Applied Technical Services

Quality Manual

Testing, Inspection, Calibration, and Services

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Introduction

Applied Technical Services (ATS) is a premier provider of high-quality consulting engineering, testing, and inspection services. Since our founding in 1967, ATS has established an excellent reputation with business, industry, and the legal profession. Notably, ATS is known for successfully uncovering facts in metallurgy, materials testing, chemical analysis, non-destructive testing, calibrations, fires, and explosions. ATS can take a closer look for you to help find the technical answers and solutions you need.

Our Purpose

Create a safe and reliable world.

Our Mission

Our vision is to deliver assurance through precise technical and professional services.

Our Core Values

Keep People First

- Foster a collaborative and inclusive environment for team members' growth.

Deliver Service Excellence

- Provide best-in-class experiences for our clients.

Think Global, Act Local

- Utilize our combined expertise and knowledge to deliver when and where.

Create Value

- Work efficiently and effectively to deliver quality results in complex environments.

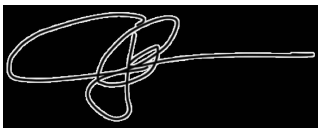
Do What's Right

- Hold ourselves accountable to the highest safety, professional and personal standards.

1 Purpose and Responsibility

The Applied Technical Services (ATS) Quality Manual defines and identifies the policies, procedures, and requirements of the Quality System. These Quality System requirements are met whether carrying out work at the permanent laboratory, the customer's location, or temporary or mobile facilities. This Quality Manual describes the structure of the ATS' Quality System and supporting documentation including references to Quality Assurance Procedures and Departmental Procedures that describe how policies and requirements are implemented.

The ATS Quality Assurance Director, under the authority of the Chief Executive Officer (CEO), is responsible for the preparation, approval, revision, and distribution of this document. Initial release and revision of this document requires approval by the CEO, Vice Presidents, Discipline Leads, and Quality Director prior to implementation. For NDT, managers are represented by the Vice Presidents.

NAME	TITLE	SIGNATURE
Mike McIlwain	Chief Executive Officer	
Robert Luttrell	Vice President	Robert Luttrell
Chris Vorwald	Vice President	
Jeremy Orr	Vice President of Engineering	
Burak Akyuz	Vice President of Lab Services	
Robert Kurtzer	Vice President of Calibration	
James Halsey	Quality Assurance Director	

2 References

- ANSI/ISO/ASQ 9001:2015 Quality Management Systems - Requirements
- ASME NQA - 1 - 2015 Quality Assurance Requirements for Nuclear Facility Applications
- ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories
- FAR 145.211 FAA Requirements for Quality Control System
- Title 10, Code of Federal Regulations, Part 50 App. B Nuclear Quality Assurance Requirements
- Title 10, Code of Federal Regulations, Part 21
- Title 10, Code of Federal Regulations, Part 50.55e
- NEI 14-05-A Revision 1 Guidelines for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services.
- ATS Quality Assurance Procedures (Level 2)
- ATS Departmental Procedures (Level 3)
- FAA Repair Station Manual
- A2LA Scopes of Accreditation for Calibration, Chemistry, Mechanical Testing, and Non-Destructive Testing
- A2LA Policies and Procedures
- Nadcap 7101/1 Nadcap Audit Criteria for Materials Testing Laboratories General Requirements for Laboratories

3 Terms and Definitions

This document does not introduce any new definitions but rather relies on the following:

3.1 Definitions typically used by our customers, stakeholders, or in the marketplace.
3.2 Terms typically used in standards, specifications, and regulations as they relate to our Quality Management System (QMS).
3.3 Standard business terminology.
3.4 Vocabulary commonly used in quality practices.

4 Context of ATS

4.1 Understanding ATS and Our Context

ATS is committed to defining our position in the marketplace and understanding how relevant factors arising from legal, political, economic, social, and technological issues influence our strategic direction and our organizational context. ATS identifies, analyzes, monitors, and reviews factors that may affect our ability to satisfy our customers and stakeholders as well as factors that may adversely affect the stability of our processes or our QMS' integrity. To ensure that our QMS is aligned with our strategy while taking account of relevant internal and external factors, we initially collate and analyze pertinent information to determine potential impact on our context and subsequent business strategy. ATS then monitors and reviews this information to ensure that a continual understanding of each group's requirements is derived and maintained. To facilitate the understanding of our context, we regularly consider issues that influence our context during management review and these issues are conveyed via management review minutes and business planning documents. The output from this activity is evident as an input to the consideration of risks and opportunities, and the actions we take to address them.

4.2 Understanding the Needs and Expectations of Interested Parties

ATS recognizes that we have a unique set of interested parties whose needs and expectations change and develop over time, and furthermore; that only a limited set of their respective needs and expectations are applicable to our operations or to our QMS. Such needs and expectations broadly include those shown in the table below.

Interested Parties	Needs & Expectations
Customers	Price, Reliability, Value
Owners/Shareholders	Profitability and Growth
Employees	Shared Values and Job Security
Suppliers	Beneficial Relationships
Regulatory & Statutory	Compliance and Reporting

To ensure that our services and processes continue to meet all relevant requirements, we identify and assess the potential impact of relevant needs and expectations that may be obtained from the interested parties. Where appropriate, to ensure that our processes are aligned to deliver the requirements of our interested parties; we convert relevant needs and expectations into requirements which become inputs to our QMS and to our services.

4.3 Scope of the Quality Management System

This Quality Manual applies to the testing, inspection, nuclear consulting engineering, and calibration services provided by ATS headquartered at 1049 Triad Court, Marietta, GA 30062 and to the following locations.

NDT Inspection Services	Calibration Services	Chemical Testing	Materials Testing	NDT Training	Nuclear Consulting Engineering
Marietta, GA [1, 2, 4]	Marietta, GA [1, 2]	Marietta, GA [1, 2, 4]	Marietta, GA [1, 2, 4]	Marietta, GA [3]	Denver, CO
Woodstock, AL	Bartlett, TN [1]		Chesapeake, VA	Greenville, SC	
Indian Trail, NC	Tempe, AZ		Tempe, AZ [1]		
Chesapeake, VA	Orlando, FL [1]				
Cocoa Beach, FL	Greenville, SC				
Garden City, GA					
Greenville, SC [2, 5]					
Grimesland, NC					
Portland, OR					
Jacksonville, FL					
Shreveport, LA					
Louisville, KY					
Augusta, GA					
Mobile, AL					
Huntsville, AL[2, 5]					
Oak Ridge, TN					
Rockville, VA					
Soddy Daisy, TN					

(1) A2LA Accredited Location; (2) ISO 9001 Registered Location; (3) Authorized ASNT Exam Center Location; (4) NADCAP Accredited Location, (5) AS9100D Registered Location.

The ATS Quality System is intended to reflect a quality program with a commitment to compliance with the applicable elements of the following standards:

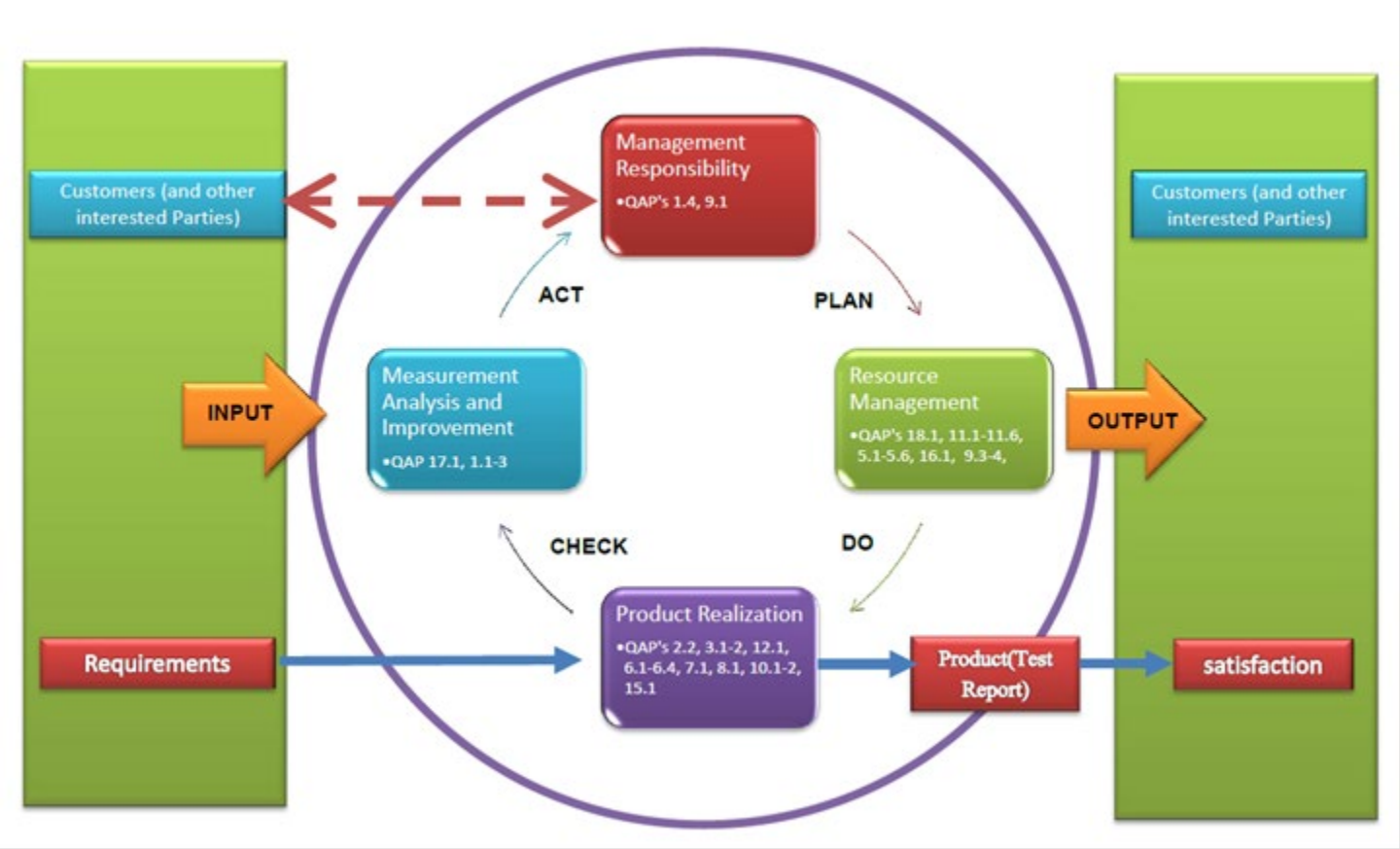
- ANSI/ISO/ASQ 9001:2015 Quality Management Systems - Requirements
- ANSI/NCSL Z540 -1 - 1994 Calibration Laboratories (capabilities are listed on scope of accreditation)
- ASME NQA - 1 - 2015 Quality Assurance Requirements for Nuclear Facility Applications
- ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories
- Title 10, Code of Federal Regulations, Part 50 App. B, Nuclear Quality Assurance Requirements
- Title 10, Code of Federal Regulations, Part 21
- Title 10, Code of Federal Regulations, Part 50.55e
- NEI 14-05-A Revision 1 Guidelines for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services.
- FAR 145.211 FAA requirements for Quality Control System

- AC7101/1 NADCAP General requirements for All Labs

4.4 Quality Management System and Its Processes

ATS has established a QMS to achieve the company's Quality Policy, ensure service quality, and promote continuous improvement. The QMS has been instituted in accordance with the requirements of ISO 9001:2015, and additional applicable quality system standards. ATS has identified the processes needed for the quality management system, their application throughout the organization, and the sequence and interaction of these processes.

5 Leadership



5.1 Leadership and Commitment

5.1.1 General

The CEO, Vice Presidents, and Managers of ATS demonstrate leadership and commitment by fully supporting and taking accountability for the effectiveness of the QMS and the requirements described in the Quality Manual. Policies and procedures contained within the QMS establish ATS' commitment to good professional practice and ensure the quality of testing, inspection, calibration, and nuclear consulting engineering.

By utilizing the QMS, ATS is committed to meeting the requirements of its customers, certifying and accrediting agencies as well as the requirements of ASME NQA - 1 - 2015 Quality Assurance

Requirements for Nuclear Facility Applications, Title 10, Code of Federal Regulations, Part 50 App. B Nuclear Quality Assurance Requirements, Title 10, Code of Federal Regulations, Part 21, Title 10, Code of Federal Regulations, Part 50.55e and NEI 14-05-A Revision 1.

Management has established the quality policy and objectives which is compatible with ATS' context and strategic direction and ensures the integration of the QMS into business processes. During management review and semi-annual managers' meetings, top management promotes and utilizes the process approach and risk-based thinking to ensure that the resources needed for the QMS to meet its intended results are available, communicates the importance of effective quality management, and engages, directs, and supports our employees for complying to and improving the QMS. Additionally, management supports all managers in demonstrating their leadership as it applies to their respective areas of responsibility.

5.1.2 Customer Focus

ATS management ensures customer requirements and expectations are clearly defined, understood, and achieved at all levels of ATS. ATS is committed to achieving a high degree of client service excellence and will accomplish this by understanding and mitigating risks and opportunities that may affect the conformity of testing services and to assure Statutory and Regulatory requirements are identified and achieved according to the applicable clauses of the Quality Manual, Quality System Procedures and Quality System Forms.

