design* and IAEA Safety Guide NS-G-1.1, *Software for Computer Systems Important to Safety in Nuclear Power Plants* to meet the requirement for an accepted software quality assurance standard. The responsibility for verifying implementation of NQA-1 is assigned to the Sandia National Laboratories Specific Use Specification, Sandia National Laboratories Software Quality Assurance Program (SNL SSQAP) SS-R89727. Declared standards and grading levels are reviewed and approved annually as part of the TA-V's management system approval process.

DOE-approved QAPs applicable to safety software based on requirements from DOE O 414.1C are acceptable (per Attachment 4, 2.a).

The SSQAP specifies national or international consensus standards used and establishes and documents grading levels for safety software using the graded approach. Both elements are submitted for approval by the designated DOE approval authority.

Implementation Attributes
Ensuring software acquired, developed, and implemented meets requirements.

Graded Approach
DOE O 414.1D, Attachment 4, requires the establishment and documentation of grading levels, subject to the approval of DOE. These grades are built into the procedures and guidance found in the QA cross-mapping table in Section 9.0.

Tools and References
The Software Quality Implementation Group (SQUIG) web site is maintained by the SQUIG. This group represents a broad spectrum of software quality professionals and is chartered to provide software quality support upon request, and seek ways to identify and share training, lessons learned, and best practices throughout the Sandia software development community.

8.0 List of Acronyms

ALD	Associate Laboratories Director
AIS	Assurance Information System
CAS	Contractor Assurance System
CG	Corporate Governance
CGPA	Corporate Governance Policy Area
CPS	Corporate Policy System
CPS-F	Corporate Policy System of the Future
CPM	Corporate Policy Management
CRADA	Cooperative Research and Development Agreement
CTO	Chief Technology Officer
DOE	Department of Energy
ES&H	Environment, Safety & Health
FFRDC	Federally Funded Research and Development Center
FMFIA	Federal Managers Financial Integrity Act
HRP	Human Reliability Program
ICPT	Integrated Contractor Purchasing Team
IG	Inspector General
JIT	Just in Time
KCNSC	Kansas City National Security Plant
KDP	Knowledge Development Program
LDRD	Laboratory Directed Research and Development
LOS	Laboratory Operating System
LSS	Lean Six Sigma
MA	Mission Assurance
MAF	Mission Assurance Framework
NNSA	National Nuclear Security Administration
NQT	Nuclear Security Quality Training
NSE	Nuclear Security Enterprise
NWPMU	Nuclear Weapon Program Management Unit
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
PDCA	Plan Do Check Act
PMF	Performance Management Form
PMU	Program Management Unit
PSL	Primary Standards Laboratory
QA	Quality Assurance
QAP	Quality Assurance Program

QAPD	Quality Assurance Program Description
QM	Quality Management
QMA	Quality Maturity Assessment
Q-Sig	Quality-Significant
R2A2	Roles, Responsibilities, Accountabilities, and Authorities
S/CI	Suspect/Counterfeit Items
Sandia	National Technology and Engineering Solutions of Sandia, Inc.
SCM	Supply Chain Management
SCR	Sandia Contracting Representative
SCMC	Supply Chain Management Center
SE	Systems Engineering
SFO	Sandia Field Office (NNSA)
SLT	Sandia Leadership Team
SMI	Sandia Management Information
SMM	Sandia Management Model
SMS	Sandia Management System
SNL	Sandia National Laboratories
SPP	Strategic Partnership Projects
SPS	Sandia Performance Scorecard
SQA	Software Quality Assurance
SQUIG	Software Quality Implementation Group
SSQAP	Sandia Software Quality Assurance Program
SRN	Sandia Restricted Network
STA	Secure Transportation Asset
SWPR	Stockpile and Weapon Product Realization
TA-V	Technical Area V
WIPP	Waste Isolation Pilot Plant
WP&C	Work Planning and Control
WS&T	Weapons Science and Technology

Corporate Policy Prefixes

CG	Corporate Governance
ESH	Environmental Safety & Health
FAC	Facilities
FIN	Finance
HR	Human Resources
ISS	Integrated Safeguards & Security
IMCS	Information Management & Cyber Security
SCM	Supply Chain Management

9.0 Corporate Policy System Cross-Map to DOE O 414.1D

The table on the following pages provides the relationship between the individual corporate policy, process, or procedure that is intended to meet each criterion of DOE O 414.1D and 10CFR830, Subpart A. This table also provides a cross-reference to the sections and titles of NAP-24A, ISO 9001:2015, and AS9100D.

