Ames Procedural Requirements

APR 8735.3

Effective Date: April 24, 2018

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COMPLIANCE IS MANDATORY

Subject: Control of Nonconforming Products and Services

Responsible Office: Code Q / Safety and Mission Assurance Directorate

DOCUMENT CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Baseline	0	6/09/09	Baseline release
Revision	1	8/12/09	Added Revision History, revised section 1.0 on hardcopy, added definition of residual risk, updated section 5.3.1.2 to discuss residual risk, updated section 5.6.1 PRACA Manager to clarify review function, clarified who assigned PRACA manager - it is SMA Director not Associate Center Director, updated flow chart.
Revision	2	9/30/2014	Reformatted to new NASA Procedural Requirements format. Updated Records to Reflect ARC PRACA. Updated Appendix A: Definitions. Added Appendix B: Acronyms. Added Appendix C (Appendix A from Revision 1).
Revision	3	12/10/2014	Update Applicability to remove users; corrected formatting.
Revision	4	4/24/2018	Deleted processes and procedures from scope – these are CIAs,

			Revised applicability to include UAV, Critical GSE, Revised responsibilities to include the two Center Associate Directors, Gave the responsibility of appointing the PRACA manager to the deputy Center Director, Added requirements for residue risk associated with repair and use-as-is items, Made the Project MAM/CSO responsible for chairing the MRB. Updated number to comply with the NPR.

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PREFACE

P.1 PURPOSE

a. This document represents the NonConformance Report (NCR) element of the quality assurance ensemble of core processes, which include the Corrective Action Request (CAR), Corrective Action Plans (CAPs) and Deviation/Waiver (D/W). In total, these integrated core processes are intended to ensure that customer requirements are met in the most effective and efficient manner possible.

b. This document defines the requirements and responsibilities for the identification, control, remediation, documentation, and disposition of nonconforming products and services, hereby referred to as non-conformances (NCs), discovered before or after delivery to the customer. In addition, it establishes the relationships and links between NCs and the other elements of the core Quality Assurance (QA) processes; Corrective Actions (CAs), and D/Ws.

c. Use of this document ensures that suspect NCs are identified; documented, reviewed for clarity, validity, root cause determination, severity of impact (residual risk), and need for action, and consequently assigned an appropriate CAP. In addition, use of this document ensures that any CAPs stemming from nonconforming products or services receive validation and verification for their effectiveness.

d. The Ames Research Center's Problem Reporting and Corrective Action system (PRACA) is the only NCR system used to implement this document and electronically generate, manage, and archive NCRs, CARs, and D/Ws.

P.2 APPLICABILITY

a. The requirements in this APR shall be applied to materials, hardware (machinery, equipment, subsystems, platforms, parts, and assemblies), and software, products of research, services, and facilities.

b. The requirements in this APR apply to current and future programs and projects which are led by ARC including: spacecraft, unmanned aerial vehicles (UAVs), science instruments and experiment payloads, designated technology developments to be incorporated by flight projects, critical facilities specifically developed or significantly modified for flight systems, and ground systems that are in direct support of flight operations.
c. For those activities wherein Ames is responsible for a task within a project whose governance resides outside of ARC, this APR's applicable procedural requirements shall be delineated in the statement of work or customer agreement for the task.
d. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms: "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.
e. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 AUTHORITY

NPD 8700.1, NASA Policy for Safety and Mission Success

P.4 APPLICABLE DOCUMENTS AND FORMS

a. NPR 7120.X, Management Series
b. NPR 8715.3, NASA General Safety Program Requirements
c. NPR 8000.4, Risk Management
d. APD 8700.1, Problem, Nonconformance, Preventive and Corrective Action Policy
e. APD 8735.3, Verification of Product / Service Conformance to Requirements
f. APR 8000.4, Risk Management
g. APR 8705.1, System Safety and Mission Assurance
h. APR 8735.2, Deviation and Waiver Process

P.5 MEASUREMENT/VERIFICATION

a. Verification of conformance to requirements in this directive are measured through Center and Responsible Organizational management reviews, self-assessments, and subsequent analysis and reports of conformance to requirements, as well as periodic internal audits.
b. Measurement of effectiveness will be accomplished by the AMS Manager via the oversight role. Verification is to be accomplished via the ARC Responsible Managers for NCRs and the ARC internal audit program.