ATS values the maintenance of good communication, advice, and guidance in technical matters, and opinions and interpretations based on results. ATS stresses the importance of communication with the customer, especially in large assignments, being maintained throughout the work.

ATS provides the opportunity for customers or their representative's cooperation to verify tests, inspections, and/or calibrations and to monitor the laboratory's performance in the work performed, provided this ensures confidentiality to other customers. This includes providing reasonable access to relevant areas of the laboratory for witnessing of tests and/or calibrations.

5.2 Policy

5.2.1 Establishing the Quality Policy

ATS' management has established, implemented, and maintains a quality policy that is appropriate to the purpose and context of ATS and supports ATS' strategic direction, provides a framework for setting quality objectives, includes a commitment to satisfy requirements and to continually improve the QMS. ATS' quality policy is:

It is the policy of Applied Technical Services to empower the organization by creating a world-class operating system that continually improves to meet customer needs by providing:

- ***Services in accordance with applicable standards and specifications***
- ***Accredited testing, inspection, and calibration services in compliance with applicable accrediting bodies and standards***
- ***Professional services delivered in a timely manner***
- ***Clear and accurate data.***
- ***Qualified, equipped and engaged employees***

5.2.2 Communicating the Quality Policy

ATS' Quality Policy is available and maintained as documented information as a part of the QMS and is made available to relevant interested parties. This policy is communicated, understood, and implemented by everyone within ATS and incorporated within their work.

5.3 Organizational Roles, Responsibilities and Authorities

ATS' management ensures that the responsibilities and authorities for relevant roles are assigned, communicated, and understood within ATS.

A Manager responsible for the technical operations within their area directs each department or location. The Manager has the responsibility and authority for obtaining and providing the necessary resources to carry out operations. This includes providing adequate equipment, training, procedures, personnel, facilities, and the other necessary resources to ensure that the processes deliver the intended outputs including calibrations, testing, inspections, managerial functions, nuclear consulting engineering and verification activities. Managers are responsible for promoting customer focus throughout their regions/departments and throughout ATS. NDT Level III's are responsible for approving NDT procedures, maintain the overall authority for the interpretation of these procedures, and work with the Quality Assurance Director in the implementation of the NDT program.

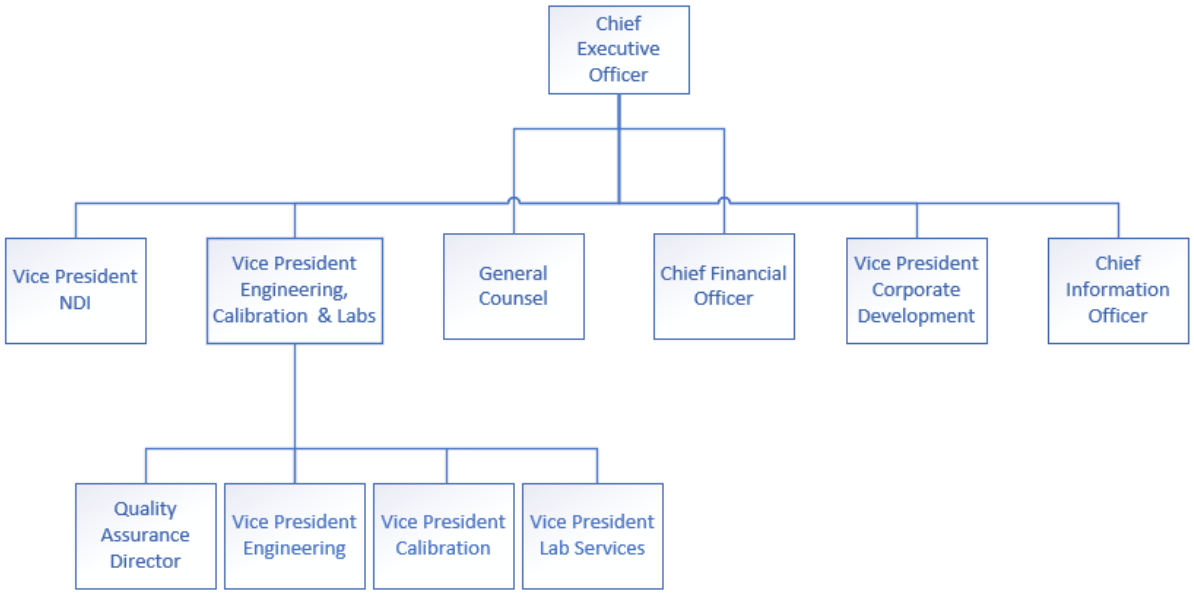
The Quality Assurance Director is responsible for ensuring the quality system conforms to the requirements of standards, is implemented, and followed at all times. The Quality Assurance Director has the organizational freedom to recognize, prevent, and evaluate quality problems and departures from the quality system or from the procedures for performing tests and/or calibrations. In addition, The Quality Assurance Director has the authority to control further processing and delivery when deficiencies or unsatisfactory conditions exist. The Quality Assurance Director may initiate, recommend, and provide solutions to quality problems and is authorized to implement immediate correction in any area in question and to verify the implementation and effectiveness of solutions. The Quality Assurance Director is responsible for reporting on the performance of the QMS during management reviews and for reporting opportunities for improvement. The Quality Assurance Director and Managers are responsible for ensuring that the integrity of the QMS is maintained when changes are planned and implemented.

The CEO ensures that responsibilities and authorities are defined and communicated within ATS.

The CEO has designated the Quality Assurance Director as the Management Representative to administer the Quality System and ensure that processes needed for the quality management system are established, implemented, and maintained and that these processes fulfill the requirements of the applicable quality system standards. The Management Representative reports to the CEO and Vice Presidents on the performance of the quality system, any needs for improvement, and ensures the promotion of awareness of customer requirements throughout the organization.

The Quality Assurance Director, under the authority of the CEO, is responsible for the preparation, approval, revision, and distribution of this document.

The following chart illustrates the responsibility, authority, and interrelationships of personnel involved in the quality system under this manual.



ATS is an independent consulting engineering, testing, inspection, and calibration organization and not part of any organization that may have an involvement or influence on activities or otherwise pose a conflict of interest. The laboratory and those individuals employed by ATS are not involved in any activities that would diminish confidence in the laboratory's impartiality, competence, judgment, or operational integrity. In addition, the internal organization and structure of operations is such that management and personnel are free from undue internal and external commercial, financial, and other pressures that may adversely affect the quality of work.

6 Planning

6.1 Actions to Address Risks and Opportunities

6.1.1 When planning for the QMS, ATS has taken into consideration potential issues and has determined the risks and opportunities that need to be addressed to:

- provide assurance that the QMS can achieve its intended results;
- enhance desirable effects;
- prevent, or reduce, undesired effects;
- achieve improvement;

6.1.2 ATS has planned actions to address the above risks and opportunities and has initiated appropriate procedures to integrate and implement appropriate actions into the QMS including the evaluation of the effectiveness the QMS processes. Any actions taken to address risks and opportunities are proportionate to the potential impact on the conformity of testing, inspection, calibration, and nuclear consulting engineering.

6.2 Quality Objectives and Planning to Achieve Them

6.2.1 ATS has established quality objectives at relevant functions, levels, and processes needed for the QMS. The quality objectives

- are consistent with the Quality Policy;
- are measurable;

- consider applicable requirements;
- are relevant to the conformity of testing, inspection, calibration, and nuclear consulting engineering and to the enhancement of customer satisfaction;
- are monitored;
- are communicated;
- are updated as appropriate.

ATS maintains documented information on the quality objectives.

6.2.2 When planning on how to achieve the quality objective, ATS determines

- what will be done;
- what resources will be required;
- who will be responsible;
- when it will be completed;
- how the results will be evaluated.

6.3 Planning of Changes

When ATS determines there is need for changes to the QMS, the changes are executed in a planned manner with the following considerations:

- the purpose of the change and the potential consequence(s);
- the integrity of the QMS;
- the availability of resources;
- the allocation or reallocation of responsibilities and authorities.

Planning is performed to define and document how the requirements for quality will be met including determining the sequence and interaction of processes. Quality Planning includes requirements for:

- development of quality plans;
- identification and acquisition of controls or resources to achieve the required quality;
- ensuring the compatibility of processes;
- quality control, inspection, and testing techniques;
- development of required measurement capabilities;
- verifications at appropriate stages;
- identification and preparation of quality records.

This Quality Manual and the supporting documentation represent a general quality plan that has been developed and approved by management for routine testing, inspection, nuclear consulting engineering and calibration activities to meet quality system requirements and quality objectives. Contracts are reviewed to ensure they fall within the scope of the general quality plan and then a specific plan detailing activity to be performed is developed for each job. If purchase orders or contracts contain special requirements or activities outside the scope of activities covered by this Quality Manual, then the manager is responsible for consulting with the customer and developing a quality plan specific to the job prior to processing. The integrity of the QMS is maintained when changes to the QMS are planned and implemented.

7 Support

7.1 Resources

7.1.1 General

ATS provides the resources needed to establish, implement, maintain, and continually improve the effectiveness of the QMS including those needed to meet customer requirements and enhance customer satisfaction. ATS considers:

- the capabilities of and constraints on existing internal resources;
- what needs to be obtained from external sources.

7.1.2 People

ATS determines and provides the employees necessary for the effective implementation of the QMS and for the operation and control of its processes. Personnel performing work affecting conformity to product requirements is competent based on appropriate education, training, skills, and experience.

7.1.3 Infrastructure

ATS determines, provides, and maintains an infrastructure needed to achieve conformity to product requirements. As applicable, this includes,

- buildings, workspace, and associated utilities;
- process equipment (both hardware and software);
- transport resources;
- communication and information systems.

7.1.4 Environment for the Operation of Processes

A work environment needed to achieve conformity to product requirements is determined and provided.

Facilities for testing and/or calibration, including but not limited to energy sources, lighting, and environmental conditions, are such as to facilitate correct performance of the tests and calibrations and do not invalidate or adversely affect the required quality of any measurement.

Environmental conditions are monitored, controlled, and recorded as required by the relevant specifications, methods, and procedures or where they influence the quality of the results. Effective separation is maintained between neighboring areas where there may be incompatible activities or cross-contamination. Access to and use of areas affecting the quality of tests is controlled based on the activities being performed. Tests and calibrations are stopped when the environmental conditions jeopardize the results of tests and/or calibrations.

Measures are taken to ensure good housekeeping. This may include special procedures, if necessary.

7.1.5 Monitoring and Measuring Resources

7.1.5.1 ATS determines the monitoring and measuring required to ensure valid and reliable results and ensures the equipment needed to carry out these functions is provided, adequate, and consistent with the requirements. ATS ensures that the resources provided are suitable for the specific monitoring and measurement activities being performed and that the resources are maintained to ensure their continuing fitness for purpose. The laboratories are furnished with all items of measurement, test, and sampling equipment required for the correct performance of the tests and/or calibrations.

7.1.5.2 Measurement Traceability

Calibration programs are established for key quantities or values of instruments where these properties have a significant influence on the results.

Where necessary to ensure valid results, inspection, measuring, and test equipment is:

- calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification is recorded;
- adjusted or readjusted as necessary;
- identified to enable the calibration status to be determined;
- safeguarded during handling, maintenance, and storage from adjustments, damage, or deterioration that would invalidate the calibration status and subsequent measurement results.

ATS investigates the validity of previous results when equipment is found not conforming to requirements. Appropriate action for the equipment and any results delivered to the customer are taken as necessary. Calibrations and verifications are documented and retained according to documented procedures.

ATS does not allow personal equipment to be used in performance of any calibration, testing and inspection services. Use of personal flashlights is acceptable for NDT provided the flashlights meet NDT procedural requirements.

Computer software used in inspection, measuring, and test equipment is validated prior to use and further as necessary.

In cases where equipment outside the permanent control of this laboratory is used, the requirements of the quality system and applicable standards are met.

7.1.5.3 Calibration

All equipment used for tests and/or calibrations, including equipment for subsidiary measurements having a significant effect on the accuracy or validity of the result of the test, calibration, or sampling is calibrated per an established program before being put into service.

7.1.5.4 Reference Standards and Reference Materials

Reference standards are calibrated before and after adjustments by a body that can provide traceability. Reference standards are used for no other purpose. Reference standards and materials are selected based on applicable requirements. Measurements are recorded before and after any adjustments are made. As needed, intermediate checks are performed according to defined procedures and schedules to maintain confidence in the calibration status of reference, primary, transfer, or working standards and materials.

7.1.6 Organizational Knowledge

ATS determines the knowledge necessary for the operation of its processes and to achieve conformity of testing, inspection, calibration, and nuclear consulting engineering. This knowledge is maintained as documented information in the form of Quality System and Departmental Procedures. This information is made available via the ATS intranet.

When addressing changing needs and trends, ATS considers its current knowledge base and determines how to acquire or access additional knowledge and the required updates. This additional knowledge may come from internal or external sources.