Cross-map Notes

[1] DOE O414.1D specifies in the Contractor Requirements Document additional requirements in attachment 2, 3, and 4.

[2] DOE O414.1D provides direction for determining appropriate consensus standards for developing a QAP. Distinction is made for Hazardous Category 1, 2, and 3 nuclear facilities.

General Notes

- Mapping was developed with DOE O 414.1D and 10CFR 830, Subpart A as the baseline showing associations to NAP-24A, ISO 9001:2015, and AS9100D. Because ISO9001 and AS9100 are more detailed, there may be multiple associations of a given criteria from these standards to NAP-24A.
- Mapping was intended to show the most direct association and best fit. The user should not assume that associations shown represent perfect one-to-one mapping. The actual criteria should be read, as the requirements may vary in detail from left to right, with DOE O 414/10CFR830 being the most general and AS9100D providing the most detail.
- When the highest-level section is noted (e.g., NAP-24A, 5.5), all subsequent subsections apply.
- 10 CFR Subpart B - Safety Basis Requirements is not included in this mapping. Subpart B establishes safety basis requirements for hazard category 1, 2, and 3 DOE nuclear facilities.
- Pink highlighted items identify additional requirements.
- Italicized wording implies paraphrasing of requirements.
- The most current versions of corporate policies, processes, and procedures can be found in the Corporate Policy System.

Corporate-Required				NW-Required		Elected			
DOE O 414.1D [1] / 10 CFR 830 Subpart A		**Corporate Policy System Procedure**		**NAP-24A**		**ISO 9001:2015**		**AS9100:2016**	
Section Number	**Section Title**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
1.	Purpose	1.1	Introduction (Quality Assurance Program Description)	1.0	Purpose	0.1	General - Introduction	0.1	General - Introduction
3./830.120	Applicability	1.3	Corporate Policy System and Requirements Flow Down (Quality Assurance Program Description) CG100.10.1 Manage Prime Contract CG100.10.2 Manage Baseline Directives SCM100.2.11 Acquire Quality Significant Items SCM100.2.12 Develop the Statements of Work SCM100.2.13 Plan for SP-Placed Procurements	1.1	Scope	1	Scope	1	Scope
				1.2	Supplemental Policy and Clarifications				
6./830.3	Definitions				Definitions are documented and maintained in the NNSA Definition Lexicon	3	Terms and Definitions	3	Terms and Definitions
7.	References					2	Normative References	2	Normative References
Attachment 1	**Contractor Requirements Document**								
1./830.121[2]	**Quality Assurance Program Development and Implementation**			2.2	Weapon Quality Management System	0.3	Process Approach	0.3	Process Approach
2./830.121b	**Quality Assurance Program Approvals and Changes**	1.0	Sandia's Quality Assurance Program (Quality Assurance Program Description)	2.2.1	WQAP	4.4	Quality management system and its processes	4.4	Quality management system and its processes
				2.2.2	Submittal, Approval, Implementation, and Reporting	6	Planning	6	Planning
Attach.2/830.122	**Quality Assurance Criteria**								
1.	**Criterion 1 - Management/Program**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
1.a	Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing the authority, and interfaces for those managing, performing, and assessing the work.	7.1	Criterion 1 - Program (Quality Assurance Program Description) CG100.1.1, Create and Maintain the Management Structure and Associated Corporate Roles CG100.1.2, Create, Change, Cancel, or Review a Corporate Policy, Process, or Procedure CG100.6.1, Manage Risks ESH100.1.GP.2, Implement ES&H General Requirements (see GN470108, ES&H General Requirements) ESH100.1.GP.3, Implement the Integrated Safety Management System ESH100.1.WPC.1, Plan and Control Work FAC100.1.3, Plan Projects at the Funding Program Level FAC100.1.5, Plan Buildings and Sites FIN100.4.5, Manage Project Resources FIN100.6.2, Manage Financial Information FIN100.4.1, Use a Graded Approach to Project Management FIN100.5.1, Initiate, Process, and Execute Strategic Partnership Projects, Other Federal Agency and Non-Federal Entity Proposals and Agreements FIN100.5.2, Initiate, Process, and Execute Cooperative Research and Development Agreements (CRADAs) FIN100.5.4, Submit Annual Budget FIN100.4.7, Develop a Cost Estimate HR100.1.6, Implement an Integrated Workforce Management Approach SCM100.2.15, Perform Formal Acquisition Planning for Procurements	2.1	Risk Management	6.1 6.3	Actions to Address Risk and Opportunities Planning of Changes	6.1 6.3	Actions to Address Risk and Opportunities Planning of Changes
				2.2	Weapon Quality Management System	5.1 4 5.3	Leadership and Commitment Context of the Organization Organization Roles, Responsibility and Authorities	5.1 4 5.3	Leadership and Commitment Context of the Organization Organization Roles, Responsibilities and Authorities
				2.3	Organization	5.3	Organizational Roles, Responsibility and Authorities	5.3	Organizational Roles, Responsibility and Authorities
				4.0	Responsibilities	5.1 5.1.2 5.2	Leadership and Commitment Customer Focus Quality Policy	5.1 5.1.2 5.2	Leadership and Commitment Customer Focus Quality Policy
				4.7	Contractors				
				2.6	Planning	6	Planning	6	Planning
1.b	Establish management processes, including planning, scheduling, and providing resources for the work.			2.6	Planning	7.1 7.1.6	Resources Organizational Knowledge	7.1 7.1.6	Resources Organizational Knowledge
						7.1.3	Infrastructure	7.1.3	Infrastructure
						8.2	Requirements for Products and Services	8.2	Requirements for Products and Services
						7	Support	7	Support