P.6 CANCELLATION

APR 8735.1, Control of Nonconforming Products and Services, dated July 6, 2015.

Eugene Tu
Director

DISTRIBUTION STATEMENT:

Distribution of this document is controlled by the Center Data Management System (CDMS).

CHAPTER 1 RESPONSIBILITY

1.1 Organizational Directors

Organizational Directors shall:

Ensure the recording and remediation of products and services that do not meet documented requirements using the Center-wide nonconformance reporting process defined in Chapter 2 below.

1.2 All Personnel

All Personnel shall:

a. Identify and segregate suspect nonconforming items to prevent unintended use, and product nonconforming items with appropriate labeling, packaging and storage, to preclude damage or deterioration.

b. Notify the Responsible manager of the suspected nonconformity.

c. Document and describe nonconformities using the nonconformance reporting process prescribed in Chapter 2 below.

d. Document immediate action(s) taken.

1.3 Responsible Managers

Responsible Managers shall:

a. Ensure that reports of non-conformances are accurate, submitted, evaluated and acted upon.

b. Categorize all NCRs stemming from NPR 7120.X work for the NCR's level of criticality according to Table 1 Non-Conformance Criticality Matrix (reference requirements in NPRs 8000.4 and 8621.1), such that the NCR is given the criticality level corresponding to the highest level of any of the five impact areas.

Note: For all other work, Table 1 Non-Conformance Criticality Matrix and paragraph 1.3.d may be used but organizations have the option of developing their own criticality matrix, and accompanying escalation protocol. Alternative protocols shall be documented and approved by the Ames Safety and Mission Assurance (SMA) Directorate. All other requirements of this APR shall be followed.

Table 1 Non-Conformance Criticality Matrix

Attribute (Impact Area)		Level (NCR Criticality)		
		1 (Low)	3 (Moderate)	5 (Very High)
Consequence Non-Human Safety Risks	Cost	Overrun of ≤ 5%	Overrun of 5% ≤ 15%	Overrun of ≥ 15%
	Schedule	Overrun of ≤ 5% or No Impact to critical path	Overrun of 5% ≤ 15% Or ≤ 1 Month impact to critical path/milestones or No Impact to critical path	Overrun of ≥ 15% Or ≤ 1 Month impact to critical path/milestones
	[1]Mission Success (Technical Performance)	Loss of ≤ 5% success/exit criteria	Loss of 5% ≤ 15% success/exit criteria	Loss of ≥ 15% success/exit criteria
	Facilities, Equipment, or other Assets	More than normal wear and tear ≤ $1K	Property damage $1K ≤$25K	Destruction of critical assets or damage ≥ $25K
Consequences Human Safety Risks	Human Safety	Injury or illness with no adverse or long term health effects or lost time.	Injury or illness resulting in adverse or long term health effects or lost time	Injury or illness resulting in permanent or disabling health effects

[1] The mission should be considered from both a local and a global perspective. Thus, should a project element suffer a performance loss due to a nonconformity of less than or equal to 5%, the propagation of this loss to other project elements should be considered when deciding the NCR's criticality level such that the appropriate level of review and approval are invoked.

c. Assess the residual risk resulting from dispositioning a NCR in accordance with APR 8000.4.

d. Ensure that the protocol for escalating NCR review and final disposition approval/authorization corresponds to the NCR's criticality level as follows:

(1) Low with no residual risk after disposition - Responsible Manager and Mission Assurance Manager (MAM)/Chief Safety or Mission Assurance Officer (CSO)

(2) Low with Low Residual Risk after disposition - Responsible Manager, MAM/CSO, and Lead Systems Engineer

(3) Moderate - Responsible Manager or the Control Board (CB) (For hardware/material/software related NCRs), Responsible Directorate, SS&MA Division Chief or MAM/CSO, and Lead Systems Engineer

(4) Very High - Responsible Manager or the Control Board (For hardware/material/software related NCRs), the Responsible Directorate, SS&MA Division Chief or MAM/CSO, and Lead Systems Engineer, and all Center Authorities:

(a) Engineering Technical Authority - ARC Chief Engineer

(b) Programmatic Authority - ARC Associate Director

(c) Safety and Mission Assurance Technical Authority (including occupational and health) - SMA Director

