National Aeronautics and
Space Administration

**John C. Stennis Space Center**
Stennis Space Center, MS 39529-6000

**SPR 1280.1 Rev F**
**June 2012**

# COMPLIANCE IS MANDATORY

# John C. Stennis Space Center Management System Requirements

# Document History Log

| Status/Change/ Revision | Change Date | Originator/Phone | Description |
|---|---|---|---|
| Basic | July 22, 2002 | M. Wethington/8-7196 | Supersedes SPG 8730.1 Basic release of management manual to integrate SSC management systems and align the document organization with ISO Standard 9001-2000. |
| SPR 1280.1 Basic | October 27, 2004 | Renay Nelson/XX-1585 | Revalidated per NASA Rules Review. |
| Basic-1 | April 3, 2006 | Eric Ross x 8-3571 | Administrative correction to correct document type to Procedural Requirements and expiration dates in header to be consistent. Note: Expiration date intentionally reflects the original expiration date of the initial SPG prior to its revalidation and conversion to SPR. |
| A | October 13, 2006 | Eric Ross/8-3571 | Reorganized and rewritten to align with ISO 9001-2000 and to reflect recent changes in the Stennis Management System, and to comply with directives management format and other requirements. Moved management policy to SPD 1280.1. Incorporated relevant information from SSLP-1280-0001 and SLP-02. |
| B | March 23, 2007 | Eric Ross/8-3571 | Revised methods used to provide information for management review. Updated to comply with AS9100 requirements: added references to AS9100; 1.6, Configuration Management; MSR responsibilities; risk evaluation in requirements review; authorization to proceed to next stage of design and development; additional design and development validation requirements; new requirements for control of production and service provision; |

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|---|---|---|---|
| | | | new requirements for control of monitoring and measuring devices; new requirements for monitoring and measurement of products or services; and requirement to flow down corrective action requirements to contractor or supplier who is responsible for root cause. |
| C | June 2008 | Carmen Ramirez x/8-2339 | 1-. Revised section P.4 Applicable Documents; deleted reference to outdated ones.<br>2- Retitled section 2.5.2 from Strategic Management Council to Management Councils and Boards and modified content.<br>3- Reviewed section 2.5.3 Management System Representative and added AS9100 language.<br>4- Added AS9100 language to section 2.5.4 All Managers.<br>5- Revised Section 2.6 Management Review in response to NQA's Corrective Action numbers M-0803-NQA-002 and 013. Added section 2.6.4 Records Management.<br>6- Added AS9100 language to section 4.4.1 Purchasing Process<br>7- Added AS9100 language to section 4.5.1 Control of Production and Service Provision.<br>8- Added AS9100 language to section 4.5.3 Identification and Traceability.<br>9- Added AS9100 language to section 4.6 Control of Monitoring and Measuring Devices.<br>10- Added ISO 9001 language to section 5.5 Corrective Action, Preventive Action, and Improvement.<br>11- Added Appendix C. Correlation of SPR 1280.1 to ISO9001 and AS9100 Standards |

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|---|---|---|---|
| | | | 12- Revised reference to specific documents throughout the entire document; deleted outdated ones. |
| C-1 | April 2009 | M. Ferguson / 8-1067 | Administrative change to add existing ISO 9001 Registration scope to document. Added scope to section P.1. (Per ISO9001:2008 section 4.2.2. Ref. CAR M-0903-NQA-005). |
| D | April 2011 | M. Ferguson / 8-1067 | Inserted updates throughout the document to clarify requirements to revised standards ISO 9001:2008 & AS9100C. These updates also include clarifications & corrections resultant from CAR analysis.<br>Removed excessive & redundant references. (P.4)<br>Added additional applicable information referenced in SPLN-7123.1. (4.1 c, d, f, 4.2.1, 4.3, & 5.5) |
| E | October 2011 | R. Magee / 8-1417 | Replaced subsection 2.6.1.c.ii to be consistent with current acceptable practice. Includes in Section 2.6.4 the location of Senior Management Review records and how open items will be tracked to resolution using existing acceptable practice.<br>Replaced Section 5.2.2 with current acceptable practice for Internal Audits. |
| F | March 2012 | Ralph Gonzalez 228-688-2101 | • 5.5(c) revised and P.4 added: Reference SCWI-8730-0002, Corrective Action, Preventive Action and Improvement (Ref. CAR M-1203-NQA-001)<br>• 1.6 revised and P.4 added: Reference to Configuration Management procedures.<br>• 1.7 added: Risk Management<br>• 1.3(7): Added "testing".<br>• 2.5.5(2): Corrected reference to SCWI-8730-0004. |

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## PREFACE

### P.1 PURPOSE

a. This Stennis Procedural Requirement (SPR) establishes the requirements of the Stennis Management System (SMS) as a quality management system to ensure consistent quality of NASA Stennis Space Center (SSC) products and services and the safety of our customers, employees, and products. Its benefits are measured in the quality of the work we perform and our compliance with customers' requirements.

b. Under the Center Director's control, this directive is the top-level document providing requirements for the responsibilities, procedures, processes, and resources for implementing the SMS in accordance with NPD 1280.1, *NASA Integrated Management System Policy*; NASA Policy Directive (NPD) 8730.5, *NASA Quality Assurance Program Policy;* and SPD 1280.1, *Stennis Management System Policy*. This SPR is a top-level requirements document referencing lower-level documents that provide more detailed requirements and instructions.

c. The scope of the SMS specifically embodies the Research, Design, and Development of Rocket Propulsion Test Services and Earth Sciences Applications for International Organization for Standards (ISO) registration purposes but also encompasses all other SSC operations for overall management purposes.

### P.2 APPLICABILITY

a. This SPR applies to all of the NASA/SSC activities at SSC and to all NASA/SSC personnel.

b. This SPR applies to NASA/SSC contractors to the extent specified or referenced in their respective contracts and agreements.

### P.3 AUTHORITY

a. 51 U.S.C. 20113 (a) (1) of *the National Aeronautics and Space Act of 1958*, as amended.
b. NPD 1280.1, *NASA Integrated Management System Policy*.
c. SPD 1280.1, *SSC Management System Policy*.

### P.4 APPLICABLE DOCUMENTS

All references are assumed to be the latest version unless otherwise specified.

a. NPD 1000.0, *NASA Strategic Management and Governance Handbook.*
b. NPD 1001.0, *NASA Strategic Plan.*

c. NPD 1280.1, *NASA Integrated Management System Policy.*
d. NPD 1440.6, *NASA Records Management.*
e. NPD 8730.5, *NASA Quality Assurance Program Policy.*
f. NPR 1441.1, *NASA Records Retention Schedules.*
g. NPR 6000.1, *Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components.*
h. NPR 7120.5, *NASA Space Flight Program and Project Management Requirements.*
i. NPR 7123.1, *NASA Systems Engineering Processes and Requirements.*
j. NPR 8820.2F, *Facility Project Requirements.*
k. OMB Circular A-119, *Federal Participation in the Development and Use of Voluntary Standards.*
l. SOI-8040-0001-FACENG, *SSC Organization Instruction for Construction Configuration Management.*
m. SOI-8040-0002, *Configuration Management Plan for the Project Directorate.*
n. SOI-8080-0015, *SSC Configuration Control of Technical Systems.*
o. SPD 1050.1, *Agreement Preparation, Processing and Management.*
p. SPD 1280.1, *SSC Management System Policy.*
q. SPD 5100.1, *Policy for Ordering Materials and Support Services at SSC.*
r. SPD 1107.1, *SSC/NASA Organization, Mission and Responsibilities.*
s. SPR 1150.1, *Establishment of Charters – Boards/Councils/Committees.*
t. SPR 1400.1, *Document Preparation, Numbering, and Management.*
u. SPR 1440.1, *Records Management Program Requirements.*
v. SPR 8500.1, *SSC Environmental Management System Procedural Requirements.*
w. SPR 8730.1, *Control of Nonconforming Product.*
x. SPR 8739.1, *Software Assurance Procedural Requirements.*
y. SCWI-1280-0001, *Management System Internal Audits.*
z. SCWI-8730-0002, *Corrective Action, Preventive Action and Improvement.*
aa. SCWI-8730-0004, *Instructions to Initiate and Process Form SSC 715 - CPI Report.*
bb. SPLN-1280-0001, *Management System Annual Audit Plan.*
cc. SPLN-7123-0001, *Implementation Plan for Systems Engineering Processes and Requirements, NPR 7123.1.*
dd. SSTD-8070-0001-CONFIG, *SSC Facilities Engineering Documentation Standard.*
ee. ANSI/ISO/ASQ Q9000, *American National Standard, Quality Management Systems – Fundamentals and Vocabulary.*
ff. ANSI/ISO/ASQ Q9001, *American National Standard, Quality Management Systems – Requirements.*
gg. ANSI/ISO/ASQ Q9004, *American National Standard, Quality Management Systems – Guidelines for Performance Improvements.*
hh. SAE AS9100, *Quality Management Systems – Aerospace – Requirements.*

## P.5 MEASUREMENT/VERIFICATION

Compliance with the requirements contained in this document will be verified through audits, observations, and self assessments.