DOE O 414.1D [1] / 10 CFR 830 Subpart A		Corporate Policy System Procedure		NAP-24A		ISO 9001:2015		AS9100:2016	
2.	**Criterion 2 - Management/Personnel Training and Qualification**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
2.a **2.b**	Train and qualify personnel to be capable of performing their assigned work. Provide continuing training to personnel to maintain their job proficiency.	7.2	Criterion 2 - Personnel Training and Qualification (Quality Assurance Program Description) ESH100.2.GEN.2, Determine, Complete, and Document Required ES&H Training HR100.1, Acquire Talent (all procedures) HR100.2, Develop the Workforce (all procedures) HR100.3, Motivate and Retain the Workforce (all procedures) ISS100.5.7, Participate in the Human Reliability Program (HRP)	3.2	Training	7.1.2 7.2 7.3 7.4	People Competence Awareness Communication	7.1.2 7.2 7.3 7.4	People Competence Awareness Communication
3.	**Criterion 3 - Management/Quality Improvement**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
3.a **3.b** **3.c** **3.d**	Establish and implement processes to detect and prevent quality problems. Identify, control, and correct items, services, and processes that do not meet established requirements. Identify the causes of problems, and include prevention of recurrence as a part of corrective action planning. Review item characteristics, processes implementation, and other quality related information to identify items, services, and processes needing improvement.	7.3	Criterion 3 - Quality Improvement (Quality Assurance Program Description) CG100.4.8, Report and Investigate Allegations of Misconduct CG100.6.1, Manage Risks CG100.6.3, Determine, Plan, and Perform Assessments CG100.6.6, Determine and Take Action CG100.6.13, Measure Performance for Management Entities CG100.6.15, Identify Operating Experience, and Share Lessons Learned CG100.6.19, Conduct Management Review and Manage Issues CG100.6.21, Control Nonconforming Product ESH100.4.FI.3, Implement and Manage Corrective Actions ESH100.4.RPT.1, Report ES&H Concerns and Suggestions for Improvement ESH100.4.RPT.2, Report Injuries and Illnesses ESH100.4.RPT.3, Report Occurrences ESH100.4.RPT.4, Report Environmental Releases ESH100.4.RPT.5, Report Vehicle Accidents and Property Damage ESH100.4.RPT.7, Address Safety and Security Regulatory Compliance Requirements (see GN470106) ESH100.4.RPT.9, Manage the Formal Accident Investigation ISS100.3.1, Report Personnel Security Information; Security Incidents; and Waste, Fraud, and Abuse SCM100.3.13, Manage Suspect or Counterfeit Items	3.1.3	Metrics (See 4.7d for specific reporting)	9.1 9.1.3	Monitoring, measurement, analysis and evaluation Analysis and Evaluation	9.1 9.1.3	Monitoring, measurement, analysis and evaluation Analysis and Evaluation
				3.1 3.1.1 3.1.2	Quality Improvement Continuous Improvement Process Prevention versus Detection	6.2 10.1 10.3	Quality Objectives and planning to achieve them General Continual Improvement	6.2 10.1 10.3	Quality Objectives and planning to achieve them General Continual Improvement
				3.1.3	Metrics				
				3.12 3.12.1 3.12.2	Nonconformance Nonconforming Item Control Nonconforming Item Disposition	8.7 10.1 10.2	Control of Nonconforming Outputs General Nonconformity and Corrective Action	8.7 10.1 10.2	Control of Nonconforming Outputs General Nonconformity and Corrective Action
				3.13	Corrective Action (See 4.7c for associated management responsibilities)	10.2	Nonconformity and Corrective Action	10.2	Nonconformity and Corrective Action
						9.1.2	Customer Satisfaction	9.1.2	Customer Satisfaction