(d) Health and Medical Technical Authority - Center Chief Medical Officer

Note: Project and/or Program may levy additional requirements for NCR review/authorization above those above (i.e., Program Offices may want to review all material nonconformances regardless of the ARC assigned NCR criticality level).

e. Coordinate with the SS&MA Division Chief, or if delegated the MAM/CSO, the formation of a Control Board (CB) (e.g., Material Review Board (MRB), a Parts Control Board (PCB), or a Software Change Control Board (SCCB)) for NCRs rated above a criticality of Low based on the following:

(1) No CB Required:

(a) Nonconformities against processes, procedures, plans, or products of research that do not impact a hardware or software system

(2) CB Required:

(a) Nonconformities against processes, procedures, plans, and products of research that impact a hardware or software system.

(b) Nonconformities of hardware or software systems including materials, machinery, equipment, subsystems, platforms, parts, assemblies, and facilities.

Note: For non-conformances related to EEE parts the Parts Control Board (PCB) takes the place of an MRB and is always chaired by the Ames Chief Engineer, reference APR 8730.

f. Ensure that identified nonconforming materials and products are controlled as defined in this procedure so that they are not delivered to a customer unless authorized.

g. Ensure that all stakeholders are notified and provided follow-on communications through final disposition of the nonconformity.

h. Ensure remedial disposition of nonconformities are implemented and are based on:

(1) Root cause analysis.

(2) Analysis of impact on design margins and residual risk.

(3) Evaluation of impact on safety, functionality and customer satisfaction.

(4) Consideration of cost and schedule impact.

(5) Identification of less demanding alternative applications for nonconforming items.

(6) Obtaining a customer approved devation/waiver for acceptable nonconformities when required.

i. Ensure that repair and use-as-is remedial actions (i.e. product / service won't meet original requirements) are:

(1) Approved by the relevant engineering function, and in the case of a repair, alternative acceptance criteria are defined.

(2) Approved by the relevant safety and mission assurance function. Note: Customers often reserve the right to approve repair and use-as-is remedial actions since they result in delivery of nonconforming items (e.g., NCR's initiated due to a material surface or cosmetic issue that will not impact performance).

(3) Processed on a Deviation/Waiver in accordance with APR 8735.2.

j. Ensure the initiation of corrective action or preventive action in accordance with APD 8700.1 to preclude future similar nonconformities.

k. Ensure authorized personnel inspect and release nonconforming materials or products after repair or rework.

l. Ensure Lessons Learned submittal and Government-Industry Data Exchange Program (GIDEP) failure reporting.

m. Ensure nonconformance report closure after authorized remedial actions and final disposition of the nonconformity have been fully implemented, including any re-inspection, re-test or re-analysis.

n. Use the PRACA system to transmit an electronic version of the completed Nonconformance Report and associated documentation to the Center PRACA Manager.

o. Coordinate MRB membership with the SS&MA Division Chief, or if delegated, the MAM/CSO.

1.4 Assigned Organization Director

Assigned Organization Director Shall:

a. Implement authorized remedial actions.

b. Validate the effectiveness of the remedial actions, or final disposition of the nonconformity.

c. Coordinate with the SS&MA division for the verification of the effectiveness of the remedial actions, or final disposition of the nonconformity.

d. After rework (see Definitions), provide for the verification of conformance to original requirements.

e. After repair (see Definitions), provide for the verification of conformance to authorized (sometimes alternate) acceptance criteria.

Note: Verification of conformance may include re-inspection, re-test or re-analysis.

f. notify the responsible NASA and PRACA Managers when the authorized remedial action and verification of conformance are complete.

1.5 Ames Management System (AMS) Manager

Ames Management System (AMS) Manager Shall:

a. Collaborate with the Center PRACA Manager to provide independent analysis of the Center-wide NCR Process for trends and potential preventive actions or Continuous Improvement Action.

b. Report nonconformance trends to the AMS Executive Steering Committee.

1.6 Center PRACA Manager

Center PRACA Manager shall:

a. Ensure NCRs have the required level of review and disposition approval/authorization corresponding to each NCR's criticality level. This ensures that NCRs are properly filled out and that the proper authority reviews, and approves/disapproves. If the PRACA Manager is not certain as to the proper level, the PRACA Manager shall contact SS&MA and the Ames Chief Engineer to determine proper review and approval level.

b. Ensure that all deviations/waivers and other stakeholder documentation are formally recorded with the nonconformance report.

c. Hold annual, or more frequent if necessary, reviews to identify patterns or trends in the NCR activity that might indicate a need for a Corrective Action Request (CAR) and report findings to the AMS Manager.

d. Initiate preventive action or Continuous Improvement Action in accordance with APR 8700.2.