## P.6 CANCELLATION

SPR 1280.1 Rev E, *SSC Management System Requirements* dated May 2011.

Patrick E. Scheuermann
Director

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Approved for public release via NODIS; distribution is unlimited.

# CHAPTER 1.0 THE STENNIS MANAGEMENT SYSTEM (SMS)

## 1.1 General Requirements

a. The SMS is a formally documented system of planned activities established to provide evidence of compliance to the requirements of applicable regulations, codes, standards, specifications, the SSC management policy, and the SSC strategic management objectives.

b. Outsourced processes that affect product or service conformity shall also be included as part of the SMS.

- All of these activities shall be managed in accordance with procedures and written instructions supported with records of objective evidence of satisfactory compliance
- The SMS shall be documented, maintained, and continually improved as a means of ensuring that SSC's products and services conform to the customer specified requirements and to ensure conformance to regulatory and obligatory requirements

c. SSC activities can be represented as a process or set of processes. Processes and their interactions are identified at appropriate levels of the organization in order to manage and document the management system effectively. The following model illustrates the process approach:

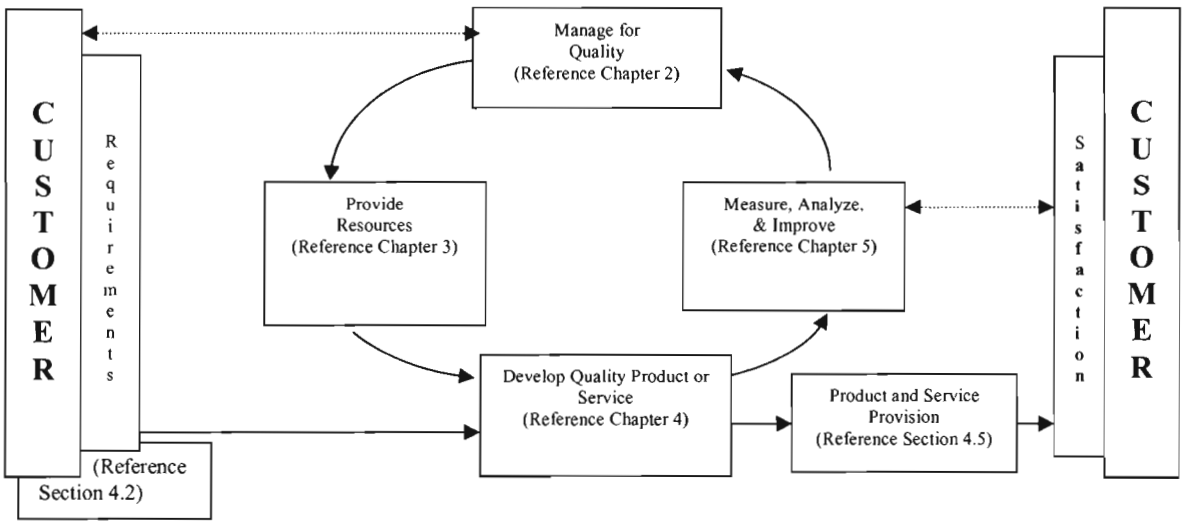


**Figure 1. Process Model for Stennis Management System**

## 1.2 General Documentation Requirements

a. The range and detail of the procedures that form the SMS will depend on the complexity of the work, the methods used, and the skills and training needed by personnel involved in carrying out the activity. Procedures may make reference to work instructions that define how an activity is performed.

b. All NASA/SSC organizations shall establish processes, procedures, documentation and records to implement requirements of the SMS, ANSI/ISO/ASQ Q9001, SAE AS9100, Quality Management Systems – Aerospace – Requirements, and other NASA or SSC directives.

## 1.3 The Stennis Management System Requirements Directive

This directive shall be the top-level document providing information for the responsibilities, procedures, processes, and resources for implementing the SMS in accordance with NPD 1280.1, *NASA Management System Policy*; NPD 8730.5, *NASA Quality Assurance Program Policy*; and SPD 1280.1, *Stennis Management System Policy*. This directive is referred to as SSC's "quality manual" in the ISO 9001 and AS9100 standards. This SPR is a top-level requirements document referencing lower-level documents that provide more detailed requirements and instructions. The organization of this SPR is similar to that found in the ISO 9001 and AS9100 standards, in order to facilitate reference and compliance to the standards. Elements of this SPR are correlated to ISO 9001 and AS 9100 Standards in Appendix C. NPD 8730.5 requires compliance on activities that are both complex and critical. At SSC, complex and critical activity areas are defined as:

- Test Operations in all test areas
- Calibration Lab
- Component Shop
- Gas & Materials Analysis Lab
- High Pressure Gas
- Machine Shop
- Non-Destructive Testing
- Weld Shop

Further details on this subject can be found on the SSC web portal at http://sscintranet.ssc.nasa.gov/iso9000/welcome.html under *SMS Info*, then *AS9100 – SSC's Critical and Complex Activities*

## 1.4 Control of Documents

### 1.4.1 General

a. Documented procedures shall be established and maintained to identify/define, prepare, control, and disposition all documents and data that are within the scope of the SMS including, to the extent applicable, documents of external origin such as standards and customer drawings.

b. Procedural controls shall include requirements to periodically review, update as necessary, and re-approve documents. (Refer to SPR 1400.1, *Document Preparation, Numbering, and Management*.)

c. The SSC Technical Documentation (Tech Doc) System shall be the official receipt, storage, and distribution point for SSC instructional and procedural documents that are within the scope of the SMS.

d. SSC may also employ a variety of other tools such as the Design and Data Management System (DDMS), WindChill, or SharePoint for documentation, configuration, and work process management. The control mechanisms implemented by these other tools shall be appropriate for the intended use.

e. Documentation not archived on Tech Doc shall be searchable and accessible through Tech Doc. Documentation describing document control number nomenclature shall be on Tech Doc. Documentation describing how to search for a document within that system shall be on Tech Doc.

f. The NASA Technical Standards Program's Agency wide Full-Text Technical Standards System serves as the master list for searching for information about various Technical Standards Products, including NASA Preferred Technical Standards. The Agency wide Full-Text Technical Standards System is accessible from the NASA Technical Standards Program's Web site at http://standards.nasa.gov/public

g. Changes to technical standards can have major impacts on the safety and performance of SSC Programs and Projects. The Standards Update Notification System (SUNS) is a Web-based system that provides official notification to NASA's Programs/Projects/Organizations and contractors within the "nasa.gov" domain of changes to standard products being used. The SUNS is also accessible from the NASA Technical Standards Program Web site at http://standards.nasa.gov/public

### 1.4.2 Document and Data Approval and Issue

a. Authorized management or their designee shall review and approve documents and data for adequacy and accuracy prior to release of product or performance of work.
The referencing of a Master Records Index (MRI), SPR 1400.1 or SPR 1440.1 is not an appropriate substitute for listing Records and Forms in a document. The specific records and forms needed to document the performance of the procedure shall be called out.