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4.	**Criterion 4 - Management/ Documents and Records**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
4.a **4.b**	Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design. Specify, prepare, review, approve, and maintain records.	7.4	Criterion 4 - Documents and Records (Quality Assurance Program Description) CG100.1.2, Create, Change, Cancel, or Review a Corporate Policy, Process, or Procedure CG100.4.2, Apply Configuration Management Principles to Items Critical to Work Quality ESH100.2.GEN.3, Develop and Use Technical Work Documents FAC100.3.4, Authorize and Conduct Real Property Asset Construction Projects HR100.2.15, Maintain Training Records in TEDS HR100.5.7, Manage Corporate HR Records HR100.7.1, Communicate Within the Laboratory HR100.7.2, Communicate Outside the Laboratory HR100.7.3, Refer Matters to Media Relations IM100.2.1, Control Documents IM100.2.2, Control Records IM100.2.3, Prepare and Release Information IM100.2.5, Identify and Protect Unclassified Information IM100.2.6, Control Personally Identifiable Information. IM100.3, Create, Maintain, and Evaluate Information Technology Resources and Services (all procedures) ISS100.1, Perform Classified Work (all procedures)	3.3.9 3.4 3.5 3.14	Design Records Instructions, Procedures, and Drawings Document Control Records	7.5 7.5.1 7.5.3 7.5.2 8.5.6	Documented Information General Control of Documented Information Creating and Updating Control of Changes	7.5 7.5.1 7.5.3 7.5.2 8.5.6	Documented Information General Control of Documented Information Creating and Updating Control of Changes
5.	**Criterion 5 - Performance/ Work Process**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
5.a	Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, or other appropriate means.	7.5	Criterion 5 - Work Processes (Quality Assurance Program Description) CG100.6.20, Achieve Quality and Mission Success CG100.6.21, Control Nonconforming Product ESH100.3.2, Manage Accountability and Operational Modes for Facilities ESH100.3.3, Implement Conduct of Operations FAC100.7.1, Prepare for and Manage Emergencies FIN100.4., Use the Project Framework to Manage Projects FIN100.4.2, Apply Configuration Management Principles to Items Critical to Work Quality IM100.1.2, Manage Controlled Electronic Devices and Media IM100.1.3, Use and Protect Computing Resources IM100.3.5, Provide Quality Software ISS100.2.10, Manage Special Nuclear Material ISS100.2.11, Manage Other Accountable Nuclear Material ISS100.5.1, Manage Controlled and Prohibited Articles ISS100.5.5, Use, Control, and Protect Badges ISS100.5.6, Manage Locks and Keys SCM100.3.3, Manage Property SCM100.3.5, Conduct Physical Inventory of Trackable Property SCM100.3.6, Ship Property, Material, or Documents SCM100.3.7, Management and Use of Government Vehicles and Motorized Equipment SCM100.3.13, Manage Suspect or Counterfeit Items SCM100.3.14, Store General Materials at SNL	3.8 3.8.1 3.8.2 3.4	Control of processes Process Control Methods Special Processes Instructions, Procedures, and Drawings	7.1.4 8.5 8.5.1	Environment for the operation of processes Production and Service Control of Production and Service Provision	7.1.4 8.5 8.5.1	Environment for the operation of processes Production and Service Control of Production and Service Provision
						8.5.1.1	Control of Equipment, Tools, and Software	8.5.1.1	Control of Equipment, Tools, and Software
						8.5.1.3	Production Process Verification	8.5.1.3	Production Process Verification
5.b **5.c**	Identify and control items to ensure proper use. Maintain items to prevent damage, loss, or deterioration.			3.7 3.7.1 3.7.2 3.7.3 3.7.4 3.7.5 3.7.6 3.7.7 3.11 3.11.1 3.11.2	Identification, Control and Status of Items Identification of Items Control of Items Status of Items Tooling and Fixtures Limited Life Materials and Components Materials or Items Designated for Destructive Testing Special Instructions and Environments Handling, Storage, Packaging and Delivery Government - Furnished Material NNSA - Accepted Material	8.2.2 8.5.5 8.5.2 8.5.3 8.5.4	Determination of Requirements Related to the product and Services Post-delivery activities Identification and Traceability Property Belonging to Customers or External Providers Preservation	8.2.2 8.5.5 8.5.2 8.5.3 8.5.4	Determination of Requirements Related to the product and Services Post-delivery activities Identification and Traceability Property Belonging to Customers or External Providers Preservation
5.d	Calibrate and maintain equipment used for process monitoring or data collection.			3.10	Control of Measuring and Test Equipment	7.1.5	Monitoring and Measuring Resources	7.1.5	Monitoring and Measuring Resources