1.7 SS&MA Division, Project Mission Assurance Manager (MAM) or Chief Safety and Mission Assurance Officer (CSO)

SS&MA Division, through its assigned Project Mission Assurance Manager (MAM) or Chief Safety and Mission Assurance Officer (CSO), shall:

a. Ensure that the Agency, Center, or customer directed requirements for SS&MA activities are addressed in all moderate and very high NCRs at the Center.

b. Provide verification and validation of all moderate and very high NCR dispositions including corrective actions when applicable per APD 8735.3 and authorize closure after all necessary information, signatures have been collected.

c. Complete acceptance of any open test or manufacturing operations that supported the issuance of the NCR.

d. Chair the CB and coordinate its membership with the Responsible Manager.

1.8 The Control Board

The Control Board shall:

Include members representing Project, Engineering, and Safety and Mission Assurance functions.

a. Authorize a disposition for each nonconformity, based on evaluations provided by Subject Matter Experts.

b. Define usage restrictions on the PRACA record when the product is re-graded for a less demanding application.

c. Define processing requirements and re-inspection criteria on the PRACA record when a rework or repair disposition is authorized.

d. Determine whether corrective action should be initiated to preclude/minimize similar nonconformities.

e. Issue a Corrective Action Request when it is detertmined that a correction should be initiated.

f. Document in the PRACA record when the Control Board determines that no Corrective Action is required. .

1.9 The Control Board Chair

The Control Board Chair Shall:

a. Coordinate Control Board activities.

b. The Associate Center Directors for Mission Support Operations Shall:

c. Review and approve or disapprove NCRs with a criticality level of very high that they deem to be within their purview.

1.10 The Ames Chief Engineer

The Ames Chief Engineer (in the capacity of the Center's Engineering Technical Authority) shall:

a. Review and approve or disapprove NCRs with a criticality level of very high that they deem applicable to their purview.

1.11 The Safety and Mission Assurance Directorate, SS&MA and Health and Medical Technical Authority

The Safety and Mission Assurance Directorate (in the capacity of the Center's SS&MA and Health and Medical Technical Authority) shall:

a. Review and approve or disapprove NCRs with a criticality level of very high that they deem applicable to their purview.

1.12 The Deputy Center Director

The Deputy Center Director shall:

a. Appoint the PRACA Manager.

b. Review and approve or disapprove NCRs with a criticality level of very high that they deem applicable to their purview.

1.13 Responsible Directors

Responsible Directors shall:

a. Review and approve or disapprove NCRs with a criticality level above low.

1.14 Organizational Directors

Organizational Directors shall:

a. Review and approve or disapprove NCRs with a criticality level above low.

CHAPTER 2 PROCEDURAL REQUIREMENTS

2.1 Workflow

Figure 2.1 Control of Nonconfroming Products and Services Workflow below represents the workflow that shall be followed in exercising the responsibilities of Chapter 1.