b. Each organization shall maintain the documents and data or identify the repository location of the documents and data such that each employee who is performing the task can easily retrieve the applicable documents/data for use. These documents can be in the form of any type of media; electronic media is recommended when available.

c. Master lists identifying the current revision status of instructional documents, as well as previous versions authorized for use, shall be readily accessible from the Tech Doc System to preclude the use of invalid and/or obsolete documents.

d. Control measures shall ensure that:

- Pertinent issues of appropriate documents are available at all locations essential to the effective functioning of the SMS
- Invalid and/or obsolete documents are promptly removed from all points of issue or use, destroyed, or otherwise ensured against unintended use
- Any previous/obsolete version of any documents within the SSC system retained by the user (e.g., for limited applicability, for historical purposes, for reference) are marked, or otherwise suitably identified

### 1.4.3 Document and Data Changes

Changes, revisions, and cancellations to documents and data shall be reviewed and approved by appropriate SSC organizations, unless designated otherwise. The SSC organizations performing review and approval will have access to pertinent background information upon which to base their review and approval. Where practical, a description of the change will be identified in the document or in the appropriate attachments.

## 1.5 Control of Records

All records shall be documented and retained, including disposition, in accordance with NPD 1440.6, *NASA Records Management* and NPR 1441.1, *NASA Records Retention Schedules*. Where appropriate, other federal or state retention requirements may be also applied.

Records may be filed in any sequenced manner that makes them readily identifiable and retrievable by the owner and users, but the NPR 1441.1 numbering system and retention information must listed be on every file. Labeling and contents must remain legible.

### 1.6 Configuration Management

Procedures for configuration management shall be documented for appropriate processes in SSC organizations. Various aspects of configuration management can be found in *various SSC documents such as SSTDs, and SOIs.* (Refer to SOI-8040-0002, *Configuration Management Plan for the Project Directorate*, SSTD-8070-0001-CONFIG, *SSC Facilities Engineering Documentation Standard,* SOI-8040-0001-FACENG, *SSC Organization Instruction for Construction Configuration Management, and* SOI-8080-0015, *SSC Configuration Control of Technical Systems,* NASA-STD-0005 *NASA Configuration Management (CM) Standard)*

### 1.7 Risk Management

SSC Management shall maintain processes for risk management in accordance with NPR 8000.4A, *Agency Risk Management Procedural Requirements* and NASA/SP-2011-3422 *NASA Risk Management Handbook* and the Stennis documents that address those requirements (SPD 7120.1 *SSC Institutional Risk Management,* and SPR 7120.1 *SSC Risk Management Procedural Requirements).* The processes shall include:

- Assignment of responsibilities for risk management
- Definition of risk criteria (e.g., likelihood, consequences, risk acceptance)
- Identification, assessment and communication of risk throughout product realization
- Identification, implementation and management of action to mitigate risks that exceed the defined risk acceptance criteria
- Acceptance of risk remaining after implementation of mitigating actions

## CHAPTER 2.0 MANAGEMENT RESPONSIBILITY

### 2.1 Management Commitment

a. SSC senior management shall provide evidence of its commitment to the development and implementation of the SMS and continually improving it by:

- Communicating to the organization the importance of meeting customer as well as statutory and regulatory requirements
- Establishing the management policy
- Ensuring that strategic mission objectives are established and measured
- Conducting management reviews
- Ensuring the availability of resources

b. SSC senior management shall ensure the integrity of the SMS is maintained when changes are planned and implemented.

c. Senior management shall ensure that appropriate communication processes are established within SSC and that communication takes place regarding the effectiveness of the SMS.

## 2.2 Customer Focus

a. Management shall ensure that customer requirements are understood and met with the aim of enhancing customer satisfaction.

b. Customer agreements shall be developed in accordance with SPD 1050.1, *Agreement Preparation, Processing and Management.*

## 2.3 SSC Management Policy

The SSC Management Policy is described in SPD 1280.1, *SSC Management System Policy.*

## 2.4 Planning

### 2.4.1 Strategic Management Objectives

a. The top level SSC Strategic Management Objectives are documented in SPLN-1280-0003.

b. SSC Environmental Objectives are developed and documented in accordance with SPR 8500.1, *Environmental Management System Procedural Requirements.*

### 2.4.2 Stennis Management System Planning

Where appropriate, managers shall develop plans to achieve the SSC Strategic Management Objectives and SSC Environmental Objectives.

## 2.5 Responsibility, Authority, and Communication

### 2.5.1 SSC Center Director

a. SSC's Management System Requirements are owned by the Center Director who shall ensure that they are reviewed periodically.

b. The Center Director shall ensure SSC products and services meet customers' requirements and that the processes and procedures applied to product and service development and delivery are defined, followed correctly, and maintained.

c. The Director shall provide sufficient resources (including trained personnel) as required for management, performance of work, verification, and auditing functions.

d. The Center Director shall appoint by letter a Management System Representative (MSR) who, irrespective of other duties, shall have responsibility and authority to ensure that the SMS is established and maintained in accordance with NASA requirements, SSC requirements, and the ISO 9001 standard.

### 2.5.2 Management Councils and Boards

Management Councils and Boards, within the scope of their responsibilities, can assess opportunities for improvement and recommend action to the Center Director. Also, they can recommend focus areas for internal audits.

### 2.5.3 Management System Representative (MSR)

a. As an appointee of the Center Director, the MSR shall have direct access to the Director and other managers on matters pertaining to the SMS.

b. The MSR shall:

- Ensure that processes needed for the SMS are established, implemented and maintained
- Report to the Center Director and Senior Management on the performance of the SMS and any need for improvement
- Ensure the promotion of awareness of customer requirements throughout the organization
- Provide the conduit whereby key information regarding the SMS flows to Senior Management from other sources outside of the management review
- Serve as the primary liaison with external parties on matters pertaining to the SMS and scope of the ISO 9001 registration and AS9100 compliance
- Maintain this directive
- Have the organizational freedom to resolve matters pertaining to the SMS

### 2.5.4 All Managers

a. Managers of each NASA and contractor organization shall be responsible for defining, communicating, implementing, and maintaining the SMS within their individual work areas and ensuring that their employees operate in strict compliance with ISO 9001 and other applicable standards, regulations, specifications, and procedures.

b. Managers shall support their employees by removing barriers that prevent quality in any work process.

c. Managers shall establish and maintain work processes that consistently yield the desired product and service quality.

d. Managers shall conduct self assessments by surveying processes and operations independent of the internal audit functions, to enable them to maintain an independent awareness of the internal processes and operations in their area of responsibility.

e. Managers shall review internal audit results, corrective actions, preventive actions, and improvements for applicability to their organization.

f. Managers shall ensure that the responsibilities and authorities are defined and communicated within the organization.

### 2.5.5 All Employees

a. All employees shall be responsible for the quality of their work and for understanding and complying with the requirements of this and other NASA and SSC documents.

b. Employees shall be responsible for stopping the work process or making appropriate notification when the process is unsafe or when the required quality is not being produced. Any employee may initiate action by informing their immediate supervisor or initiating a Corrective Action, Preventive Action, and Improvement (CPI) report for any nonconformity or potential nonconformity by initiating a CPI form SSC-715 (Refer to SCWI-8730-0004, *Instructions to Initiate and Process Form SSC 715 - CPI Report*).