			SCM100.3.15, Manage Precious Metals SCM100.3.16, Receive, Transfer, and Ship Explosive Materials at SNL SCM100.3.17, Receive, Transfer, and Ship Nuclear/Radioactive Materials at SNL SCM100.3.18, Manage Firearms Lifecycle SCM100.3.19, Movement of Hazardous Material						
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6.	**Criterion 6 - Performance/Design**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
6.a	Design items and processes using sound engineering/ scientific principles and appropriate standards.	7.6	Criterion 6 - Design (Quality Assurance Program Description) CG100.6.20, Achieve Quality and Mission Success FAC100.3, Acquire or Modify Real Property Assets (all procedures) FIN100.4.2, Apply Configuration Management Principles to Items Critical to Work Quality IM100.3.2, Acquire or Develop and Implement Information Technology Resources IM100.3.5, Provide Quality Software	2.4 2.4.1 3.3 3.3.9 3.3.2	Early and Continuous Application of Quality Principles Producibility Design Design Records Design Process	8.1 8.1.1 8.3 8.3.2	Operational Planning and Control Operational Risk Management Design and Development of Products and Services Design and Development Planning	8.1 8.1.1 8.3 8.3.2 8.1.3	Operational Planning and Control Operational Risk Management Design and Development of Products and Services Design and Development Planning Product Safety
						8.2.1	Customer Communication	8.2.1	Customer Communication
6.b	Incorporate applicable requirements and design bases in design work and design changes.			2.5 3.3.1	Establishing and Validating Requirements (See 4.7d for management responsibilities) Design Input	8.2 8.2.2 8.3.3 8.3.4 8.2.3	Requirements for Products and Services Determination of Requirements Related to the Product and Services Design and Development Inputs Design and Development Controls Review of the Requirements for Products and Services	8.1.2 8.2 8.2.2 8.3.3 8.3.4 8.2.3	Configuration Management Requirements for Products and Services Determination of Requirements Related to the Product and Services Design and Development Inputs Design and Development Controls Review of the Requirements for Products and Services
								8.5.5	Post-Delivery Activities
6.c	Identify and control design interfaces.			3.3.8	Interface Control	8.3.4	Design and Development Controls	8.3.4	Design and Development Controls
6.d **6.e**	Verify or validate the adequacy of design products using individuals or groups other than those who performed the work. Verify or validate work before approval and implementation of the design.			3.3.3 3.3.4 3.3.5 3.3.6 3.3.7	Design Verification Design Reviews Design Qualification Design Documents Design Change Control and Configuration Management	8.3.5 8.3.4 8.3.6 8.2.4	Design and Development Outputs Design and Development Controls Design and Development Changes Changes to Requirements for Products and Services	8.1.2 8.3.5 8.3.4 8.3.6 8.2.4	Configuration Management Design and Development Outputs Design and Development Controls Design and Development Changes Changes to Requirements for Products and Services