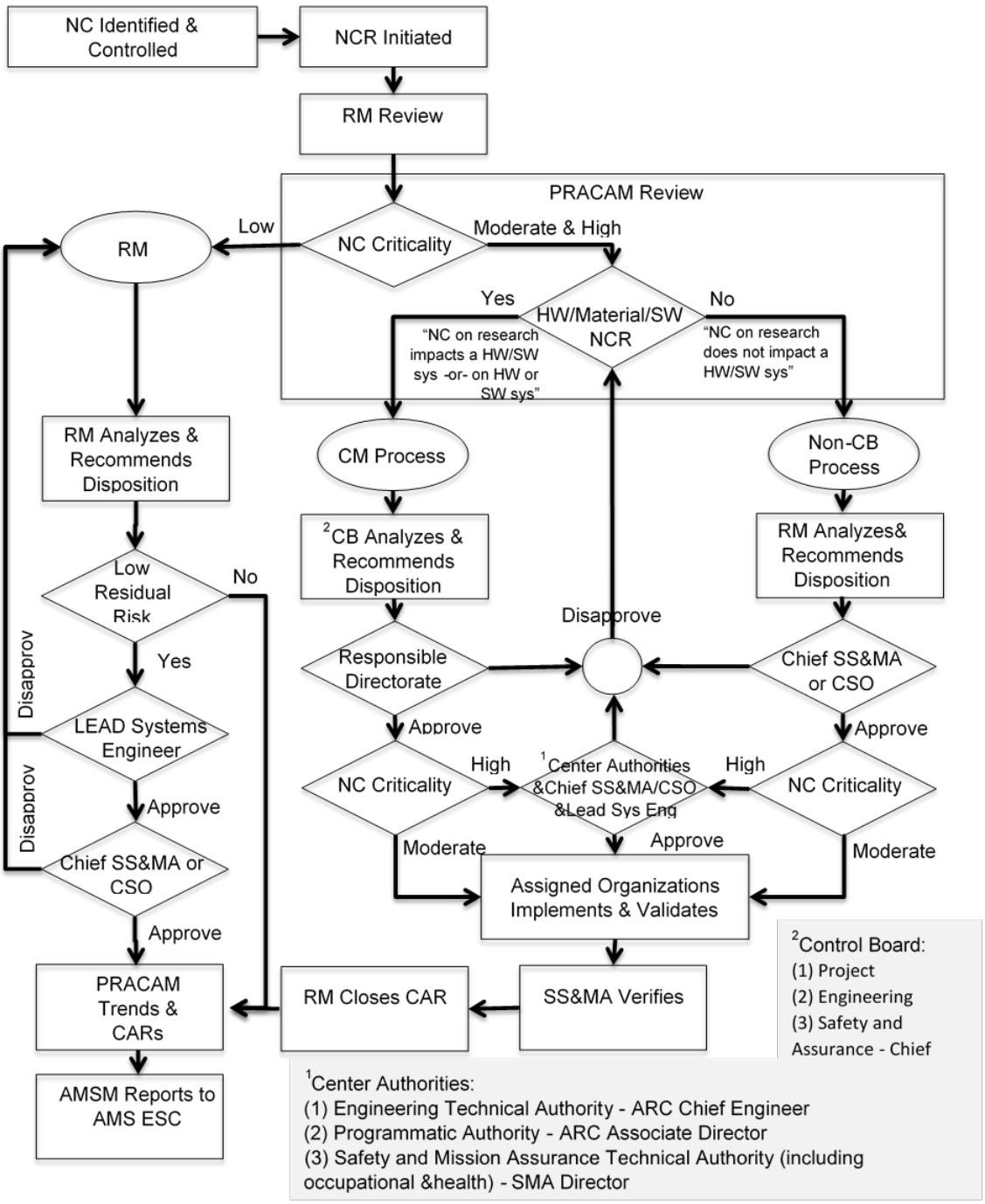

Figure 2.1 Control of Nonconfroming Products and Services Workflow

APPENDIX A. DEFINITIONS

Authorizing Customer. The recipient of an ARC product or service. A customer may be internal, such as another ARC organization, or external to the Center.

Center-Wide NCR System. PRACA is the Center-Wide NCR system

Concession. Documented (via a Deviation and Waiver request) acceptance or use of a nonconformance, nonconforming product, or nonconforming service by a relevant Approval Authority, and where applicable, the customer.

Control Board. Either a MRB, PCB, or software change control board.

Corrective Action (CA). An action taken to trace the symptoms of a current problem to its cause, identify solutions for minimizing/preventing the recurrence of the problem, implement the solution(s), and monitor that the solution(s) have been successful.

Defect. Non-fulfillment of a requirement related to an intended or specified use.

Disposition. The action taken on a nonconformance. See Rework, Repair, Regrade, Return to Supplier, Use As-Is and Scrap as examples of disposition.

Material. Raw material, component, hardware, software, or subassembly intended for use in or is used in a product.

Non-conformance (NC). Resulting condition when a process, product or service is identified as not meeting or fulfilling specified requirements.

Material Review Board (MRB): The Material Review Board consists of a Code Quality Assurance, design Engineer(s), and a Project Representative or Responsible Manager who controls and dispositions nonconforming products.

Preventive Action. An action taken to trace the symptoms of a potential problem to its cause, identify solutions for minimizing/preventing the occurrence of the problem, implement the solution(s), and monitor that the solution(s) have been successful.
Parts Control Board. MRB for EEE parts that is always chaired by the Ames Chief Engineer.