## 2.6 Management Review

### 2.6.1 General

a. Senior Management shall review the SMS to ensure its continuing suitability, adequacy, and effectiveness.

b. This review shall include assessing opportunities for improvement and the need for changes to the SMS, including the quality policy and quality objectives.

c. Updates on the status of the SMS shall be reported to Senior Management periodically, at least once every 12 months. In order to ensure SSC meets the intended requirements of ISO 9001 5.6.1 (Management Review), 5.6.2 (Review Inputs), and 5.6.3 (Review Outputs), the following shall be performed by each Directorate:

- Center and Directorate Management shall determine more frequent review cycles appropriate to their Directorate activities that will ensure suitability, adequacy and effectiveness of the SMS within each Directorate

- Presentations, reports, staff meetings, meeting minutes, and email messages are acceptable ways to convey the message and support current events. However, they do not replace official/formal periodic reviews to Senior Management

### 2.6.2 Review Input

Within each review cycle, as determined by each Directorate above, the status update submitted by each Directorate for Senior Management review shall include information on:

- Information on results of audits
- Customer feedback
- Process performance and product conformity
- Status of preventive and corrective actions
- Follow-up actions from previous management reviews
- Progress against our goals and objectives
- Changes that could affect the SMS
- Recommendations for improvement

### 2.6.3 Review Output

The output from management reviews shall include any decisions and actions related to:

- Improvement of the effectiveness of the SMS and its processes
- Improvement of the products or services related to customer requirements
- Resource needs

### 2.6.4 Records Management

Evidence of the inputs/updates to Senior Management (per section 2.6.2) and output from Senior Management review (per section 2.6.3) shall be uploaded to the Joint Management Council (JMC) website by the Executive Secretary of the JMC within 15 working days of the JMC meeting in accordance with NPR 1441.1, *NASA Records Retention Schedules* (for ISO 9001 purposes, three years worth of records need to be available). The functions responsible for the review inputs/outputs are responsible for providing a copy of such records to the appropriate records custodian. Any action items resulting from the Senior Management review will be uploaded into the current SSC action item tracking system by the Executive Secretary of the JMC.

# CHAPTER 3.0 RESOURCE MANAGEMENT

## 3.1 Provision of Resources

SSC Management shall determine and provide the resources necessary to implement and maintain the SMS; to continually improve the effectiveness of the SMS; and to enhance customer satisfaction by meeting or exceeding customer requirements.

## 3.2 Human Resources

### 3.2.1 General

a. Management shall ensure that personnel performing work affecting conformity to product or service requirements shall be competent on the basis of appropriate education, training, skills, and experience.

b. Organizational charters shall be documented in accordance with SSC Stennis Policy Directives (SPDs).

c. Employee responsibilities and authority shall be defined and documented in employee job descriptions, performance plans, and process and/or procedural documentation.

### 3.2.2 Competence, Awareness, and Training

a. SSC shall maintain documented procedures that identify the competency level and training needs of the organization.

b. Appropriate training of personnel shall be provided. [Refer to SSC SPDs, Stennis Procedural Requirements (SPRs), and Stennis Common Work Instruction (SCWIs).]

c. Appropriate records of education, training, skills, and experience shall be maintained in accordance with NPR 1441.1, *NASA Records Retention Schedules.*

d. Personnel performing work affecting conformity to product or service requirements will be competent on the basis of appropriate education, training, skills, and experience. Management shall determine the necessary competence for personnel.

e. Management shall provide training or take other actions to achieve the necessary competence and evaluate the effectiveness of the actions taken.

f. Personnel shall be informed of the relevance and importance of their activities and how they contribute to the achievement of the strategic management objectives and environmental objectives.

### 3.3 Infrastructure

SSC Management shall determine, provide, and maintain the infrastructure needed to achieve conformity to product requirements. Infrastructure includes, as applicable:

- Buildings, workspace, and associated utilities
- Process equipment (both hardware and software)
- Supporting services (such as transport or communication or information systems)

### 3.4 Work Environment

SSC Management shall determine and manage the work environment needed to achieve conformity to product requirements. These include, but are not limited to: noise, temperature, humidity, lighting or weather.

## CHAPTER 4.0 PRODUCT OR SERVICE REALIZATION

### 4.1 Planning of Product or Service Realization

a. SSC Management shall plan and develop the processes necessary for product or service realization. This includes the required verification, validation, monitoring, measuring, inspection and test activities specific to the product or service.

b. Planning of product or service realization shall be consistent with the requirements of the other processes of the SMS.

c. NASA requires that Centers have a well-defined system for integrated planning, approval, and implementation of programs to ensure they are consistent with Agency and Center strategic planning, available resources, and conducted in accordance with established commitments. SSC shall apply the principals of NPR 7120.5, *Program and Project Management Processes and Requirements*; NPR 7123.1, *NASA Systems Engineering Procedural Requirements*; and NPR 8820.2 *Facility Project Requirements* as applicable. NOTE: See the SCWI-8080-0001, Stennis Common Work Instruction for Propulsion Test Project Management for the SSC-specific policy related to project management & technical implementation of projects managed by the Project Directorate.

d. For programs & projects involving more than one Center, the lead organization shall develop documentation to describe the hierarchy and reconciliation of Center plans implementing NPR 7120.5. *Program and Project Management Processes and Requirements:* NPR 7123.1, NASA *Systems Engineering Procedural Requirements* and NPR 8820.2 *Facility Project Requirements* as applicable.

e. SSC shall maintain documented procedures and instructions for the management, operation, and performance of engineering and science projects, propulsion test projects, and facility projects.

f. For technical systems that contain software, SSC shall ensure that software developed internally within the Center or acquired complies with NPD 2820.1, NASA *Software Policy* and NPR 7150.1, NASA *Software Engineering Requirements*.

## 4.2 Customer Related Processes

### 4.2.1 Requirements Definition

Customer expectations and requirements including those for delivery and post-delivery activities; expectations and requirements not stated by the customer but necessary for specified or intended use, where known; statutory and regulatory requirements applicable to products; and any additional requirements considered necessary by SSC shall be documented in Customer Agreements developed in accordance with SPD 1050.1, *Agreement Preparation, Processing and Management*; in detailed technical requirements developed in accordance with NPR 7123.1, *NASA Systems Engineering Processes and Requirements*; and/or in facility project documents developed in accordance with NPR 8820.2F, *Facility Project Requirements*.
Post delivery activities include, but are not limited to: warranty provisions, maintenance services, and supplementary services (example: recycling or final disposal).

### 4.2.2 Requirements Review

a. SSC shall periodically review the requirements related to products or services.

b. At a minimum, the reviews shall be conducted prior to SSC's commitment to supply a product or service to a customer (e.g., submission of tenders, acceptance of contracts or orders, acceptance of changes to contracts or orders).

c. The reviews shall ensure that product or service requirements are defined, contract or order requirements differing from those previously expressed are resolved, risks have been evaluated, and that SSC has the ability to meet the defined requirements.

d. Records of the results of these reviews and actions arising from these reviews shall be maintained.

e. Where the customer provides no documented statement of requirement, the customer requirements shall be confirmed and documented by SSC before acceptance.

f. Where product or service requirements are changed, SSC shall ensure that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

### 4.2.3 Customer Interface

Effective arrangements shall be made for communicating with customers in relation to product or service information. These include inquiries, contracts, or order handling, including amendments, customer feedback, as well as customer complaints.

## 4.3 Design and Development

a. SSC design and development procedures shall be developed and maintained to control and verify the design of all products (hardware and software) and facilities, as well as control Research, Technology and Development activities (RT&D), within the scope of SSC's SMS to ensure that specified requirements are met.

b. Written procedures pertaining to design of propulsion hardware and associated ground/test support equipment shall be developed and maintained. These procedures shall include processes necessary to develop logical models and system architectures, as well as development of the design from concept through the full detailed design phase and design release.