7.	Criterion 7 - Performance/Procurement	QAPD Section Number	Section Title	Section Number	Section Title	Section Number	Section Title	Section Number	Section Title
7.a **7.b** **7.c**	Procure items and services that meet established requirements and perform as specified. Evaluate and select prospective supplier based on specified criteria. Establish and implement processes to ensure that approved suppliers continue to provide acceptance items and services.	7.7	Criterion 7 - Procurement (Quality Assurance Program Description) SCM100.2.2, Acquire Property SCM100.2.8, Order Through Self-Service Procurement (JIT) SCM100.2.10, Acquire Services of Non-Employees SCM100.2.11, Acquire Quality Significant Items SCM100.2.12, Develop the Statements of Work SCM100.2.13, Plan for SP-Placed Procurements SCM100.2.14, Create Contract Award Criteria for Competitive Procurement SCM100.2.15, Perform Formal Acquisition Planning for Procurements SCM100.2.17, Request a Sole-Source Procurement SCM100.2.19, Acquire Fabricate to Print Product/Service SCM100.3.7, Management and use of Government Vehicles and Motorized Equipment SCM100.3.8, Evaluate Contractor's Performance through SCORE SCM100.3.13, Manage Suspect or Counterfeit Items	3.6 3.6.1 3.6.2 3.6.3 3.6.4 3.6.5	Procurement (Refer to 4.7c for specific responsibilities) Supplier Evaluation, Selection and Monitoring Procurement Documentation Acceptance of Procured Items, and Materials Acceptance of Procured Services Certificate of Conformance	8.4 8.4.1 8.4.2	Control of Externally Provided Products and Services General Type and extent of control	8.4 8.4.1 8.4.2 8.4.2.c.3	Control of Externally Provided Products and Services General Type and extent of control Take into consideration the results of the periodic review of external provider performance (See 8.4.1.1.c)
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8.	**Criterion 8 - Performance/Inspection and Acceptance Testing**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
8.a **8.b**	Inspect and test specified items, services, and processes using established acceptance and performance criteria. Calibrate and maintain equipment used for inspections and tests.	7.8	Criterion 8 - Inspection and Acceptance Testing CG100.6.20, Achieve Quality and Mission Success CG100.6.21, Control Nonconforming Product IM100.3.5, Provide Quality Software SCM100.2.13, Plan for SP-Placed Procurements SCM100.3.10, Do's and Don'ts for Requesters and SDRs During Contract Management Activities SS-R89727, Specific Use Specification, SNL Software Quality Assurance Program	3.9 3.9.1 3.9.2	Inspection, Test, and Acceptance Inspection and Test Acceptance	7.1.5 8.6	Monitoring and Measuring Resources Release of Products and Services	7.1.5 8.6	Monitoring and Measuring Resources Release of Products and Services
9.	**Criterion 9 - Assessment/Management Assessment**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
	Ensure that managers assess their management processes, identify, and correct problems that hinder the organization from achieving its objectives.	7.9	Criterion 9 - Management Assessment (Quality Assurance Program Description) CG100.6.3, Determine, Plan, and Perform Assessments CG100.6.6, Determine and Take Action CG100.6.19, Conduct Management Review and Manage Issues ESH100.4.FI.1, Perform ES&H Line Self-Assessment Activities. ESH100.4.FI.3, Implement and Manage Corrective Actions FIN100.4.1 Use a Graded Approach to Project Management ISS100.3.2, Perform Security Integrated Assessments	3.15 3.15.1 3.15.2 3.15.3 3.15.4 3.15.5 3.15.6 3.15.7	Assessments (See 4.7d for management responsibilities) Management Assessments Independent Assessments Assessor Qualification Scheduling Planning Performance Reporting	9.3 9.3.1 9.3.2 9.3.3 9.1.3	Management Review General Review Input Review Output Analysis and Evaluation	9.3 9.3.1 9.3.2 9.3.3 9.1.3 9.3.2c.8	Management Review General Review Input Review Output Analysis and Evaluation On-time Delivery Performance

10.	Criterion 10 - Assessment/Independent Assessment	QAPD Section Number	Section Title	Section Number	Section Title	Section Number	Section Title	Section Number	Section Title
10.a **10.b** **10.c**	Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement. Establish sufficient authority and freedom from line management for independent assessment teams. Ensure persons who perform independent assessments are technically qualified and knowledgeable in the areas to be assessed.	7.10	Criterion 10 – Independent Assessment (Quality Assurance Program Description) CG100.4.8., Report and Investigate Allegations of Misconduct CG100.6.3, Determine, Plan, and Perform Assessments CG100.6.6, Determine and Take Action ESH100.4.FI.3, Implement and Manage Corrective Actions	3.15 3.15.2 3.15.3 3.15.4 3.15.5 3.15.6 3.15.7	Assessments (See 4.7d for management responsibilities) Independent Assessments Assessor Qualification Scheduling Planning Performance Reporting	9.2	Internal Audit	9.2	Internal Audit