7.2 Competence

ATS determines the necessary competence for personnel performing work affecting conformity to product requirements, and where applicable, provides training or takes other actions to achieve the necessary competence, and evaluates the effectiveness of the actions taken.

ATS management provides supervision of testing and calibration staff, including trainees, by persons knowledgeable with methods and procedures, the purpose of each test and/or calibration, and with the assessment of the test or calibration results. This training includes recognizing proper operation of the equipment, a properly executed analysis or test, distinguishing between valid and invalid test data and to justify invalidating data.

Management determines the level of education, experience, and training required for each job position and identify these requirements in the job description for qualification purposes. Department Managers may qualify individuals for specific test, inspection, calibrations, or other tasks by providing specific training. Qualification and certification for personnel performing Nondestructive Testing or inspection is described in ATS procedures under a program in compliance with the latest revision of SNT-TC-1A, NAS 410 and other relevant specifications, as required. ATS subsidiary Nondestructive Testing employees are considered equivalent for employment purposes. ATS subsidiary employees shall qualify by examination in accordance with the applicable ATS Written Practice(s).

Personnel annually undergo an assessment to determine their proficiency evaluation and the need for further training or recertification.

7.3 Awareness

ATS ensures that its personnel undergo training on the quality system and are aware of

- the quality policy;
- the relevance and importance of their activities and how they contribute to the achievement of the quality objectives;
- their contribution to the effectiveness of the QMS including benefits of improved performance;
- the implications of not conforming with QMS requirements.

7.4 Communication

The President ensures that appropriate communication processes are established within and external to ATS and that communication takes place regarding the effectiveness of the QMS. ATS Management determines the internal and external communications relevant to the QMS including:

- what will be communicated;
- when to communicate;
- with whom to communicate;
- how to communicate;
- who communicates.

7.5 Documented Information

7.5.1 General

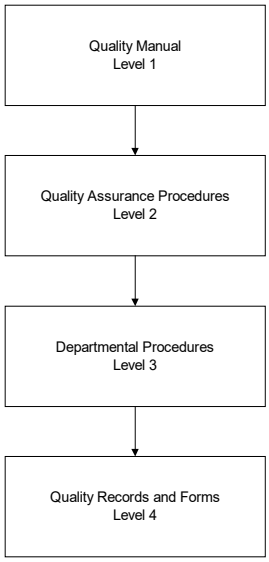
The QMS is comprised of:

- Quality Manual;
- Quality Policy and Objectives;
- Quality System Procedures (QAPs);
- Process Diagrams;
- Departmental Procedures;
- Project Management Plans/Purchase Orders/Work Orders, which define specific project requirements;
- Quality Records, which provide evidence of processes performed and results achieved;
- Drawings, specifications, and standards;
- Resource calibration system;
- Employee training programs;
- Subcontractor evaluation and control programs;
- Document, Data, and Record control systems;
- Corrective and Preventive Action systems;
- Performance measurement system;
- Internal Auditing, to verify QMS compliance and adequacy;
- Management Review, to analyze QMS performance, initiate improvement measures, and assign resources accordingly;
- Throughout the year, metrics data is collected by process owners and presented during the Management Review, in order that adjustments may be made as needed and goals set to achieve ATS' strategic direction and long-term continual improvement;
- Specific quality objectives are defined for each process in their respective Process Diagram;
- Metrics, along with current standings and goals for each objective, are recorded for Management Review.

This Quality Manual describes the structure of the ATS' QMS and supporting documentation including references to Quality Assurance Procedures and Departmental Procedures that describe how policies and requirements are implemented. This Quality Manual contains the scope of the quality management system including details of and justification for any exclusion, the documented procedures established for the QMS, or reference to them, and the description of the interaction between the processes of the QMS.

Policies, systems, programs, procedures, and instructions are documented in the Quality Manual and supporting documentation to the extent necessary to assure the quality of the test and/or calibration results and provide direction for the implementation of the quality policy and objectives. The Quality Manual is linked by a reference section at the end of each policy or procedure to indicate further reference, if any.

The quality documentation hierarchy is illustrated below.



Quality System documentation is communicated to, understood by, available to, and implemented by the appropriate personnel for the activities they perform.

7.5.2 Creating and Updating

When creating and updating documented information, ATS ensures:

- the identification and description of the documented information;
- the format and media utilized;
- the review and approval for suitability for adequacy.

7.5.3 Control of Documented Information

7.5.3.1 Procedures are established and maintained to control documents that are required by the QMS. Documented information is controlled to ensure its availability and auditability for use when and where it is needed and is adequately protected from loss of confidentiality, improper use or loss of integrity.

7.5.3.2 Documented information is made available via the ATS intranet and through additional resources available through the intranet. ATS Quality Assurance maintains a Master Document List that identifies the revision and distribution of controlled documents and data. Document and data control procedures are implemented for the following items:

- ATS Quality Manual
- FAA Repair Station Manual, EASA Supplement, Training Manual and Forms manual
- Quality Assurance Procedures
- Departmental Procedures
- Forms, Lists, and Posted Instructions
- External work instructions and specifications (ASTM procedures, Customer Purchase Orders, engineering drawings, etc., obsolete technical data retained for academic purposes only)
- Software and electronic media.

Note: Technical data used for FAA specific functions is controlled by the customer.

7.5.3.3 Document and Data Approval

Managers are responsible for the preparation, issuance, review, approval, and revision of Quality System procedures, documents, and data within their areas of responsibility for adequacy prior to issue. The requirements for the control of these items are documented in Quality Assurance Procedures. These control systems ensure documents and data are available at all locations where operations essential to the functioning of the quality system are performed and invalid or obsolete versions are identified and removed from unintended use. Documents are periodically reviewed and, where necessary, revised to ensure continuing suitability, legibility, and compliance with applicable requirements. Obsolete documents requiring retention for regulatory, or knowledge-preservation purposes are clearly identified as such.

7.5.3.4 Document and Data Changes

Changes made to controlled documents require the same approval as the original issue of the document. Document changes are identified and maintained per procedures.

7.5.3.5 Control of Quality Records

ATS quality records are traceable to each report/certification, readily retrievable and maintained under secure conditions to prevent damage, deterioration, and loss. Fire-resistant or dual location storage is used for job folders containing safety related nuclear requirements. The requirements and procedures for identification, collection, indexing, access, retention period, and storage locations are designated in documented procedures. Computers and automated equipment are maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of test and calibration data.

7.5.3.6 Customer Job Records

Customer records are protected to ensure confidential information and proprietary rights. Information concerning any tests or inspections performed by ATS will not be released to third parties without the customer's permission.

Customer job folders are considered non-permanent records and are retained for a minimum of seven years from completion. Job folders contain contract reviews, copies of purchase orders or contracts, work orders, data sheets, contract revisions, inspection, and test reports (which includes personnel involved in testing and approval), certifications, shipping/receiving reports, and/or any other documentation specific to a customer job to facilitate recreation of the events as close to original test, calibration or inspection as possible or identify incorrectly tested material.

Where agreed contractually, quality records is made available for evaluation by the customer or the customer's representative for an agreed period. For NADCAP accredited MTL services, records is made available to the customer upon request within three working days.

There are documented procedures for the storage, protection, back-up, and unauthorized access or amendment of electronic records, where needed.

8 Operation

8.1 ATS plans, implements, and controls the processes needed to meet the requirements for providing testing, inspection, nuclear consulting engineering and calibration services and to implement the planned actions by:

- determining the requirements for testing, inspection, and calibration services;
- establishing criteria for

- the processes;
- the acceptance of testing, inspection, and calibration services;

- determining the resources needed to achieve conformity to testing, inspection, and calibration service requirements;
- implementing the control of the processes according to the criteria
- determining, maintaining, and retaining documented information:
  - to have confidence that the processes have been carried out as planned;
  - to demonstrate the conformity of testing, inspection, and calibration services to their requirements.

The output of this planning is suitable for ATS' operations. ATS controls planned changes and reviews the consequences of unintended changes and acts to mitigate any adverse effects as needed. ATS controls outsourced processes.

8.2 Requirements for Products and Services

8.2.1 Customer Communication

ATS has effective arrangements for communicating with customers in relation to:

- providing information relating to testing, inspection, nuclear consulting engineering and calibration services;
- enquiries, contracts, or order handling, including amendments
- obtaining customer feedback relating to testing, inspection, and calibration services, including customer complaints;
- handling and control of customer property;
- establishing specific requirements for contingency actions when relevant.

8.2.2 Determining the requirements for testing, inspection, and calibration services

ATS values the maintenance of good communication, advice, and guidance in technical matters, and opinions and interpretations based on results. ATS stresses the importance of communication with the customer, especially in large assignments, being maintained throughout the work.

ATS provides the opportunity for customers or their representative's cooperation to verify tests, inspections, and/or calibrations and to monitor the laboratory's performance in the work performed, provided this ensures confidentiality to other customers. This includes providing reasonable access to relevant areas of the laboratory for witnessing of tests and/or calibrations.

When determining the requirements for testing, inspection, and calibration services to be offered to customers, ATS ensures the requirements for testing, inspection, and calibration services are defined by Qualified Personnel including:

- applicable statutory and regulatory requirements;
- requirements considered necessary by ATS;
- all customer requirements, including the methods to be used, and delivery and post-delivery requirements, are adequately defined, documented and understood;
- the appropriate test, inspection, and/or calibration method is selected when intended use is known and the method is not specifically stated by the customer;
- ATS has the capability and resources to fulfill all contract or order requirements and/or to resolve any discrepancies prior to acceptance;

- ATS meets the claims for testing, inspection, and calibration services offered to customers.

8.2.3 Review of the requirements for testing, inspection, and calibration services

8.2.3.1 ATS ensures that it can meet the requirements for testing, inspection, and calibration services offered to customers. ATS conducts a review before committing to supply testing, inspection, and calibration services to customers including:

- requirements specified by the customer including the requirements for delivery and post-delivery activities;
- requirements not specified by the customer but necessary for the specified or intended use when known;
- ATS' requirements;
- Applicable statutory and regulatory requirements applicable to testing, inspection, and calibration services
- Contract/order requirements differing from those previously expressed.

Where the customer provides no documented requirements, ATS confirms customer requirements, as practical.

8.2.3.2 ATS retains documented information on the results of the review and on any new requirements.

8.2.4 Contracts may be written or verbal agreements. Where product or purchasing requirements are changed, these changes are reviewed in the same manner as the initial inquiry and contract/order requirements differing from those previously defined are resolved. These changes are documented and communicated to the personnel responsible for the work.

8.3 Design Control

8.3.1 General

The design is defined, controlled, and verified. Design inputs is specified on a timely basis and translated into design documents. Design interfaces are identified and controlled. Design adequacy is verified by individuals other than those who designed the item or computer program. Design changes are governed by control measures commensurate with those applied to the original design.

8.3.2 Design Input

Applicable design inputs are identified and documented, and their selection reviewed and approved. The design input is specified to the level of detail necessary to permit the design activities to be carried out in a correct manner and to provide a consistent basis for making design decisions, accomplishing design verification measures, and evaluating design changes.

8.3.3 Design Process

ATS' Nuclear Engineering Group prescribes and documents the design activities to the level of detail necessary to permit the design process to be carried out in a correct manner, and to permit verification that the design meets requirements. Design documents support facility design, construction, and operation. Appropriate quality standards are be identified and documented, and their selection reviewed and approved.

The design methods, materials, parts, equipment, and processes that are essential to the function of the items are selected and reviewed for suitability of application. Applicable information derived from experience, as set forth in reports or other documentation, are made available to cognizant design personnel.

The final design

- is relatable to the design input by documentation in sufficient detail to permit design verification.
- specifies required inspections and tests and include or reference appropriate acceptance criteria.
- identifies assemblies and/or components that are part of the item being designed. When such an assembly or component part is a commercial grade item, the critical characteristics of the item to be verified for acceptance and the acceptance criteria for those characteristics shall meet the requirements of Part II, subpart 2.14, Quality Assurance Requirements for Commercial Grade Items and Services.

Critical characteristics to be verified are those that provide reasonable assurance that the item will perform its intended safety function. If a commercial grade item, prior to its installation, is modified or selected by special inspection and/or testing to requirements that are more restrictive than the Supplier's published product description, the component part is represented as different from the commercial grade item in a manner traceable to a documented definition of the difference.

8.3.4 Design Analysis

Design analyses is sufficiently detailed such that a person technically qualified in the subject can review and understand the analyses and verify the adequacy of the results without recourse to the originator.

8.3.4.1 Use of Computer Programs

Each computer program used for design analysis is independently verified with the design analysis for each application.

Note 1: Otherwise acquired computer programs are identified and controlled during the dedication process. The dedication process requirements are described in section 8.3.11.2

The acceptance of controlled computer programs used for design analysis, and verification methods applied to the results of unproven programs, meet the following requirements:

- The computer program, or the verification method applied to the computer program results, is shown to produce correct solutions for the applied mathematical model within defined limits for each parameter employed.
- The applied mathematical model is shown to produce a valid solution to the physical problem associated with the particular application.