### 4.3.1 Design and Development Planning

a. SSC shall define and document how requirements will be met for each project, program, or activity within its defined scope.

b. Program/Project and quality planning shall be performed in accordance with NPR 7120.5, *NASA Program and Project Processes and Requirements*; and NPR 8820.2F, *Facility Project Requirements*; and shall be consistent with all other requirements of the SMS. Program/Project and quality planning may be documented in a format to suit the method of operation.

c. Design and development activities shall be assigned to qualified personnel equipped with adequate resources.

d. SSC shall prepare plans commensurate with contracts or Customer Agreements for each design and development activity.

e. The plans shall describe or reference these design and development activities and define responsibility for their implementation.

f. The design and development stages and the appropriate reviews, verification, and validation shall be determined during planning. These items may be conducted and recorded separately, or simultaneously, depending upon governing Agency and SSC requirements and procedures.

g. The plans for propulsion test projects shall be accomplished in accordance with established procedures.

h. In the formulation phase, SSC Program/Project managers shall evaluate the use of non-Government voluntary consensus standards in lieu of Government-unique standards in their procurements and regulatory activities, except where inconsistent with law or otherwise impractical, per OMB Circular A-119, *Federal Participation in the Development and Use of Voluntary Standards*, and SSC SSTDs. Use of non-Government voluntary consensus standards is not required where they would fail to serve NASA's program/project needs.

i. Non-flight hardware and propulsion test facility design planning shall be accomplished in accordance with documented SSC procedures.

j. Plans shall be updated as the design evolves.

### 4.3.2 Design and Development Inputs

a. Design and development inputs shall be identified, documented, and reviewed by each appropriate department or office for adequacy and accuracy. The inputs include functional and performance requirements, applicable statutory and regulatory requirements, information derived from previous similar designs (where applicable), and other requirements essential for design and development.

b. Ambiguous, incomplete, or conflicting requirements shall be resolved with those responsible for imposing the requirements.

c. The results of the contract review shall be considered during design input.

d. Any changes agreed to shall be documented and approved.

### 4.3.3 Design and Development Outputs

a. Design and development outputs shall be documented and expressed in terms suitable for verification and validation against the design and development inputs.

b. The design outputs shall meet the design and development input requirements, contain or reference acceptance criteria, and identify critical design characteristics crucial for the safe and proper functioning of the product. This includes appropriate information for purchasing,

production, and service provision, as well as, operating, storage, handling, maintenance, and disposal requirements.

c. All design output documentation shall be reviewed and approved prior to release.

### 4.3.4 Design and Development Review

a. At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangements to evaluate the ability of the results of design and development to meet requirements, to identify any problems and propose necessary actions, and to authorize progression to the next stage.

b. Participants in such reviews shall include representatives of functions involved with the design and development stages being reviewed.

c. Records of the results of the reviews and any necessary actions shall be maintained.

### 4.3.5 Design and Development Verification

a. Verification shall be performed in accordance with planned arrangements to ensure that the design and development outputs have met the design and development input requirements.

b. Records of the results of the verification and any necessary actions shall be maintained.

### 4.3.6 Design and Development Validation

a. Design and development validation shall be performed in accordance with planned arrangements to ensure that the resulting product is capable of meeting the requirements for the specified application or intended use, where known.

b. Wherever practical, validation shall be completed prior to the delivery or implementation of the product.

c. Records of the results of validation and any necessary actions shall be maintained.

d. At completion of design or development validation, the appropriate organization shall ensure that reports, calculations, test results, etc. demonstrates that the product or service definition meets the specified requirements for all operational conditions, where applicable.

e. Where necessary for verification and validation, tests shall be planned, controlled, reviewed, and documented to ensure and prove the following:

- Test plans/specifications identify the test article and the resources being used, test objectives and conditions, parameters to be recorded, and relevant acceptance criteria
- Test procedures describe the method of operation, performance of the test, and results recording
- The correct configuration standard of the product is submitted for the test
- The requirements of the test plan and the test procedures are observed; and
- The acceptance criteria are met

### 4.3.7 Design and Development Change Control

a. Design and development changes shall be identified and records maintained.

b. The changes shall be reviewed, verified, and validated, as appropriate, and approved before implementation.

c. The review of design and development changes shall include evaluation of the effect of the changes on constituent parts and products already delivered.

d. Records of the results of the review of changes and any necessary actions shall be maintained.

e. Changes and modifications to designs and specifications shall be in accordance with planned arrangements and documented SSC procedures.

f. Configuration control shall be applied, with the optimum degree of uniformity, to all programs and projects procured through contracts or acquired through in-house activities.

g. The configuration and data management activities that fulfill the requirements of NPR 7120.5, *NASA Program and Project Management Processes and Requirements* shall be documented and implemented in accordance with SSC procedures.

## 4.4 Purchasing

### 4.4.1 Purchasing Process

a. Management shall maintain documented procedures to ensure that purchased products and services conform to specified requirements. (Refer to SSC SPDs.)

b. Outsourced processes that can affect product conformity shall be also controlled by procedures.

c. Management shall maintain documented procedures to ensure the quality of all products purchased from suppliers, including outsourced processes.

d. Suppliers and outsourced processes shall be evaluated and selected based on their ability to supply product in accordance with the specified requirements.

e. Criteria for selection, evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary action arising from the evaluation shall be maintained.
f. Contract Specialists shall review the Excluded Parties List System (EPLS) at http://www.epls.gov, which includes information regarding entities debarred, suspended, proposed for debarment, excluded or disqualified under the non-procurement common rule, or otherwise declared ineligible from receiving Federal contracts, certain subcontracts, and certain Federal assistance and benefits.

g. The Contracting Officer will review supplier performance. Records of these reviews shall be used as a basis for establishing the level of controls to be implemented; and define the necessary actions to take when dealing with suppliers that do not meet requirements.

h. SSC personnel shall adhere to the following regulations and guidelines for all SSC procurements:

- NASA procurements shall be conducted in accordance with the Federal Acquisition Regulation (FAR) and the NASA FAR Supplement.
- Contractor procurements shall be conducted in accordance with the contractor's company purchasing procedures and standard commercial practices and contain appropriate FAR flow-down clauses.
- Where appropriate and beneficial to NASA, contractors shall be contractually required to have quality systems that comply with or shall be registered to the ISO 9001 standard or AS9100.

    i. Efforts to meet the "comply with or shall be registered to" as mentioned above, shall be independent of NASA's effort to maintain its own "Comply with or Register to" status. (Contractors bound by this requirement must have their own quality management system and cannot rely upon NASA-SSC's system to meet this requirement)

### 4.4.2 Purchasing Information

a. SSC shall review and approve purchasing documents for adequacy of the specified purchase requirements prior to their communication to the supplier.

b. Purchasing documents shall clearly describe the product ordered including, where applicable:

- The type, class, grade, or other precise identification
- The title of other positive identification, and applicable issues of specifications, drawings, process requirements, inspection instructions, and other relevant technical data, including

requirements for approval or qualification of product, procedures, process equipment, and personnel
- The title, number, and issue of the standard to be applied

### 4.4.3 Verification of Purchased Product

a. SSC shall ensure that the purchased product meets specified purchase requirements.

b. Where SSC or its customer proposes to verify the purchased product at the supplier's premises, SSC shall specify verification arrangements and the method of product release in the purchasing documents.

### 4.4.4 Assessment of Contractors

a. SSC shall evaluate and select contractors on the basis of their ability to meet all specified requirements including performance, cost, and schedule, as well as the management system and any specific quality assurance requirements. The various methods used in this assessment are:

- Quality System Evaluations and/or Surveys
- Past Performance Evaluations and Customer Questionnaires
- Capability or Mission Suitability Evaluations
- NASA Contractor Surveillance Plans

b. Criteria for selection, evaluation, and re-evaluation shall be established in writing.

c. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained in the contract file.

d. The type and extent of control exercised over contractors shall be defined in the appropriate contract file.

e. The type and extent of control shall be dependent upon the type of product, the effect of the purchased product or services on subsequent product realization, and the impact on the quality of the final product.