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Attachment 3	**Suspect/Counterfeit Items (S/CI) Prevention**	**QAPD Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**	**Section Number**	**Section Title**
1. **2.** **3.** **4.**	*Purpose: QAPs must set forth requirements to (1) ensure items and services meet specified requirements; (2) prevent entry of S/CIs into the DOE supply chain; and (3) ensure detection, control, reporting and disposition of S/CIs.* *Include S/CI oversight and prevention process commensurate with the facility activity hazards and mission impact. Identify the position responsible for S/CI activities, provide training to prevent introduction of S/Cis into SSCs in safety systems. Conduct inspections to identify S/Cis that may be installed in safety systems.* *Contact the DOE Inspector General (IG) before destroying or disposing of S/Cis and corresponding documentation, to allow the IG to determine whether the items and documentation need to be retained for criminal investigation or litigation.* *Report S/Cis in accordance with DOE O 232.2, Occurrence Reporting and Processing of Operations Information dated 08-30-11 (or latest version).*	7.11	Suspect/Counterfeit Items Prevention (Quality Assurance Program Description) CG100.6.6, Determine and Take Action CG100.6.21, Control Nonconforming Product ESH100.4.RPT.3, Report Occurrences SCM100.3.13, Manage Suspect or Counterfeit Items	3.6	Procurement	8.4 8.5.2	Control of Externally Provided Processes, Products, and Services Identification and Traceability	8.1.4 8.4 8.5.2	Prevention of Counterfeit Parts Control of Externally Provided Processes, Products, and Services Identification and Traceability

Attachment 4	Safety Software Quality Assurance Requirements for Nuclear Facilities	QAPD Section Number	Section Title	Section Number	Section Title	Section Number	Section Title	Section Number	Section Title
1. **2.**	*Purpose: Prescribe the safety software quality assurance requirements for DOE Nuclear Facilities.* *Safety Software must be acquired, developed and implemented using ASME NQA-1-2008 with the NQA-1a-2009 addenda (or a later edition), Quality Assurance Requirements for Nuclear Facility Applications, Part I and Subpart 2.7, or other national or international consensus standards that provide an equivalent level of quality assurance requirements as NQA-1.*	7.12	Safety Software Quality Assurance Requirements for Nuclear Facilities (Quality Assurance Program Description) IM100.3.5, Provide Quality Software SS-R89727, Specific Use Specification, SNL Software Quality Assurance Program SS-R89224, Specific Use Specification, Safety Software Inventory Matrix SS-R94286, Specific Use Specification, Self-Assessment Instrument for Software Quality SS-R94287, Specific Use Specification, Sandia Safety Software Training Program	3.16	Software Quality Assurance (SQA)	8.5 8.5.1	Production and Service Provision Control of Production and Service Provision	8.5 8.5.1	Production and Service Provision Control of Production and Service Provision NOTE: Limited reference to SQA in 8.5.1.1, Control of Production Process Changes, and 8.6.6, Control of Changes.

[1] DOE O414.1D calls out in the CRD additional requirements in attachment 2, 3, and 4.
[2] In DOE O414.1D, direction is provided for determining appropriate consensus standards for developing QAP. Distinction is made for Hazardous Category 1, 2, and 3 nuclear facilities.
GENERAL NOTES:
• This mapping was developed with NAP-24A as the baseline showing associations to 414.1D, 10 CFR 830 Subpart A, ISO 9001:2015, and AS9100:2016. Because ISO9001 and AS9100 are more detailed, there may be multiple associations of a given criteria from these standards to the NAP-24A baseline.
• Mapping was intended to show the most direct association; best fit. The user should not assume that associations shown represents perfect 1-to-1 mapping. The actual criteria should be read as the requirements vary in detail from left to right, with DOE O 414/10CFR 830 being the most general and AS9100:2016 providing the most detail.
• When the highest-level section is noted (e.g. NAP-24A, 5.5), all subsequent subsections apply.
• 10 CFR Subpart B - Safety Basis Requirements is not included in this mapping. Subpart B establishes safety basis requirements for hazard category 1, 2, and 3 DOE nuclear facilities.
• The pink highlighted items identify additional requirements.
• Italicized wording implies paraphrasing of requirements.