8.3.4.2 Documentation of Design Analyses

Documentation of design analyses includes the following:

- the objective of the analyses
- design inputs and their sources
- results of literature searches or other applicable background data
- assumptions and indication of those assumptions that must be verified as the design proceeds

- identification of any computer calculation, including identification of the computer type, computer program name, and revision, inputs, outputs, evidence of or reference to computer program verification, and the bases (of reference thereto) supporting application of the computer program to the specific physical problem
- review and approval

8.3.5 Design Verification

ATS' Nuclear Engineering Group identifies and documents the design verification method(s) used. The results of design verification are documented with the identification of the verifier clearly indicated. Design verification is performed by any competent individual(s) or group(s) other than those who performed the original design but who may be from the same organization. This verification may be performed by the originator's supervisor, provided

- the supervisor did not specify a singular design approach or rule out certain design considerations and did not establish the design inputs used in the design; or
- the supervisor is the only individual in the organization competent to perform the verification.

Cursory supervisory reviews do not satisfy the intent of NQA-1.

Note 1: section 8.3.6.2 identifies the test program requirements.

Design verification is performed prior to releasing the design for procurement, manufacture, construction, or use by another design organization, except where this timing cannot be met, such as when insufficient data exist. In those cases, the unverified portion of the design is identified and controlled. In all cases the design verification is completed prior to relying upon the component, system, structure, or computer program to perform its function.

If the design is modified to resolve verification findings, the modified design is verified prior to release or use.

8.3.5.1 Extent of Design Verification

The extent of the design verification is a function of the importance to safety, the complexity of the design, the degree of standardization, the state of the art, and the similarity with previously proved designs. Where the design has been subjected to a verification process, the verification process need not be duplicated for identical designs. However, the applicability of standardized or previously proven designs, with respect to meeting pertinent design inputs, is verified for each application. Known problems affecting the standard or previously proved designs and their effects on other features is considered. The original design and associated verification documentation is referenced in records of subsequent application of the design.

8.3.5.2 Methods

Acceptable verification methods include, but are not limited to, any one or a combination of the following:

- design reviews
- alternate calculations
- qualification testing

8.3.6 Design Reviews

Design reviews provide assurance that the final design is correct and satisfactory by addressing, where applicable,

- Were the design inputs correctly selected?
- Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?
- Were appropriate design methods and computer programs used?
- Were the design inputs correctly incorporated into the design?
- Is the design output reasonable compared to design inputs?
- Are the necessary design inputs for interfacing organizations specified in the design documents or in supporting procedures or instructions?
- Have suitable materials, parts, processes, and inspection and testing criteria been specified?

8.3.6.1 Alternate Calculations

Alternate calculations use alternate methods to verify correctness of the original calculations or analyses. The appropriateness of assumptions; input data used; and the computer program, its associated computer hardware and system software, or other calculation method used is also reviewed.

8.3.6.2 Qualification Tests

Testing demonstrates adequacy of performance under conditions that simulate the most adverse design conditions. Operating modes and environmental conditions are considered in determining the most adverse conditions. Where the test is intended to verify only specific design features, the other features of the design are verified by other means. When tests are being performed on models or mockups, scaling laws are established and verified. The results of model test work are subject to error analysis, where applicable, prior to use in the final design.

8.3.7 Change Control

Changes to design inputs, final designs, field changes, and temporary and permanent modifications to operating facilities are justified and subject to design control measures commensurate with those applied to the original design. These measures include evaluation of effects of those changes on the overall design and on any analysis upon which the design is based. The evaluation includes facility configurations that occur during operation, maintenance, test, surveillance, and inspection activities.

Changes are approved by the same affected groups or organizations that reviewed and approved the original design documents. When the organization originally responsible for review and approval of the original design documents is no longer responsible, the owner or owner’s designee has responsibility or designates a new responsible organization. The design organization approving the change demonstrates competence in the specific design area of interest and have an adequate understanding of the requirements and intent of the original design.

When a design change is approved other than by revision to the affected design documents, measures are established to incorporate the change into these documents, where such incorporation is appropriate.

Where a significant design change is necessary because of an incorrect design, the design process and verification procedure are reviewed and modified as necessary.

Note 1: Configuration Management of Operating Facilities does not apply as Applied Technical Services does not manage an operating facility.

8.3.8 Interface Control

Interface controls include assignment of responsibility and establishment of procedures among participating design organizations for review, approval, release, distribution, and revision of documents involving design interfaces.

Design information transmitted across interfaces identifies the status of the design information or document provided, and identifies incomplete items that require further evaluation, review, or approval. Where it is necessary to initially transmit design information orally or by other informal means, the transmittal is confirmed promptly by a controlled document.

8.3.9 Software Engineering

The scope of software engineering activities includes the following elements, as appropriate:

- software acquisition method(s) for controlling the acquisition process for software and software services
- software engineering method(s) used to manage the software life-cycle activities
- application of standards, conventions, and other work practices that support the software life cycle
- controls for support software used to develop, operate, and maintain computer programs

8.3.9.1 Definitions

acceptance testing, also known as software validation: the process of exercising or evaluating a system or system component by manual or automated means to ensure that it satisfies the specified requirements and to identify differences between expected and actual results in the operating environment.

baseline: a specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for use and further development, and that can be changed only by using an approved change control process.

change control: an element of configuration management consisting of the evaluation, coordination, approval or disapproval, and implementation of changes to configuration items after formal establishment of their configuration identification.

configuration item: a collection of hardware or software elements treated as a unit for the purpose of configuration control.

configuration management (software): the process of identifying and defining the configuration items in a system (i.e., software and hardware), controlling the release and change of these items throughout the system's life cycle, and recording and reporting the status of configuration items and change requests.

control point: a point in the software life cycle at which specified agreements or controls (typically a test or review) are applied to the software configuration items being developed, e.g., an approved baseline or release of a specified document or computer program.

error: a condition deviating from an established baseline, including deviations from the current approved computer program and its baseline requirements.

operating environment: a collection of software, firmware, and hardware elements that provide for the execution of computer programs.

regression testing: selective retesting to detect errors introduced during modification of the computer program or to verify that the modified computer program still meets its specified requirements.

software design verification: the process of determining if the product of the software design activity fulfills the software design requirements.

software development cycle: the activities that begin with the decision to develop a software product and end when the software is delivered. The software development cycle typically includes the following activities:

- software design requirements
- software design
- implementation
- test
- sometimes installation

software engineering:

the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software

the study of approaches as in (a)

software life cycle: the period of time that begins when a software product is conceived and ends when the software is no longer available for use. The life cycle typically includes a concept phase, requirements phase, design phase, implementation phase, test phase, installation and checkout phase, operation and maintenance phase, and, sometimes, retirement phase. These phases may overlap or be performed iteratively, depending on the software development approach used.

software tool: a computer program used in the development, testing, analysis, or maintenance of a program or its documentation. Examples include comparators, cross-reference generators, compilers, CASE (Computer Aided Software Engineering) tools, configuration and code management software, decompilers, disassemblers, editors, flowcharters, monitor test case generators, and timing analyzers.

system software: software designed to enable the operation and maintenance of a computer system and its associated computer programs.

test case: a set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.

testing (software): the process of

- operating a system (i.e., software and hardware) or system component under specified conditions
- observing and recording the results

- making an evaluation of some aspect of the system (i.e., software and hardware) or system component in order to verify that it satisfies specified requirements and to identify errors.

test plan (procedure): a document that describes the approach to be followed for testing a system or component. Typical contents identify the items to be tested, tasks to be performed, and responsibilities for the testing activities.

8.3.9.2 Verification

The appropriate software engineering elements define the control points and associated reviews. Reviews of software ensure compliance with the approved software design requirements. Although multiple review requirements are specified the reviews may be performed and documented separately or combined, as appropriate, to the defined software engineering method. The following two reviews are required:

- One review shall consider the requirements related to the activities of preparing the computer program for acceptance testing. This review can be combined with or be part of the software design verification.
- The other review shall provide assurance of the satisfactory completion of the software development cycle including acceptance testing. This review can be combined with or be part of software design verification. Individual(s) familiar with the design detail and the intended use of the computer program is included in the review.

Reviews identify the participants and their specific review responsibilities. Documentation of review comments and their disposition is retained until they are incorporated into the updated software. Comments not incorporated and their disposition are retained until the software is approved for use. When review alone is not adequate to determine if requirements are met, alternate calculations are used, or tests are developed and integrated into the appropriate activities of the software development cycle.

Tests performed in support of a review can be used to complement acceptance testing. The tests and test results are included in the acceptance testing documentation. Such tests are subjected to the same criteria as the acceptance tests. These tests do not substitute for performing the comprehensive, end of development, acceptance test.

8.3.10 Software Configuration Management

Software configuration management includes, but is not limited to, configuration identification, change control, and configuration status control. Configuration items is maintained under configuration management until the software is retired.

The appropriate software engineering elements identify when configuration baselines are to be established.

Note 1: The appropriate software engineering elements described in Section 8.3.9 shall identify when configuration baselines are to be established.

8.3.10.1 Configuration Identification

A labeling system for configuration items is implemented that

- uniquely identifies each configuration item
- identifies changes to configuration items by revision
- provides the ability to uniquely identify each configuration of the revised software available for use

8.3.10.2 Configuration Change Control

The software configuration change control process includes

- initiation, evaluation, and disposition of a change request
- control and approval of changes prior to implementation
- requirements for retesting (e.g., regression testing) and acceptance of the test results

A software baseline is established at the completion of each activity of the software design process. Approved changes created subsequent to a baseline is added to the baseline. A baseline defines the most recently approved software configuration. Configuration items to be controlled as part of the baseline include, as appropriate

- documentation (e.g., software design requirements, instructions for computer program use, test plans, and results)
- computer program(s) (e.g., source, object, backup files)
- support software

Changes to software are formally documented. The documentation includes

- a description of the change
- the rationale for the change
- the identification of affected software baselines

The change is formally evaluated and approved by the organization responsible for the original design unless an alternate organization has been given the authority to approve the changes. Only authorized changes are made to software baselines. Appropriate verification activities are performed for the change. The change is appropriately reflected in documentation, and traceability of the change to the software design requirement is maintained.

Appropriate acceptance testing is performed for the change.

8.3.10.3 Configuration Status Control

The status of configuration items resulting from software design is maintained current. Configuration item changes is controlled until they are incorporated into the approved product baseline. The controls include a process for maintaining the status of changes that are proposed and approved but not implemented. The controls also provide for notification of this information to affected organizations.

8.3.10.4 Problem Reporting and Corrective Action

Method(s) for documenting, evaluating, and correcting software problems

- describe the evaluation process for determining whether a reported problem is an error or other type of problem (e.g., user mistake)

- define the responsibilities for disposition of the problem reports, including notification to the originator of the results of the evaluation

When the problem is determined to be an error, the method provides, as appropriate, for

- how the error relates to appropriate software engineering elements
- how the error impacts past and present use of the computer program
- how the corrective action impacts previous development activities
- how the users are notified of the identified error, its impact, and how to avoid the error, pending implementation of corrective actions

8.3.11 Software Acquisition

Software acquisition includes software or software services procured in accordance with the QMS.

8.3.11.1 Procured Software and Software Services

The QMS governs the procurement of software and software services. The Purchaser is responsible for the appropriate requirements of Purchasing upon acceptance of the software or related item. Procurement documents shall identify requirements for Supplier's reporting of software errors to the Purchaser and, as appropriate, the Purchaser's reporting of software errors to the Supplier.

8.3.11.2 Otherwise Acquired Software

The QMS governs acquired software that has not been previously approved for use in its intended application. This includes computer programs not obtained using the procurement requirements such as freeware, shareware, and computer programs from corporate repositories.

Otherwise acquired computer programs whose results are verified with the design analysis for each application are excluded from Commercial Grade Dedication. Otherwise acquired computer programs are identified and controlled during the dedication process. The dedication process is documented and includes the following:

- identification of the capabilities and limitations for intended use as critical characteristics
- utilization of test plans and test cases as the method of acceptance to demonstrate the capabilities within the limitations
- instructions for use (e.g., user manual) within the limits of the dedicated capabilities

The dedication process documentation and associated computer program(s) establishes the current baseline.

Subsequent revisions of the software are dedicated in accordance with this section.

8.3.12 Software Engineering Method

Software engineering methods are documented. The selected software engineering method ensures that software life-cycle activities are planned and performed in a traceable and orderly manner. The software design process is documented, approved by the responsible design organization, and controlled. This process includes the activities described in 8.3.12.

8.3.12.1 Software Design Requirements

Software design requirements specify technical and software engineering requirements, including security features (e.g., vulnerability protection and cybersecurity), identify applicable reference drawings, specifications, codes, standards, regulations, procedures, or instructions that establish software design requirement test, inspection, and acceptance criteria. Security requirements specified are commensurate with the risk from unauthorized access or use. The software requirements identify the operating system, function, interfaces, performance requirements, installation considerations, design inputs, and any design constraints of the computer program. Software design requirements are traceable throughout the software life cycle. Software design requirements are identified, documented and their selection reviewed and approved.

8.3.12.2 Software Design

An integral part of software design is the design of a computer program that is part of an overall system. Thus, the software design considers the computer program's operating environment. Measures to mitigate the consequences of problems, as identified through analysis, is an integral part of the design. These potential problems include external and internal abnormal conditions and events that can affect the computer program.