## 4.5 Production and Service Provision

### 4.5.1 Control of Production and Service Provision

a. Procedures and instructions shall be developed and maintained by responsible organizations to ensure that functional activities are performed under controlled conditions. Controlled conditions include, as applicable:

- The availability of information that describes the characteristics of the product
- The availability of work instructions, as necessary
- The use of suitable equipment
- The availability and use of monitoring and measuring equipment
- The implementation of monitoring and measurement
- The implementation of product release, delivery, and post-delivery activities
- The provision for the prevention, detection, and removal of foreign objects
- Monitoring and control of utilities and supplies such as water, compressed air, electricity, and chemical products to the extent they affect product or service quality

b. Process controls for hardware and software products shall be carried out in accordance with planned arrangements and documented SSC.

c. Written procedures for configuration control of construction and procurement projects that affect the facilities configuration baseline shall be developed and maintained.

d. Production operations shall be carried out in accordance with approved drawings, parts lists, process flow charts, etc., as applicable.

e. People authorized to approve changes to production processes shall be identified.

f. The organization shall identify and obtain acceptance of changes in accordance to established agreements or requirements.

g. Changes affecting processes, production equipment, tools and programs shall be documented and procedures shall be available to control their implementation.

h. The results of changes to production processes shall be assessed to confirm that the desired effect has been achieved without adverse effects to product or service quality.

i. Production equipment, tools, and programs shall be validated prior to use, and maintained and inspected periodically according to documented procedures.

j. When planning to temporarily transfer work to a location outside the NASA/SSC facilities, the responsible organization shall define the process to control and validate the quality of the work.

### 4.5.2 Validation of Processes for Production and Service Provision

a. Processes for production and service provision shall be validated where subsequent monitoring or measurement and, as a consequence, deficiencies become apparent only after the product is in use or the service has been delivered.

b. Validation shall demonstrate the ability of these processes to achieve planned results. Arrangements 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

### 4.5.3 Identification and Traceability

a. Where appropriate, SSC shall maintain documented procedures for identifying the product throughout product realization.

b. SSC shall maintain documented procedures for unique identification of individual products or batches requiring traceability.

c. The organization shall maintain the identification of the configuration of the product in order to identify any difference between the actual configuration and the agreed configuration.

d. The organization shall identify the product status with respect to monitoring and measurement requirements throughout product realization.

e. Where traceability is a requirement, SSC shall control the unique identification of the product and maintain records.

### 4.5.4 Customer Property

a. SSC shall exercise care with property belonging to an external customer while it is under SSC's control.

b. To ensure control of customer-supplied products, SSC shall establish and maintain documented procedures for the control, verification, storage, and maintenance and return of any customer-supplied products.

c. Unless specified otherwise by the customer, all customer-supplied products, from time of receipt until the time they are transferred back to the customer, shall be handled in accordance with the requirements and procedures applicable to SSC hardware of the same classification.

d. External customer-supplied products that are lost, damaged, or are found to be otherwise unsuitable for use shall be formally reported to the customer and records maintained.

e. Customer property may include intellectual property and personal data. Proprietary/confidential documentation received by SSC shall be controlled in accordance with SSC documented procedures.

### 4.5.5 Preservation of Product

SSC shall follow NASA's documented procedures for identification, handling, packaging, storage, preservation, and delivery of products that are within the scope of the SMS. (Refer to NPR 6000.1, *Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components*.). SSC shall preserve the product during internal processing and delivery to the intended destination in order to maintain conformity to requirements.

## 4.6 Control of Monitoring and Measuring Equipment

a. Monitoring and measurement activities to be undertaken and the monitoring and measuring equipment needed to provide evidence of conformity of product to requirements shall be controlled in accordance with planned arrangements and documented SSC procedures.

b. SSC shall maintain a register of the monitoring and measuring devices, and define the processes employed for their calibration including details of equipment type, unique identification, location, frequency of checks, check method, and acceptance criteria.

c. Documented procedures shall ensure that monitoring and measurement can be accomplished and are accomplished in a manner that is consistent with the monitoring and measurement requirements.

d. The organization shall ensure that environmental conditions are suitable for the calibrations, inspections, measurements, and tests being carried out.

e. To ensure valid results, measuring equipment shall be:

- Calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; or to a recorded basis for calibration or verification where no such standards exist
- Adjusted as necessary
- Have identification in order to determine its calibration
- Safeguarded from adjustments that would invalidate the measurement result
- Protected from damage and deterioration during handling, maintenance and storage

f. SSC shall assess and record the validity of the previous measuring results when the equipment is found not to conform to requirements.

g. SSC shall take appropriate action on the equipment and any product affected.

h. Records of the results of calibration and verification shall be maintained.

i. When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application shall be validated. SSC shall confirm the ability of computer software to satisfy the intended application, including verification and configuration management to maintain its suitability for use.

j. Software validation shall be undertaken prior to initial use and reconfirmed as necessary.

## CHAPTER 5.0 MEASUREMENT, ANALYSIS, AND IMPROVEMENT

### 5.1 General

SSC shall plan and implement the monitoring, measurement, analysis and improvement processes necessary to:

- Demonstrate that products and/or services conform to product requirements
- Ensure the SMS conforms to applicable standards and directives
- Continually improve the effectiveness of the SMS

### 5.2 Monitoring and Measurement

#### 5.2.1 Customer Satisfaction

a. Directors/project managers shall monitor information relating to customer perception as to whether SSC has met the customer's requirements.

b. Active methods shall be employed to obtain customer feedback. Active measures may include telephonic and email follow-up to mailed survey requests.

c. Customer satisfaction shall be evaluated via means & measures documented in SSC policy and procedures. These include, but are not limited to: written surveys, electronic surveys, customer data, lost business analysis, compliments, and various presentations and reports.

#### 5.2.2 Internal Audit

a. In accordance with section 8.8.2 of the ISO 9001 and AS9100 Standards, SSC shall conduct internal audits at planned intervals to determine whether the system, called the Stennis Management System (SMS):

- Conforms to the planned arrangements/contractual requirements, to the requirements of ISO 9001 and AS9100 (where applicable to critical and complex processes), and to the quality management system requirements.
- Is effectively implemented and maintained.

b. A NASA person shall be appointed to plan and implement internal audits to the SMS.

The SMS internal audits are performed at planned intervals to verify:

- Conformity to the SMS.
- That the SMS is effectively implemented and maintained.
- Continual improvement and effectiveness of the SMS.

c. A documented procedure shall be established to define the responsibilities and requirements for planning and conducting audits, establishing records and reporting results.

d. NASA and Contractor work units shall have their own internal audits to self-assess conformance to the SMS on an annual basis. Such action shall be independent of NASA-SSC audit activity.

### 5.2.3 Monitoring and Measurement of Processes

a. Suitable methods for monitoring and, where applicable, measurement of the SMS processes shall be defined by management. These methods must demonstrate the ability of the processes to achieve planned results.

b. When planned results are not achieved, corrective and preventive action shall be taken, as appropriate, to ensure conformity of products or services. This includes actions to correct existing deficiencies and actions taken to prevent future occurrences.

### 5.2.4 Monitoring and Measurement of Products or Services

a. Documented procedures shall be maintained for inspection and testing activities to verify that the specified requirements for products or services are met.

b. The required inspection and testing, and the records to be established, shall be documented.

c. Product or service characteristics shall be monitored and measured to verify that requirements have been met.

d. Product or service requirements verification shall be carried out at appropriate stages of the product or service realization process in accordance with planned arrangements.

e. Evidence of conformity with the acceptance criteria shall be maintained.

f. Records shall indicate the person(s) authorizing product release or service delivery to the customer.

g. Product release and service delivery to the customer shall not proceed until all the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority, and where applicable, by the customer.

h. Measurement requirements for product or service acceptance shall be documented.

i. Where applicable, a process shall be defined for the inspection, verification, and documentation of a representative item from the first production run of a new part; or following any subsequent change that invalidates the previous first article inspection results.

### 5.3 Control of Nonconforming Product or Service

a. Documented procedures shall be maintained to ensure that if a product or service does not conform to specified requirements; it is prevented from unintended use, delivery, or installation. (Refer to SPR 8730.1, *Control of Nonconforming Product*).

b. Controls shall provide for identification, documentation, evaluation, segregation, and disposition of nonconforming product/services and for notification of the customer.

c. Records for the identification, documentation, evaluation, segregation, and disposition of nonconforming product/services shall be maintained.

d. Actions appropriate to the effects or potential effects of nonconformity shall be taken when non-conforming product is detected after delivery to or use by the customer.

### 5.4 Data Analysis

a. SSC shall determine, collect, and analyze appropriate data to demonstrate the suitability and effectiveness of the SMS and to evaluate where continual improvement of the effectiveness of the SMS can be made. This includes data generated as a result of monitoring and measurement and from other relevant sources.

b. The analysis of data shall provide information relating to customer satisfaction, conformity to product requirements, characteristics and trends of processes and products including opportunities for preventive action, and suppliers.

### 5.5 Corrective Action, Preventive Action, and Improvement

a. The organization shall take action to eliminate the cause of nonconformities in order to prevent recurrence, including reviewing the effectiveness of the corrective action taken.

b. The organization shall determine action to eliminate the causes of potential nonconformities in order to prevent their occurrence, including reviewing the effectiveness of the preventive action taken.

c. A documented procedure shall be utilized to ensure consistent and effective methods for correction of nonconformance, effective handling of customer concerns or complaints, prevention of recurrence of nonconformance, elimination of causes of potential nonconformities, making technical decisions, and documentation of improvements.
(Refer to SCWI-8730-0002, *Corrective Action, Preventive Action and Improvement*).

d. Corrective action requirements shall be flowed down to contractors and/or suppliers when it is determined that the contractor or supplier is responsible for the root cause.

e. SSC shall continually improve the effectiveness of the SMS through the use of the management policy, strategic management objectives, audit results, analysis of data, corrective and preventive actions, and management reviews.

## APPENDIX A. ACRONYMS

| | |
|---|---|
| **ANSI** | American National Standards Institute |
| **ASQ** | American Society for Quality |
| **AS** | Aerospace Standard |
| **CPI** | Corrective Action, Preventive Action, and Improvement |
| **DDMS** | Design and Data Management System |
| **FAR** | Federal Acquisition Regulation |
| **ISO** | Reference to the International Organization for Standardization |
| **MSR** | Management System Representative |
| **NASA** | National Aeronautics and Space Administration |
| **NPD** | NASA Policy Directive |
| **NPR** | NASA Procedural Requirements |
| **NODIS** | NASA Online Directives and Information System |
| **OMB** | Office of Management & Budget |
| **RT&D** | Research, Technology & Development |
| **S&MA** | Safety & Mission Assurance |
| **SCWI** | Stennis Common Work Instruction |
| **SDL** | Stennis Distribution List |
| **SLP/SSLP** | Stennis System Level Procedure |
| **SMS** | Stennis Management System |
| **SOI** | Stennis Organization Instruction |
| **SPD** | Stennis Policy Directive |
| **SPR** | Stennis Procedural Requirements |
| **SSC** | Stennis Space Center |
| **SUNS** | Standards Update Notification System |

## APPENDIX B. DEFINITIONS

In general, the definitions given in ANSI/ISO/ASQ Q9000-2000 apply. However, the following definitions are offered to assist the user in understanding the application of the ISO 9001 quality standard at SSC.

**Customer:** The recipient of a product or service provided by SSC.

**Customer Agreement:** The documented agreement between SSC and the Customer or Partner establishing the requirements of a desired service or collaboration, and the manner in which the desired service or collaboration is provided. Customer Agreements may take many forms, such as a Reimbursable or Non-reimbursable Space Act Agreement, a Task Agreement, a Memorandum of Understanding, etc.

**Design Review:** A documented, comprehensive, and systematic examination of a design to evaluate its capability to fulfill the requirements; to identify problems, if any; and to propose the development of solutions. A design review can be conducted at any stage of the design process, but should, in any case, be conducted at the completion of the design stage.

**Instructional and Procedural Documentation (Documents):** All NASA/SSC policies, instructions, and procedures that are specific and/or essential to performance of NASA/SSC functions, services and operations and which shall remain in place and effect until revised or cancelled regardless of the preparing or performing organization or contractor. Such documentation is considered the property of NASA/SSC and provides for the continuity of NASA/SSC business and operations.

**ISO:** Borrowed from the Greek word, *isos*, meaning "equal." It refers to the International Organization for Standardization, which was founded in 1946 to develop a common set of manufacturing, trade, and communication standards. Although this organization is commonly referred to as ISO, *ISO* technically is not an acronym for anything.

**Management System Representative (MSR):** A person who is responsible for ensuring the effective establishment, implementation, and maintenance of the SMS, and who represents the Center Director in this capacity.

**Master List:** Listing of work instructions, forms, etc. used to perform tasks. It contains the document's number and revision level.

**Product:** Results of activities or processes. A product may include service, hardware, processed materials, software, or a combination thereof. A product can be tangible (e.g., assemblies or processed materials), intangible (e.g., knowledge or concepts), or a combination thereof. For the purposes of the SMS, the term "product" applies to the intended product offering only, and not to unintended by-products affecting the environment.

**Project Manager:** The Project Lead and Primary Point of Contact (POC) who provides the interface between the Customer or Partner and Stennis Space Center, i.e. all Stennis Space Center organizations. The Project Manager may delegate Point of Contact duties to alternate persons.

**Quality:** The degree to which a set of inherent characteristics fulfils requirements.

**Quality Management:** The coordinated activities to direct and control an organization with regards to quality. All activities of the overall management function that determine the management policy, objectives, and responsibilities, and that implement them by means such as planning, quality control, quality assurance, and improvement.

**Quality Manual:** The organization's document that describes the scope of the quality management system, the quality management system procedures, and the interaction of the processes of the quality management system. The quality manual for SSC is SPR 1280.1, *Stennis Management System Requirements.*

**Quality Objective:** Something sought, or aimed for, related to quality. The top level quality objectives for SSC are formally expressed by top management in SPLN-1280-0003, *SSC Strategic Management Objectives*.

**Quality Policy:** The overall intentions and direction of an organization with regard to quality as formally expressed by top management in SPD 1280.1, *SSC Management System Policy*.

**Quality Record:** A document or data item that furnishes objective evidence of activities performed or results achieved. A quality record substantiates the fulfillment of quality requirements or the effectiveness of an activity's operation. Some of the purposes of quality records are demonstration, traceability, preventive action, or corrective action. A quality record can be written or stored on any data medium.

**Quality Management System:** The organizational structure, procedures, processes, and resources needed to implement quality management. SSC's quality management system is known as the Stennis Management System or SMS.

**Stennis Management System (SMS):** The interrelated methods through which top management directs and controls the NASA/SSC organization.

**Strategic Management Council (SMC):** The SMC is composed of senior managers from throughout SSC, and manages the implementation, maintenance, and effectiveness of the SMS. This management team renders decisions, assigns actions, and tracks those actions to closure.

**Top Management:** The person or group of people who directs and controls an organization at the highest level.

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

**Verification:** Confirmation by examination and provision of objective evidence that specified requirements has been fulfilled.