The software design is documented and defines the computational sequence necessary to meet the software requirements. The documentation includes, as applicable, numerical methods, mathematical models, physical models, control flow, control logic, data flow, process flow, data structures, process structures, and the applicable relationships between data structures and process structures. This documentation may be combined with the documentation of the software design requirements or the computer program listings resulting from implementation of the software design.

8.3.12.3 Software Design Verification

Software design verification evaluates the technical adequacy of the design approach and ensure internal completeness, consistency, clarity, and correctness of the software design and verifies that software design is traceable to the software design requirements. Software design verification includes review of test results. The software design verification is completed prior to approval of the computer program for use. The requirements for the software design verification activity are documented in the software engineering method.

Software design verification is performed by a competent individual(s) or group(s) other than those who developed and documented the original design but who may be from the same organization. This verification may be performed by the originator's supervisor, provided

- the supervisor did not specify a singular design approach or rule out certain design considerations and did not establish the design inputs used in the design, or
- the supervisor is the only individual in the organization competent to perform the verification

Cursory supervisory reviews do not satisfy the intent of this Manual.

The results of verification are documented with the identification of the verifier indicated. Software verification methods include any one or a combination of design reviews, alternate calculations, and tests performed during computer program development. The extent of verification and methods chosen are a function of the complexity of the software, degree of standardization, similarity with previously proved software, and importance to safety.

8.3.12.4 Implementation

The software design is translated into computer program(s) using the programming organization's or design organization's programming standards and conventions.

The implementation process results in software products such as computer program listings and instructions for computer program use. A review is performed in accordance with 8.3.9.2.

8.3.12.5 Acceptance Testing

The acceptance testing activity demonstrates that the computer program adequately and correctly performs all intended functions (i.e., specified software design requirements). Computer program tests including, as appropriate, software design verification, factory acceptance tests, site acceptance tests, and in-use tests are controlled.

Test requirements and acceptance criteria for computer programs is provided by the organization responsible for the use of the computer program and include the following, as applicable:

- Software design verification testing shall demonstrate the capability of the computer program(s) to provide valid results for test problems encompassing the range of documented permitted usage.
- Computer program acceptance testing shall consist of the process of exercising or evaluating a system or system component by manual or automated means to ensure that it satisfies the specified requirements and to identify differences between expected and actual results in the operating environment.
- In-use computer programs testing shall demonstrate required performance over the range of operation of the controlled function or process.

8.3.12.6 Test Coverage

Acceptance testing demonstrates, as appropriate, that the computer program

- properly handles abnormal conditions and events as well as credible failures
- does not perform adverse unintended functions
- does not degrade the system either by itself or in combination with other functions or configuration items.

Acceptance testing is performed prior to approval of the computer program for use. Configuration items is under configuration change control prior to starting acceptance testing. Acceptance testing is planned and performed for all software design requirements. Acceptance testing ranges from a single test of all software design requirements to a series of tests performed during computer program development. Performance of a series of tests provides assurance of correct translation between activities and proper function of individual modules. Testing includes a comprehensive acceptance test performed in the operating environment prior to use.

8.3.12.7 Test Plans and Procedures

The requirements of this section apply to testing of computer programs and, as appropriate, the computer hardware and operating system.

Computer program test procedures provide for demonstrating the adherence of the computer program to documented requirements. For those computer programs used in design activities, computer program test procedures provide for ensuring that the computer program produces correct results. For those computer programs used for operational control, computer program test procedures provide for demonstrating required performance over the range of operation of

the controlled function or process. The procedures also provide for evaluating technical adequacy through comparison of test results from alternative methods, such as hand calculations, calculations using comparable proven programs, or empirical data and information from technical literature.

In-use test procedures are developed and documented to permit confirmation of acceptable performance of the computer program in the operating system. In-use test procedures are performed after the computer program is installed on a different computer or when there are significant changes in the operating system. Periodic in-use manual or automatic self-check tests are prescribed and performed for those computer programs in which computer program errors, data errors, computer hardware failures, or instrument drift can affect required performance.

The test plans, test cases, and test results are documented, reviewed, and approved prior to use of the computer program.

Test procedures or plans specify the following, as applicable:

- required tests and test sequence
- required ranges of input parameters
- identification of the stages at which testing is required
- criteria for establishing test cases
- requirements for testing logic branches
- requirements for hardware integration
- anticipated output values
- acceptance criteria
- reports, records, standard formatting, and conventions

Observations of unexpected or unintended results are documented and dispositioned prior to test result approval. Test results are evaluated by the responsible authority to ensure that test requirements have been satisfied.

8.3.12.8 Computer Program Test Records

Test records are established and maintained to indicate the ability of the computer program to satisfactorily perform its intended function or to meet its documented requirements. Test records include

- computer program tested, including system software used
- computer hardware used
- test equipment and calibrations, where applicable
- date of test
- tester or data recorder
- simulation models used, where applicable
- test problems
- results and applicability
- action taken in connection with any deviations noted
- person evaluating test results
- acceptability

8.3.12.9 Acceptance Testing of Changes

The acceptance testing of changes to the computer program is subjected to selective retesting to detect unintended adverse effects introduced during the change. Such testing provides assurance

that the changes have not caused unintended adverse effects in the computer program and verifies that a modified system(s) or system component(s) still meet specified software design requirements.

8.3.12.10 Operation

After the software is approved for use and installed in the operating environment, the use of the software is controlled in accordance with approved procedures and instructions. These include, as appropriate

- application documentation (e.g., application log)
- access control specifications
- computer system vulnerability protections
- problem reporting and corrective action
- in-use tests
- the configuration change control process

8.3.12.11 Maintenance

The appropriate software engineering elements, as described in 8.3.9, identify how changes to the software are controlled. Typically, changes are in response to any of the following:

- enhancement requests from the user community
- revisions to software based on software design requirements
- changes to the operating environment and changes to computer system vulnerability protections
- reported software problems that must be corrected

8.3.12.12 Retirement

During retirement, support for the software product is terminated, and the routine use of the software is prevented.

8.3.13 Standards, Conventions, and other Work Practices

As appropriate, the software engineering method, software acquisition method, or both establish the need for standards, conventions, and other required work practices to facilitate software life-cycle activities (e.g., software design and implementation activities). Standards, conventions, and other required work practices are documented.

8.3.13.1 Support Software

Support software includes software tools and system software. As appropriate, the software engineering method, software acquisition method, or both establish the need for software tools.

8.3.13.2 Software Tools

Software tools are evaluated, reviewed, tested, and accepted for use and placed under configuration control as part of the software development cycle of a new or revised software product. Software tools that do not affect the performance of the software need not be placed under configuration control.

In cases involving modifications of software products using the software tools, the configuration of the support software associated with that modification is managed. Changes to the software tool are evaluated for impact on the software product to determine the level of reviews and retesting that will be required.

8.3.13.2 System Software

System software consists of the on-line computer programs used to provide basic or general functionality and facilitate the operation and maintenance of the application computer program. Examples include lower-level software layers, assemblers, interpreters, diagnostics, and utilities.

System software is evaluated, reviewed, tested, and accepted for use as part of the software development cycle of a new or revised software product. System software is placed under configuration change control. Changes to the system software are evaluated for impact on the software product to determine the level of reviews and retesting that will be required.

8.3.14 Documentation and Records

Design documentation and records include not only final design documents, such as drawings and specifications, and revisions to those documents, but also documentation that identifies the important steps in the design process, including sources of design inputs that support the final design.

8.4 Control of externally provided processes, products, and services

8.4.1 General

ATS ensures that purchased product that contributes to customer satisfaction and/or the quality system requirements conforms to specified purchasing requirements. Control over suppliers and purchased product is dependent upon the type of product and the impact of the purchased product on processes and results.

ATS determines and applies criteria for the evaluation, selection, monitoring of performance, and re-evaluation of external providers, based on their ability to provide processes or products and services in accordance with requirements. ATS retains documented information of these activities and any necessary actions arising from the evaluations.

8.4.2 Type and extent of control

ATS ensures that externally provided processes, products and services do not adversely affect ATS's ability to consistently deliver conforming testing, inspection, and calibration services to customers.

Competent, qualified, approved suppliers are selected and used for materials, equipment, and services based upon their ability to meet ATS requirements. Documented and defined criteria for the selection, evaluation, and re-evaluation are established.

The Quality Assurance Director approves and qualifies suppliers and retains and revises an Approved Suppliers List. Records of evaluation results and any necessary action arising from the evaluation are maintained. Evaluation of suppliers is performed at defined intervals to ensure their capability to supply quality products or services.

ATS:

- ensures that externally provided processes remain within the control of ATS' QMS;
- defines both the controls that it intends to apply to an external provider and those it intends to apply to the resulting output;
- takes into consideration:

- the potential impact of the externally provided processes, products and services on the ATS' ability to consistently meet customer and applicable statutory and regulatory requirements;
- the effectiveness of the controls applied by the external provider;

- determine the verification, or other activities, necessary to ensure that the externally provided processes, products and services meet requirements.

8.4.3 Information for external providers

Purchasing documents clearly describe the product or service that is being ordered and are reviewed by the appropriate manager for items directly affecting quality prior to release. As appropriate, purchasing data includes:

- the type, class, grade, or other precise identification;
- positive identification of specifications, drawings, process requirements, inspection instructions, and other relevant technical data, including requirements for approval or qualification of product, procedures, processes, equipment, and personnel;
- identification of the quality system standard and other quality assurance requirements to be applied.
- the approval of:
- products and services;
- methods, processes and equipment;
- the release of products and services;
- competence, including any required qualification of persons;
- the external providers' interactions with ATS;
- control and monitoring of the external providers' performance to be applied by ATS;

ATS ensures the adequacy of requirements prior to their communication to the external provider.

ATS establishes and implements inspection or other activities necessary for ensuring the purchased product meets specified purchasing requirements. Purchased product is generally verified at receipt inspection. For purchased product/service that cannot be verified at the time of receipt, appropriate supplier evaluation and monitoring will be performed.

For products or services requiring verification at the subcontractor's premises, arrangements are made and set forth in the purchasing documents for verification arrangements and the method of product release.

8.5 Production and service provision

8.5.1 Control of Product and service provision

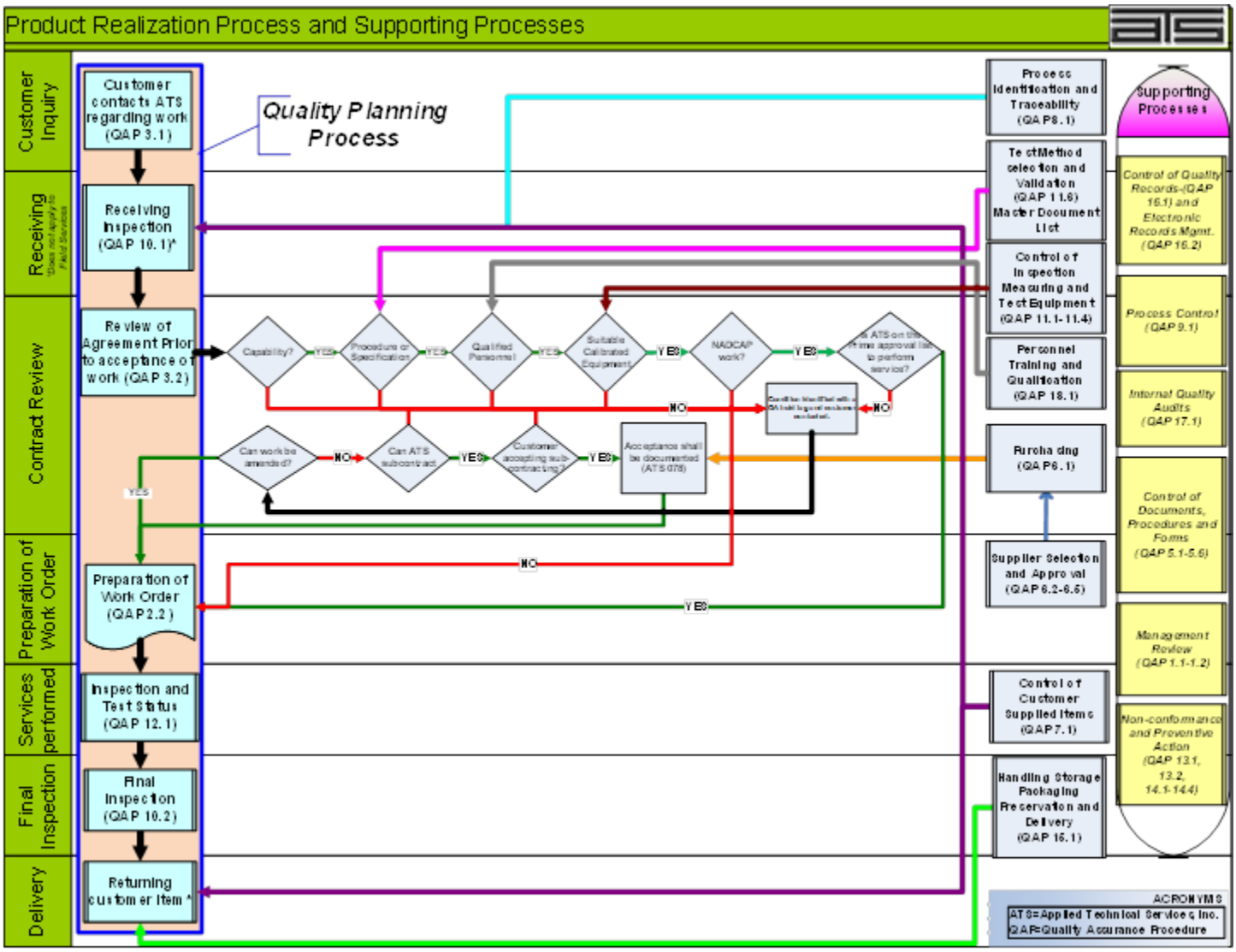
Many factors determine the correctness and reliability of the tests, inspections, and calibrations performed. ATS identifies, plans, and controls factors that directly affect quality. These process controls include the following:

- availability of information that describes necessary characteristics and results to be achieved;
- documented procedures or work instructions providing direction where the absence could adversely affect quality;
- availability and use of suitable monitoring and measuring equipment and working environment;

- compliance with reference standard/codes, quality plans, and/or documented procedures;
- process approval;
- clear, practical criteria for workmanship;
- maintenance of equipment to insure process capability;
- implementation of product release, delivery, and post-delivery activities.
- the implementation of monitoring and measurement activities at appropriate stages to verify that criteria for control of processes or outputs, and acceptance criteria for products and services, have been met;
- the appointment of competent persons, including any required qualification;
- the validation, and periodic revalidation, of the ability to achieve planned results of the processes for production and service provision, where the resulting output cannot be verified by subsequent monitoring or measurement;
- the implementation of actions to prevent human error;

ATS may perform special processes where results cannot be verified by monitoring or measurement at the time of completion and may only be apparent after delivery. In such cases, processes require validation to demonstrate results and a constant monitoring of variables to ensure ongoing process capability. Controls for these processes include, as applicable:

- defined criteria for review and approval of the processes;
- approval of equipment and qualification of personnel;
- use of specific methods and procedures;
- requirements for records;
- revalidation



8.5.2 Identification and traceability

ATS maintains identification and traceability as required by procedures and regulations throughout product realization and identifies records with a unique identification number.

Inspection and Test Status is indicated on the Work Order, which accompanies materials, designating sequencing of processes, testing and inspections. Upon completion of an operation, the Work Order is marked to indicate the employee responsible for completion of the operation and the date of completion.

Inspection stamps are issued to appropriate employees and used when required by specification.

Customer equipment or materials evaluated to specific accept/reject criteria are identified with reject tags or equivalently identified when found to be nonconforming.

8.5.3 Property belonging to customers or external providers

ATS exercises care with property belonging to customers or external providers while it is under ATS' control or being used by ATS. ATS identifies, verifies, protects, and safeguards customers' or external providers' property provided for use or incorporation into testing, inspection, nuclear consulting engineering and calibration services. When the property of a customer or external provider is lost, damaged, or otherwise found to be unsuitable for use, ATS reports this to the customer or external provider and retains documented information on what has occurred.

Reusable shipping containers or special packaging received with customer equipment is identified and stored for use when items are returned to the customer.

8.5.4 Preservation

ATS preserves the outputs during service provision, to the extent necessary to ensure conformity to requirements.

Product is carefully processed from receipt, through internal processing, and to delivery to preserve the conformity and minimize the chance of damage to maintain conformity to requirements. Special handling precautions outlined in customer's instructions are followed. This preservation includes adequate identification, handling, packaging, storage, and protection of all product and constituent parts.

Customer equipment and parts are stored in designated, secured, suitable indoor environments to minimize the chance of loss, deterioration, or damage. Materials used in testing and inspection are used in a first-in, first-out inventory system.

Personnel performing packaging are trained in acceptable techniques and procedures for packaging of customer equipment and materials. Special packaging instructions are provided as needed.

An approved carrier or other methods as specified by the customer may deliver equipment, materials, or other items.

8.5.5 Post-delivery activities

ATS meets requirements for post-delivery activities associated with testing, inspection, nuclear consulting engineering and calibration services. In determining the extent of post-delivery activities that are required, ATS considers:

- statutory and regulatory requirements;
- the potential undesired consequences associated with testing, inspection, and calibration services;
- the nature, use, and intended lifetime of testing, inspection, and calibration services;
- customer requirements;
- customer feedback.

8.5.6 Control of changes

ATS reviews and controls changes for service provision, to the extent necessary to ensure continuing conformity with requirements and retains documented information describing the results of the review of changes, the person(s) authorizing the change, and any necessary actions arising from the review.

8.6 Release of services

ATS implements planned arrangements, at appropriate stages, to verify that the testing, inspection, nuclear consulting engineering and calibration service requirements have been met. The release of testing, inspection, and calibration services to the customer does not proceed until the planned arrangements have been satisfactorily

completed, unless otherwise approved by a relevant authority and, as applicable, by the customer. ATS retains documented information on the release of testing, inspection, and calibration services. The documented information includes:

- evidence of conformity with the acceptance criteria;
- traceability to the person(s) authorizing the release.

Results of each test, inspection and/or calibration carried out by ATS are reported accurately, clearly, unambiguously, and objectively and include all the information in accordance with ATS and customer requirements. These results are reported usually in a test report or calibration certificate.

Each department has established standardized reports to provide information. These reports may be modified to meet the customer's needs but include all the required information, as applicable.

Test reports may contain information, which is intended "as a guide" only. This term will be noted on the report when the following apply:

- no other method exists, and a method is used that is for a different type of product;
- ATS does not maintain or calibrate the equipment exactly per the standard, the customer accepts this deviation and the equipment is verified prior to use;
- the sample size/configuration submitted by the customer fails to comply with the standard and the testing is performed on a "best effort basis";
- the customer waives specified steps in a procedure due to timing or cost considerations or;
- ATS performs testing, after customer approval, that does not comply with specific steps or conditions.

In the case of transmission of test, inspection, or calibration results by telephone, telex, facsimile or other electronic or electromagnetic means, the requirements of the quality system and applicable standards are met.

ATS may subcontract testing, inspection, and/or calibrations. The customer is notified in writing of this intent prior to subcontracting. Reports of subcontracted work are issued to ATS. When test, inspection and/or calibration reports issued by ATS contain results performed by subcontractors, these results are clearly identified. Subcontractor inspection and test documentation or data, is reviewed and verified by ATS in accordance with acceptance criteria.

8.7 Control of nonconforming outputs

ATS ensures when any aspect of our inspection, testing, nuclear consulting engineering and/or calibration processes, or the results of this work, does not conform to requirements and is adverse to quality, that product is identified and controlled to prevent its unintended use or delivery. Documented policies and procedures define the controls and related responsibilities for dealing with nonconforming product.

Where applicable, nonconforming conditions may be dealt with in one or more of the following ways:

- correction;
- segregation, containment, return, or suspension of products and services;
- informing the customer;
- action may be taken to eliminate the detected nonconformity;
- product may be used, released, accepted under concession by a relevant authority and, where applicable, by the customer;
- action may be taken to preclude its original intended use or application;

- action may be taken appropriate to the effects, or potential effects, of the nonconformity when nonconforming product is detected after delivery or use has started.

Any employee who is aware of a discrepancy or potential discrepancy in a process, product, or service that is not in accordance with ATS procedures, regulatory compliance specifications, or could adversely affect customer satisfaction is responsible for reporting these conditions to the proper authority.

Conformity to the requirements is verified when nonconforming outputs are corrected.

The responsibilities and authorities for the management of nonconforming testing, inspection, and/or calibration services are designated and defined. Investigation is made to evaluate the significance and impact of the nonconformity and the resulting actions are defined which includes the halting/resumption of work, and the withholding of reports. When applicable, corrective action and any decision about the acceptability of the nonconforming work are taken immediately.

Nonconforming product including reports, purchased items, or other item are identified, segregated, and dispositioned, as necessary, to prevent usage or release. When nonconformances are corrected, the results are subject to re-verification to demonstrate conformity to the requirements.

It is the policy of ATS to immediately notify customers (and regulatory agencies when required) if nonconforming conditions may have resulted in invalid results or data being delivered to the customer. ATS accepts responsibility for reporting of defects and noncompliances per Title 10, Code of Federal Regulations, Part 21, when required by customer purchase orders or contracts.

10 CFR 50.55(e) relates to construction activities, and as such, customers invoking this requirement would be responsible for the portion of the regulation that requires specific records retention and notification to the NRC when there has been a significant QA Program Breakdown. By ATS complying and implementing procedures in accordance with 10 CFR Part 21, ATS meets the intent of 10 CFR 50.55(e).

ATS retains documented information that:

- describes the nonconformity;
- describes the actions taken;
- describes any concessions obtained;
- identifies the authority deciding the action in respect of the nonconformity.

9 Performance Evaluation

9.1 Monitoring, measurement, analysis, and evaluation

9.1.1 General

ATS applies suitable methods for monitoring and measurement of the quality system processes, as applicable. These methods demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action are taken, as appropriate.

9.1.2 Monitoring and Measurement of Product

ATS monitors and measures the characteristics of the product to verify that all product requirements have been met. This is carried out at appropriate stages of the product realization process in accordance with the planned arrangements. Evidence of conformity with the acceptance criteria is maintained. Records indicate the person authorizing the release of product. Product release and service delivery do not proceed until the

planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, where applicable, by the customer. Verification activities is performed by qualified personnel.

9.1.3 Receipt Inspection

Receiving inspection and verification of equipment, materials, and services are performed to ensure that receipts are reconciled with the customer's shipping documentation, purchase order requirements are met, and detection of outwardly visible damage is documented. Incoming items are identified as appropriate until required inspections have been performed and material is released. When urgent release is necessary, traceability of all affected materials and processes are maintained to permit recall and replacement in the event of nonconformity to specified requirements.

9.1.4 In-process Inspection

Employees use in-process inspection when directed by procedure to ensure that the criteria for the output of a sub-process are met before proceeding to the next process. Employees are responsible for the quality and inspection of their own work and for providing the records of in-process inspections on the Work Order when required.

9.1.5 Final Inspection

Reports, data, and other relevant information are reviewed by the manager or designee, as required. Calculations and data transfers are subject to appropriate checks in a systematic manner. ATS maintains records of this approval as required by the quality plan.

9.1.6 Statistical Techniques

ATS identifies the need for statistical techniques for the analysis of processes. For the analysis of test, inspection, or calibration data, the customer identifies statistical techniques to be used as part of the contract. Statistical techniques are performed per documented procedures, when required.

ATS may perform sampling as required by the customer. When necessary, this sampling is performed according to documented procedures that are based on the appropriate statistical methods and available at the place of the activity. These procedures include the recording of relevant data and operations.

9.1.7 Customer Satisfaction

As a measurement of the performance of the quality system, ATS monitors information relating to customer perception as to whether the organization has met customer requirements. The methods for obtaining and using this information are documented.

9.1.8 Analysis and evaluation

ATS determines, collects, and analyzes appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of the quality management system can be made. This includes data generated because of monitoring and measurement and from other relevant sources. The results of analysis are used to evaluate:

- conformity of products and services;
- the degree of customer satisfaction;
- the performance and effectiveness of the QMS;
- if planning has been implemented effectively;
- the effectiveness of actions taken to address risks and opportunities;
- the performance of external providers;

- the need for improvements to the QMS.

9.2 Internal Audit

9.2.1 ATS performs internal audits of the quality system at least once each calendar year to determine whether the quality system conforms to ATS's own requirements for its QMS, applicable standards and requirements, and is effectively implemented and maintained. Internal audits may be rescheduled due to business needs at the discretion of the QA Director. The responsibilities and requirements for planning and conducting audits, and for reporting results and maintaining records are defined in documented procedures.

Audits are scheduled based on the status and importance of the activity to be audited and the results of previous audits. Internal quality audits are performed in accordance with documented audit procedures, which define criteria, scope, frequency, and methods, and reference prepared checklists. The selection of auditors and conduct of audits ensures objectivity and impartiality of the audit process. Trained auditors are independent of the areas in which they audit and do not audit their own work.

Nonconformances discovered during internal audits are documented and appropriate corrective action initiated without undue delay. Audit results are reported to the President, Quality Assurance Director, and the appropriate Manager(s). Audit results, verification, and effectiveness of corrective action are reviewed according to procedures.

When the identification of nonconformances or departures casts doubts on the laboratory's compliance with its own policies and procedures or on its compliance with applicable standards, ATS ensures that the appropriate areas of activity are audited as soon as possible. These additional audits may be performed to confirm the effectiveness of corrective action when nonconformances are regarded as sufficient to constitute a serious risk to the validity of process output or operations.

9.3 Management Review

9.3.1 General

The President, Vice Presidents and members from each testing or inspection discipline perform a review of the status and adequacy of the QMS to assess the Quality System's alignment with ATS' strategic direction and continuing suitability and effectiveness in satisfying the requirements of applicable quality system standards, improve the Quality System, set goals for the coming year, and assess the quality policy and objectives. Because of this review, the Quality Assurance Director may revise the Quality System and/or initiate corrective action or continual improvement activities as required. Records of management reviews are maintained as required by procedures.

9.3.2 Management Review Inputs

Management Review is planned and carried out taking into consideration:

- the status of actions from previous management reviews;
- changes in external and internal issues that are relevant to the QMS;
- information on the performance and effectiveness of the QMS, including trends in:
  - customer satisfaction and feedback from relevant interested parties;
  - the extent to which quality objectives have been met;
  - process performance and conformity of products and services;
  - nonconformities and corrective actions;
  - monitoring and measurement results;

- audit results;
- the performance of external providers;
- the adequacy of resources;
- the effectiveness of actions taken to address risks and opportunities;
- opportunities for improvement.

9.3.3 Management Review Outputs

Management review outputs include decisions and actions related to:

- opportunities for improvement;
- any need for changes to the QMS;
- resource needs.

ATS retains documented information as evidence of the results of management reviews.

10 Improvement

10.1 General

Quality system effectiveness is continually improved using the quality policy, quality objectives, audit results, analysis of data, corrective actions, customer feedback, and management review. ATS determines and selects opportunities for improvement and implements any necessary actions to meet customer requirements and enhance customer satisfaction. Opportunities for improvement include:

- improving products and services to meet requirements as well as to address future needs and expectations;
- correcting, preventing or reducing undesired effects;
- improving the performance and effectiveness of the QMS.

10.2 Nonconformity and corrective action

10.2.1 When a nonconformity occurs, including any arising from complaints, ATS:

- reacts to the nonconformity and, as applicable:
  - acts to control and correct it;
  - deals with the consequences;
- evaluates the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:
  - reviewing and analyzing the nonconformity;
  - determining the causes of the nonconformity;
  - determining if similar nonconformities exist, or could potentially occur;
- implements any action needed;
- reviews the effectiveness of any corrective action taken;
- updates risks and opportunities determined during planning, if necessary;
- makes changes to the QMS, if necessary.

ATS maintains documented procedures to prevent recurrence of nonconforming work by promptly implementing corrective action when the following items have been identified:

- significant conditions adverse to quality or
- departures from the policies and procedures in the quality system or technical operations.

Corrective actions are performed to eliminate the causes of nonconformances appropriate to the effects of the problem and risks involved.

ATS has documented procedures for corrective action that includes:

- Reviewing and investigating nonconformities, including customer complaints
- Determining the causes of nonconformities
- Evaluating the need for action to ensure nonconformities do not recur
- Determining and implementing action needed
- Records of the results of action taken
- Reviewing corrective action taken and its effectiveness

ATS retains documented information as evidence of the nature of the nonconformities and any subsequent actions taken and the results of any corrective action.

10.3 Continual Improvement

ATS continually improves the suitability, adequacy, and effectiveness of the QMS and identifies needed improvements and potential sources of nonconformances to prevent their occurrence and takes action. These actions are appropriate to the effects of the potential problems and include:

- use of information such as audit results, customer complaints, departmental procedures, or quality records to detect, analyze, and eliminate potential causes of nonconformities;
- evaluating the need for action to prevent occurrence of nonconformities;
- determining and implementing action(s) needed;
- recording the results of action and evaluation of effectiveness;
- management review of improvement actions.

11 Technical Requirements

ATS complies with the following requirements, to ensure the technical competence of the laboratory and to meet the requirements of ISO/IEC 17025:2017. Scopes of accreditation for this standard are located on the ATS website www.atslab.com.

11.1 Test and Calibration Methods

11.1.1 General

The appropriate methods and procedures for all tests and/or calibrations are used. These include, as necessary, sampling, handling, transport, storage, and preparation of items to be tested and/or calibrated, and an estimation of the measurement's uncertainty as well as statistical techniques for analysis of test and/or calibration data.

Personnel are provided instructions on the use of and operation of relevant equipment, and on the handling and preparation of items for testing and/or calibration, or both, where the absences of such instructions could jeopardize the results. All instructions, standards, manuals, and reference data relevant to the work of the laboratory are kept up to date and available. Deviation from test and calibration methods occur only if the deviation has been documented, technically justified, authorized, and accepted by the customer.

11.1.2 Selection of Methods

Test and/or calibration methods, including sampling, are selected based upon the needs of the customer. Methods published in international, regional, or national standards are preferably used. When necessary, the standard is supplemented with additional details to ensure consistency. Each department maintains a procedure list on the ATS

intranet detailing the processes specific to the scope of their work to ensure consistency. The latest valid edition of a standard is used unless it is not appropriate or possible to do so.

When the customer does not specify a method, or the method is inappropriate or out of date, notification is made to the customer.

11.1.3 Laboratory-Developed and Non-Standard Methods

ATS may perform methods that are one of the following:

- non-standard,
- customer-provided,
- laboratory-designed/developed,
- standard methods used outside of their intended scope and
- amplifications and modifications of standard methods.

ATS shall only validate ATS designed/developed test methods and shall not be responsible for any other methods.

11.1.4 Validation of ATS Lab Developed Methods

Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

The laboratory shall validate ATS designed/developed methods, to confirm that the methods are fit for the intended use. The validation is as extensive as is necessary to meet the needs of the given application or field of application. The laboratory shall record the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use.

NOTE 1 Validation may include procedures for sampling, handling, and transportation.

NOTE 2 The techniques used for the determination of the performance of a method should be one of, or a combination of, the following:

- *calibration using reference standards or reference materials;*
- *comparison of results achieved with other methods;*
- *interlaboratory comparisons;*
- *systematic assessment of the factors influencing the result;*
- *assessment of the uncertainty of the results based on scientific understanding of the theoretical principles of the method and practical experience.*

NOTE 3 When some changes are made in the ATS validated non-standard methods, the influence of such changes should be documented and, if appropriate, a new validation should be carried out.

11.1.4.1 The range and accuracy of the values obtainable from validated methods (e.g. the uncertainty of the results, detection limit, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences and/or cross-sensitivity against interference from the matrix of the sample/test object), as assessed for the intended use, is relevant to the customers' needs.

NOTE 1 Validation includes specification of the requirements, determination of the characteristics of the methods, a check that the requirements can be fulfilled by using the method and a statement on the validity.

NOTE 2 As method-development proceeds, regular review should be carried out to verify that the needs of the customer are still being fulfilled. Any change in requirements requiring modifications to the development plan should be approved and authorized.

NOTE 3 Validation is always a balance between costs, risks and technical possibilities. There are many cases in which the range and uncertainty of the values (e.g. accuracy, detection limit, selectivity, linearity, repeatability, reproducibility, robustness and cross-sensitivity) can only be given in a simplified way due to lack of information.

ATS shall not assume responsibility for validation of customer provided methods.

11.1.5 Measurement Uncertainty

The ATS Calibration Laboratory and areas of testing performing outside calibrations have a procedure for determining the uncertainty of measurement for calibrations. When estimating the uncertainty of measurement, all uncertainty components, which are of importance in the given situation, are considered using appropriate methods of analysis.

For test methods, where the nature of the method precludes rigorous, metrologically and statistically valid calculation of uncertainty, the components of uncertainty have been considered with a reasonable estimation based on knowledge of the performance of the method, measurement scope, and previous experience and data. Results are reported to avoid giving a wrong impression of the uncertainty.

11.1.6 Assuring the Quality of Test and Calibration Results

ATS has various quality control procedures for monitoring the validity of tests and calibrations including the use of certified reference materials, inter-laboratory comparisons, proficiency programs, replicate tests or calibrations, retesting of retained items, and correlation of results for different characteristics. Where practical, the resulting data is recorded such that trends are detectable and analyzed by statistical techniques.

Revision Record

Rev	Date	Section	Description of Change
0	11/1/97	All	Rewrite to incorporate ISO 9002:1994 requirements and restructure documentation. This document replaces ATS Quality Assurance Manual Rev. 7, 01-01-97
1	1/1/98	Intro 1 4.16	Addition of ATS branch offices in Chesapeake, VA and Savannah, GA Added reference to compliance with following quality system standards:MIL-I-45208A Inspection System Requirements MIL-Q-9858A Quality Program Requirements Title 10, Code of Federal Regulations, Part 50 Nuclear Quality Assurance Requirements Retention of customer job folders changed to seven years for non-nuclear related jobs
2	3/1/99	1.4.1.2 1 4.1.2.1 4.2.3 4.5.1 4.9 4.11.2.2 4.11.2.7 4.11.4 4.14.4	Add Fire Investigation to the scope of operations Reference compliance with ISO Guide 25 Rev. 3, 1990 Identify Dept. Manager's responsibility and authority for technical operations and provision of resources; ATS and employee are free from internal and external pressures that may conflict in interests The Quality Manual is representative of the general quality plan. Added policy statement for the control of Quality System documents Added process monitoring methods including participation in inter-laboratory comparisons, proficiency testing, reference materials, or other QC checks Procedures identify method of traceability In-service checks are performed when applicable Added example environmental controls Added reference to ISO/IEC Guide 25 and TUR requirements for customer equipment Added paragraph on Special Audits
3	7/1/01	Various 1 4.1.2 4.16.2	Specific requirements and clarifications have been added as needed to meet the requirements for compliance with ISO/IEC 17025:2005; No requirements have been deleted. Technical requirement of ISO/IEC 17025:1999 have been added to 4.9, where appropriate Added Calibration, Winston-Salem to the scope and address of Marietta, GA Revised Organization of NDT and Calibration, Winston-Salem Added contractual agreement for customer evaluation of records
4	4/1/02	4.1.5 2.4.1.2	Added policy for Management Review to assess continuing suitability Removed references to Winston-Salem Calibration Office and added Consulting Engineering Department and re-organized NDT
5	10/10/02	1.3	Updated reference to NQA-1 for 1997 and 2000 revisions; No quality system changes
6	5/1/03	All	Reformatted to ISO 9001:2000 numbering, added wording to correspond terminology, and supplemented requirements for measuring customer satisfaction and continual improvement and terminology, as required. No quality system requirements were eliminated.
7	7/18/06	1.3	Change of address, Updated reference to ISO 17025:2005
8	4/9/08	5.5.4 Page 2	Addition of Vice President position, change in QA Manager, Fire Investigation Manager and Controller
9	2/20/09	1 5.5.1 5.5.4 5.6.1 6.2.2 6.4 7.4.3 7.7.1.2 7.7.4 All	Remove references to MIL I 45208A and MIL-Q-9858A which are obsolete Add NDT branch office locations and additional reference to NQA-1 2004 Add NDT level III responsibilities Modify Organizational chart to reflect addition of Level III and Purchasing function Change from quarterly to semi-annual review and change title of reference document to Semi Annual Management Review Add remark "recertification" to last statement and "NAS 410" to list of certifications.(cont'd next page) Add 110.1 Qualification and certification of NDT personnel to references Change responsibility of Purchase Order review to "appropriate personnel". Add "to ensure consistency" to next to last sentence. Add "NDT Procedure Manuals" as reference document Add "Regional Manager" position to address addition of NDT branch offices
10	4/15/10	Approval Page	Update management

Rev	Date	Section	Description of Change
		1.0	Changed Richmond, VA to Rockville, and Houston, TX to Kemah, TX and Wilmington to Aston, PA
		3.0	Revised ISO 9001:2000 to ISO 9001:2008 Added FAR 145.211 FAA to standards Revised ISO 9001:2000 to ISO 9001:2008
		4.1	Added FAR 145.211
		4.2.3.2	Added Repair Station Manual Added the term established to reflect ISO 9001:2008 requirements
		4.2.4.1	Revised External work instruction and specifications bullet point to include obsolete technical data
		5.3	Addition of note that addresses technical data ownership
		5.5.1	Change fire resistant cabinets to fire resistant storage Revised quality policy
		5.5.4	Added additional responsibility to NDT level III's for assisting QA manager in implementation of quality in regards to NDT program
		6.2.2	Revised organization chart to reflect addition of positions to support FAA
		7.1	requirements Revised statement of competence to reflect ISO 9001:2008 requirements
		7.2.1	Revised statement of product realization to reflect ISO 9001:2008 requirements Revised statement of customer requirements to reflect ISO 9001:2008 requirements
		7.5.3	Revised statement of processing to product realization to reflect ISO 9001:2008 requirements
		7.5.4	Revised statement of customer property to reflect ISO 9001:2008 requirements Revised statement of "devices" to a statement of "equipment"
		7.6	Added "or both" to reflect ISO 9001:2008 requirements Revised statement "of the product" to "to product requirements" to reflect ISO
		8.1	9001:2008 requirements
11		All	Change title of Quality Assurance Manager to Quality Assurance Director
		1-3	Addition of offices/recognition of accredited locations, Update NQA-1 version to 2008/2009a addenda Reference ISO 17025 scopes of accreditations, Update NQA-1 version to 2008-2009a addenda and A2LA policies and procedures Addressing how ATS supports Commercial Grade Dedication for Nuclear work.
		2	Change the approval requirements for Quality Assurance Manual
		4.1	Insert diagram showing interaction of processes
		4.2.3.4	Additional clarification of minor and major changes.
		4.2.4.2	Additional clarification that customer job records are non-permanent records.
		5.5.1	Change "NDT quality program" to "NDT program"
		5.3	Addition to quality policy of accredited services
		5.5.2	Additional responsibility in regards to accredited disciplines
		5.5.4	Change organization chart to reflect report to status of Fire Investigation
		5.6	Change requirement of management review attendance
		7.4.4	Addition of term "service" to purchased items
		7.6	Additional policy to disallow use of personal inspection, measuring and test equipment.
		7.7	Reference location of scopes of accreditation Addition of Appendix A: Corresponding Requirements
		7.7.1.2	Written notification changed to notification.
		7.7.2.2	Additional remark addressing reference standards and "applicable requirements"
		7.7.4.4	Additional requirement of review of subcontractor reports
		Section 4	Add Code of Ethics
		References	
		Appendix A	Add cross reference to NQA-1
12	1/12/14	Approvals	Addition of new signatories to encompass regions/disciplines
		Section 1	Addition of offices/removal of Baton Rouge, LA location Removal of Commercial Grade exemption. Clarification of NQA-1 Part 1
		Section 2	Addition of Regional/Discipline Managers for Quality Manual approval