## APPENDIX C. CORRELATION OF SPR 1280.1 TO ISO 9001 AND AS 9100 STANDARDS

| **SPR 1280.1** | **Title** | | **ISO 9001 Clause** | **AS 9100 Clause** | **Title** |
|---|---|---|---|---|---|
| **Chapter 1** | **The Stennis Management System (SMS)** | | **4** | **4** | **Quality Management System** |
| 1.1 | General Requirements | | 4.1 | 4.1 | General Requirements |
| | | | 4.2 | 4.2 | Documentation Requirements |
| 1.2 | General Documentation Requirements | | 4.2.1 | 4.2.1 | General |
| 1.3 | The Stennis Management System Requirements Directive | | 4.2.2 | 4.2.2 | Quality Manual |
| 1.4 | Control of Documents | | 4.2.3 | 4.2.3 | Control of Documents |
| 1.4.1 | General | | | | |
| 1.4.2 | Documentation and Data Approval and Issue | | | | |
| 1.4.3 | Document and Data Changes | | | | |
| 1.5 | Control of Records | | 4.2.4 | 4.2.4 | Control of Records |
| 1.6 | Configuration Management | | n/a | 4.3 | Configuration Management |
| 1.7 | Risk Management | | n/a | 7.1.2 | Risk Management |
| **Chapter 2** | **Management Responsibility** | | **5** | **5** | **Management Responsibility** |
| 2.1 | Management Commitment | | 5.1 | 5.1 | Management Commitment |
| 2.2 | Customer Focus | | 5.2 | 5.2 | Customer Focus |
| 2.3 | SSC Management Policy | | 5.3 | 5.3 | Quality Policy |
| 2.4 | Planning | | 5.4 | 5.4 | Planning |
| 2.4.1 | Strategic Management Objectives | | 5.4.1 | 5.4.1 | Quality Objectives |
| 2.4.2 | Stennis Management System Planning | | 5.4.2 | 5.4.2 | Quality Management System Planning |
| 2.5 | Responsibility, Authority, and Communication | | 5.5 | 5.5 | Responsibility; Authority and Communication |
| | | | 5.5.1 | 5.5.1 | Responsibility and Authority |
| 2.5.1 | SSC Center Director | | n/a | n/a | |
| 2.5.2 | Strategic Management Council (SMC) | | n/a | n/a | |
| 2.5.2.1 | Council Representatives | | n/a | n/a | |
| 2.5.2.2 | Member Responsibilities | | n/a | n/a | |
| 2.5.3 | Management System Representative | | 5.5.2 | 5.5.2 | Management Representative |
| 2.5.4 | All Managers | | 5.5.3 | 5.5.3 | Internal Communication |
| 2.5.5 | All Employees | | n/a | n/a | |
| 2.6 | Management Review | | 5.6 | 5.6 | Management Review |
| 2.6.1 | General Management Review | | 5.6.1 | 5.6.1 | General |
| 2.6.2 | Review Input | | 5.6.2 | 5.6.2 | Review Input |
| 2.6.3 | Review Output | | 5.6.3 | 5.6.3 | Review Output |
| 2.6.4 | Records Management | | n/a | n/a | Records Management |

| SPR 1280.1 | Title | | ISO 9001 Clause | AS 9100 Clause | Title |
|---|---|---|---|---|---|
| **Chapter 3** | **Resource Management** | | **6** | **6** | **Resource Management** |
| 3.1 | Provision of Resources | | 6.1 | 6.1 | Provision of Resources |
| 3.2 | Human Resources | | 6.2 | 6.2 | Human Resources |
| 3.2.1 | General | | 6.2.1 | 6.2.1 | General |
| 3.2.2 | Competence, Awareness and Training | | 6.2.2 | 6.2.2 | Competence, Awareness and Training |
| 3.3 | Infrastructure | | 6.3 | 6.3 | Infrastructure |
| 3.4 | Work Environment | | 6.4 | 6.4 | Work Environment |
| **Chapter 4** | **Product or Service Realization** | | 7 | 7 | **Product realization** |
| 4.1 | Planning of Product or Service Realization | | 7.1 | 7.1 | Planning of Product Realization |
| 4.2 | Customer Related Processes | | 7.2 | 7.2 | Customer-related Process |
| 4.2.1 | Requirements Definition | | 7.2.1 | 7.2.1 | Determination of Requirements Related to the Product |
| 4.2.2 | Requirements Review | | 7.2.2 | 7.2.2 | Review of Requirements Related to the Product |
| 4.2.3 | Customer Interface | | 7.2.3 | 7.2.3 | Customer Communication |
| 4.3 | Design and Development | | 7.3 | 7.3 | Design and Development |
| 4.3.1 | Design and Development Planning | | 7.3.1 | 7.3.1 | Design and Development Planning |
| 4.3.2 | Design and Development Inputs | | 7.3.2 | 7.3.2 | Design and Development Inputs |
| 4.3.3 | Design and Development Outputs | | 7.3.3 | 7.3.3 | Design and Development Outputs |
| 4.3.4 | Design and Development Review | | 7.3.4 | 7.3.4 | Design and Development Review |
| 4.3.5 | Design and Development Verification | | 7.3.5 | 7.3.5 | Design and Development Verification |
| 4.3.6 | Design and Development Validation | | 7.3.6 | 7.3.6 | Design and Development Validation |
| 4.3.6 | Design and Development Validation | | n/a | 7.3.6.1 | Documentation of Design and/or Development Verification and Validation |
| 4.3.6 | Design and Development Validation | | n/a | 7.3.6.2 | Design and/or Development Verification and Validation Testing |
| 4.3.7 | Design and Development Change Control | | 7.3.7 | 7.3.7 | Control of Design and Development Changes |
| 4.4 | Purchasing | | 7.4 | 7.4 | Purchasing |
| 4.4.1 | Purchasing Process | | 7.4.1 | 7.4.1 | Purchasing Process |
| 4.4.2 | Purchasing Information | | 7.4.2 | 7.4.2 | Purchasing Information |
| 4.4.3 | Verification of Purchased product | | 7.4.3 | 7.4.3 | Verification of Purchased Product |
| 4.4.4 | Assessment of Contractors | | | | |
| 4.5 | Production and Service Provision | | 7.5 | 7.5 | Production and Service Provision |
| 4.5.1 | Control of Production and Service Provision | | 7.5.1 | 7.5.1 | Control of Production and Service Provision |

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|---|---|---|---|---|---|
| 4.5.1 | Control of Production and Service Provision | | n/a | 7.5.1.1 | Production Documentation |
| 4.5.1 | Control of Production and Service Provision | | n/a | 7.5.1.2 | Control of Production Process Changes |
| 4.5.1 | Control of Production and Service Provision | | n/a | 7.5.1.3 | Control of Production Equipment, Tools and Numerical Control (NC) Machine Programs |
| 4.5.1 | Control of Production and Service Provision | | n/a | 7.5.1.4 | Control of Work Transferred, on a Temporary Basis, Outside the Organization's Facilities |
| n/a | n/a | | n/a | 7.5.1.5 | Control of Service Operations |
| 4.5.2 | Validation of Processes for Production and Service Provision | | 7.5.2 | 7.5.2 | Validation of Processes for Production and Service Provision |
| 4.5.3 | Identification and Traceability | | 7.5.3 | 7.5.3 | Identification and Traceability |
| 4.5.4 | Customer Property | | 7.5.4 | 7.5.4 | Customer Property |
| 4.5.5 | Preservation of Product | | 7.5.5 | 7.5.5 | Preservation of Product |
| 4.6 | Control of Monitoring and Measuring Devices | | 7.6 | 7.6 | Control of Monitoring and Measuring Devices |
| **Chapter 5** | **Measure, Analysis, and Improvement** | | **8** | **8** | **Measure, Analysis and improvement** |
| 5.1 | General | | 8.1 | 8.1 | General |
| 5.2 | Monitoring and Measuring | | 8.2 | 8.2 | Monitoring and Measurement |
| 5.2.1 | Customer Satisfaction | | 8.2.1 | 8.2.1 | Customer Satisfaction |
| 5.2.2 | Internal Audit | | 8.2.2 | 8.2.2 | Internal Audit |
| 5.2.3 | Monitoring and Measure of Processes | | 8.2.3 | 8.2.3 | Monitoring and Measure of Processes |
| 5.2.4 | Monitoring and Measurement of Products or Services | | 8.2.4 | 8.2.4 | Monitoring and Measure of Product |
| 5.2.4 | Monitoring and Measurement of Products or Services | | n/a | 8.2.4.1 | Inspection Documentation |
| 5.2.4 | Monitoring and Measurement of Products or Services | | n/a | 8.2.4.2 | First Article Inspection |
| 5.3 | Control of Non-Conforming Product or Service | | 8.3 | 8.3 | Control of Nonconforming Product |
| 5.4 | Data Analysis | | 8.4 | 8.4 | Analysis of Data |
| | | | | | |
| 5.5 | Corrective Action, Preventive Action, and Improvement | | 8.5.1 | 8.5.1 | Continual Improvement |
| 5.5 | Corrective Action, Preventive Action, and Improvement | | 8.5.2 | 8.5.2 | Corrective Action |
| 5.5 | Corrective Action, Preventive Action, and Improvement | | 8.5.3 | 8.5.3 | Preventive Action |