Rev	Date	Section	Description of Change
		5.5.4 7.5 7.7.4 8.3.1 8.3.3	Revised organization chart to reflect Company harmonization of titles Revision of ATS product realization process flow Use of term “as a guide” in test reports defined Addition of term “adverse to quality” Addressing 10CFR50.55e requirements
13	1/5/16	Section 1 Section 3 4.2.4.1 4.2.4.2 5,3 5,5,4 6.2.2 8.2.2	Incorporation of NADCAP requirements and QAP 22.0 reference Removal of annual performance of internal audits.
14	1/27/17	Signature Page Section 1 4.2.3.4 5.5.4 5.6 8.2.2	Updated titles and signatories Updated facility locations Removed distinction between major and minor changes to documents. 10CFR50 Appendix B does not make allowance for major/minor changes to documents. Edited Organization Chart Removed semi-annual management review Allowed for rescheduling of internal audits; clarified planned intervals
15	7/2/2018	Entire Document	Aligned with ISO 9001:2015
16	10/1/2018	5.1.1 Appendix A 1-11	Added commitment statement to comply with requirements Added Appendix A Cross Reference with NQA-1 Removed Consulting Engineering
17	3/16/2020	All Appendix B Signature Page 4.3	Updated reference from ISO/IEC 17025:2005 to ISO 17025:2017; Added ISO 9001:2015 / NAVSEA 009-04 Matrix; Changed Calibration Manager Signatory Updated locations
18	10/16/2020	References 4.3	Updated to ASME NQA - 1 - 2015 Quality Assurance Requirements for Nuclear Facility Applications Added Oak Ridge, TN location
19	3/1/2022	Entire Document Signature Page 2 4.3 5.3 7.2	Changed Applied Technical Services, Inc. to Applied Technical Services Updated to current signatories Added reference to NEI 14-05-A Revision 1 Added nuclear consulting engineering and updated locations Updated Organizational Chart Added qualifying NDT subsidiary personnel to ATS Written Practice(s)
20	12/1/2022	8.3 Entire Document Signature Page Appendix A&B	Removed design exclusion and addressed NQA-1 design control requirements for the nuclear engineering group; Replaced references to President with CEO; Updated signature page; Updated appendices
21	6/1/2023	Introduction 8.3 Entire Document	Updated Purpose, Mission, and Values Added requirements to the design sections. Corrected typographical errors. Added “nuclear consulting engineering”.

APPENDIX A

NQA-1 Cross Reference

Requirement 2 Quality Assurance Program	
100 General	5.1.1 General Requirements 7.5.3 Control of Documented Information 7.5.3.5 Control of Quality Records 7.5.3.6 Customer Job Records 6.2 Quality Objectives and Planning to Achieve them 9.3.1 Management Review-General 9.3.2 Management Review Input 9.3.3 Management Review Output 7.1 Resources 7.1.1 General 7.1.2 People 7.1.3 Infrastructure 7.1.4 Work Environment 7.2 Competence 8 Operation 8.2.2 Determining the requirements for testing, inspection, calibration and services. 8.2.1 Customer Communication 8.2.1 Monitoring and Measurement Customer Satisfaction 9.1.2 Monitoring and Measurement of Product 9.1.8 Analysis and evaluation 10 Improvement
200 General	7.2 Competence
201 Indoctrination	

APPENDIX A

NQA-1 Cross Reference

202 Training 300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor 304 Auditors 305 Technical Specialists 400 Records of Qualification 500 Records	110.4,8, 9 and 20 Qualification and Certification of Non-Destructive Examination Personnel-Nuclear 7.2 Competence QAP 17.1 Internal Quality Audits Job Descriptions
Requirement 3: Design Control	
100 General	8.3.1
200 Design Input	8.3.2
300 Design Process	8.3.3
400 Design Analysis	8.3.4
500 Design Verification	8.3.5, 8.3.6,
600 Change Control	8.3.7
700 Interface Control	8.3.8
800 Software Design Control	8.3.12
900 Documentation and Records	8.3.8

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Requirement 4: Procurement Document Control	
100 General	8.4 Control of Externally provided products and services
200 Content of the Procurement Documents	QAP 6.1 Purchasing
201 Scope of Work	
202 Technical Requirements	
203 Quality Assurance Program Requirements	8.4.2 Type and Extent of Control 8.4.3 Information for external providers
204 Right of Access	QAP 6.1 Purchasing/ATS LIMS/SharePoint
205 Documented Requirements	
206 Nonconformances	8.7 Control of nonconforming outputs
207 Spare and replacement parts	Not applicable
300 Procurement Document review	QAP 6.1
400 Procurement Document Changes	
Requirement 5: Instructions, Procedures and Drawings	6 Planning

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Requirement 6: Document Control	
100 General	7.5.3 Control of Documented Information
	7.5.3.5 Control of Quality Records
200 Document Control	7.5.3.6 Customer Job Records
200 Document Control	QAP 5.1 Control of Documents
a-identification	
b-distribution	
c-identification of individuals	
d-review of controlled documents	
e-method to ensure the correct document	
300 Document Changes	
301 Major Changes	
302 Minor Changes	7.5.3.4 Document and Data Changes

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Requirement 7: Control of Purchased Items and Services	
100 General	QAP 15.1
200 Supplier Evaluation and Selection	QAP 6.2 ,6.3, 6.4 and 6.5
300 Bid Evaluation	Not applicable
400 Control of Supplier-Generated Documents	QAP 5.1, QAP 6.3
500 Acceptance of Item or Service	QAP 6.2, 6.5
501 General	8.4 Control of Externally provided products and services
502 Methods of Acceptance	QAP 6.2, 6.5
503 Certificate of Conformance	QAP 6.2
504 Source Verification	QAP 6.1
505 Receiving Inspection	QAP 10.2
506 Acceptance of Services Only	Not applicable-
600 Control of Supplier Nonconformances	8.7 Control of nonconforming outputs, QAP 14.4
700 Commercial Grade Items and Services	QAP 6.5
800 Records	QAP 16.1

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Requirement 8: Identification and Control of Items	QM1 section 8.5.2 and QAP 8.1
Requirement 9: Special Processes	QM1 section 8.5.1 QAP 11.6
Requirement 10: Inspection	QM-1 section 9.1.3 and section 9.1.5 QAP 10.1 QAP 10.2 QAP 12.1 QAP 12.2
Requirement 11: Test Control	QM1 section 8.5.1 QAP 9.1
Requirement 12 Control of Test and Measuring Equipment	QM1 section 7.1.5.3 QAP 11.1 QAP 11.2 QAP 11.3 QAP 11.4 QAP 11.5
Requirement 13 Handling, Storage and Shipping	QM1 section 8.5.4 QAP 15.1
Requirement 14 Inspection Test and Operating Status	QAP 12.1

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Requirement 15 Control of Nonconforming Items	QM1 section 8.7 QAP 13.1 QAP 13.2
Requirement 16 Corrective Action	QM1 section 8.7 QAP 14.1 QAP 14.2 QAP 14.3 QAP 14.4
Requirement 17 Quality Assurance Records	QM1 section 7.5 QAP 16.1
Requirement 18 Audit	QM1 section 9.2 QAP 18.1 Lead Auditor Job Description

APPENDIX B

ISO 9001:2015 / NAVSEA 009-04 Matrix

ISO 9001:2015		ISO Mandatory Documents & Records	009-04 Required documented Procedures
1	**Scope**		
4	**Context of the organization**		
4.1	Understanding the organization and its context	QM-1 Section 4.1	
4.2	Understanding the needs and expectations of interested parties	QM-1 Section 4.2	
4.3	Determining the scope of the quality management system	QM-1 Section 4.3	
4.4	Quality management system and its processes	QM-1 Section 4.4	
5	**Leadership**	QM-1 Section 5	
5.1	Leadership and commitment	QM-1 Section 5.1	
5.1.1	Leadership and commitment with respect to the quality management system	QM-1 Section 5.1.1	
5.1.2	Customer focus	QM-1 Section 5.1.2	
5.2	Quality policy	QM-1 Section 5.2	
5.3	Organization roles, responsibilities and authorities	QM-1 Section 5.3	
6	**Quality management system planning**		
6.1	Actions to address risks and opportunities	QM-1 Section 6.1	
6.2	Quality objectives and planning to achieve them	QM-1 Section 6.2	
6.3	Planning of changes	QM-1 Section 6.3	
7	**Support**		
7.1	Resources	QM-1 Section 7.1	
7.1.1	General	QM-1 Section 7.1.1	
7.1.2	People	QM-1 Section 7.1.2	
7.1.3	Infrastructure	QM-1 Section 7.1.3	
7.1.4	Processes operation environment	QM-1 Section 7.1.4	
7.1.5	Monitoring and measuring resources	QM-1 Section 7.1.5	QAP 11.1
7.1.6	Organizational knowledge	QM-1 Section 7.1.6	
7.2	Competence	QM-1 Section 7.2	QAP 18.1
7.3	Awareness	QM-1 Section 7.3	

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ISO 9001:2015		ISO Mandatory Documents & Records	009-04 Required documented Procedures
7.4	Communication	QM-1 Section 7.4	
7.5	Documented information	QM-1 Section 7.5	QAP 5.1
7.5.1	General	QM-1 Section 7.5.1	
7.5.2	Creating and updating	QM-1 Section 7.5.2	
7.5.3	Control of documented information	QM-1 Section 7.5.3	
8	**Operation**		
8.1	Operational planning and control	QM-1 Section 8.1	
8.2	Requirements for products and services	QM-1 Section 8.2	QAP 2.1
8.2.1	Customer communication	QM-1 Section 8.2.1	
8.2.2	Determination of requirements related to products and services	QM-1 Section 8.2.2	
8.2.3	Review of requirements related to products and services	QM-1 Section 8.2.3	
8.2.4	Changes to requirements for products and services	QM-1 Section 8.2.4	
8.3	Design and development of products and services	QM-1 Section 8.3	
8.3.1	General	QM-1 Section 8.3.1	
8.3.2	Design and development planning	QM-1 Section 8.3.1	
8.3.3	Design and development inputs	QM-1 Section 8.3.2	
8.3.4	Design and development controls	QM-1 Section 8.3	
8.3.5	Design and development outputs	QM-1 Section 8.3.6	
8.3.6	Design and development changes	QM-1 Section 8.3.7	
8.4	Control of externally provided products and services	QM-1 Section 8.4	QAP 6.1, 6.2, 6.3
8.4.1	General	QM-1 Section 8.4.1	
8.4.2	Type and extent of control of external provision	QM-1 Section 8.4.2	
8.4.3	Information for external providers	QM-1 Section 8.4.3	
8.5	Production and service provision	QM-1 Section 8.5	QAP 3.2
8.5.1	Control of production and service provision	QM-1 Section 8.5.1	
8.5.2	Identification and traceability	QM-1 Section 8.5.2	
8.5.3	Property belonging to customers or external providers (government)	QM-1 Section 8.5.3	
8.5.4	Preservation	QM-1 Section 8.5.4	
8.5.5	Post-delivery activities	QM-1 Section 8.5.5	
8.5.6	Control of changes	QM-1 Section 8.5.6	
8.6	Release of products and services	QM-1 Section 8.6	QAP 10.2
8.7	Control of nonconforming process outputs, products and services	QM-1 Section 8.7	QAP 13.1

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ISO 9001:2015		ISO Mandatory Documents & Records	009-04 Required documented Procedures
9	**Performance evaluation**		
9.1	Monitoring, measurement, analysis and evaluation	QM-1 Section 9.1	
9.1.1	General	QM-1 Section 9.1.1	
9.1.2	Customer satisfaction	QM-1 Section 9.1.7	
9.1.3	Analysis and evaluation	QM-1 Section 9.1.8	
9.2	Internal audit	QM-1 Section 9.2	QAP 17.1
9.3	Management review	QM-1 Section 9.3	QAP 1.1
9.3.1	General	QM-1 Section 9.3.1	
9.3.2	Review inputs	QM-1 Section 9.3.2	
9.3.3	Review outputs	QM-1 Section 9.3.3	
10	**Improvement**		
10.1	General	QM-1 Section 10.1	
10.2	Nonconformity and corrective action	QM-1 Section 10.2	QAP 14.2
10.3	Continual improvement	QM-1 Section 10.3	