Problem Reporting and Corrective Action System (PRACA). An interactive, Web-based system used to document and track nonconformances and associated corrective actions. It is the Center-Wide NCR System.

Product. The results of ARC activities and processes to include hardware, software, data (including research results), services and processed materials.

Responsible Manager. Civil Service project or line manager with responsibility for cost, schedule, and performance.

Remedial Action. Action taken to fix a current problem that might or might not address the root cause or minimize/prevent the reoccurrence of the problem.

Regrade. Assign product to another application whose less demanding requirements can be met.

Repair. Action taken on a nonconforming product to render it acceptable for the intended use. Repair may affect or change parts of the nonconforming product, for example as a part of maintenance. Requires MRB authority.

Residual Risk. The remaining risk, exceeding that which would have existed absent the nonconformance that exists after all mitigation actions have been implemented or exhausted in accordance with the risk management process.

Return to Supplier. Action taken to return nonconforming product to the supplier/vendor in accordance with contract provisions.

Rework. Action taken on a nonconforming product to render it conforming to all original requirements.

Root Cause. The most fundamental cause in a causal chain.

Space Flight Projects. Projects that include spacecraft, instruments and experiment payloads, designated technology developments to be incorporated by space flight projects, critical technical facilities specifically developed or significantly modified for space flight systems, and ground systems that are in direct support of space flight operations.

Scrap. A product's permanent removal or an action which precludes it from its originally intended use. In a nonconforming service situation, use is precluded by discontinuing the service.
Software Change Control Board. A committee that makes decisions regarding whether or not proposed changes to a software project should be implemented.

Stakeholder. A person or organization that has an interest in a project.

Use As-Is. Accepting a nonconformity for use or approving the use of a nonconforming product without resort to rework or repair.

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use, application or action plan have been fulfilled. May require a SME to conduct.

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled.

APPENDIX B. ACRONYMS

AMS	Ames Management System
AMSM	Ames Management System Manager
APR	Ames Procedural Requirement
ARC	Ames Research Center
CA	Corrective Action
CB	Control Board (Material Review, Parts, Software Change)
CAP	Corrective Action Plan
CAR	Corrective Action Request
CIAS	Center's Continuous Improvement Action System
CSO	Chief Safety Officer
D/W	Deviation/Waiver
ESC	Executive Steering Committee
GIDEP	Government-Industry Data Exchange Program
MRB	Material Review Board
NCR	Non-Conformance Report
NC	Non-Conformance
NPR	NASA Procedural Requirements
PCB	Program/Project Control Board
PRACA	Problem Reporting and Corrective Action System
QA	Quality Assurance
RM	Responsible Manager
SAR	Survey, Audit, and Review findings
SS&MA	System Safety and Mission Assurance

APPENDIX C. VERIFICATION MATRIX OR REFERENCES

C.1 NPD 1210.2, NASA Surveys, Audits and Reviews Policy
C.2 NPD 1280.1, NASA Integrated Management System Policy
C.3 NPR 7150.2, NASA Software Engineering Requirements
C.4 NPR 8000.4, Agency Risk Management Procedural Requirements
C.5 NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
C.6 NPR 8715.3, NASA General Safety Program Requirements
C.7 APR 1280.1, Ames Management System (AMS) Quality Manual
C.8 APR 1440.1, Records Management Program Requirements
C.9 APR 5100.1, Purchasing Procurement Initiator's Guide
C.10 APR 8700.2, Continuous Improvement Action
C.11 APR 8700.3, Internal Assessment of the Ames Management System

APPENDIX D. DETERMINATION OF CENTER AUTHORITY PURVIEW

Center lines of Authority fall into four distinct categories: Institutional, Programmatic, Safety, and Technical. Each Center Authority has purview per the list of AMS requirements (not to be considered exhaustive) below:

D.1 Institutional Authority – Associate Center Director for Mission Support

a. APD 2190.1, Ames Research Center Export Compliance Program

b. APR 2815.2, Information Technology (IT) Security Policies and Requirements at Ames

c. APD 8000.1, Ames Policy for Proposal Authorization, Review, Approval, and Archiving

d. APD 8800.1, Real Property Management

e. APR 8800.3, Ames Environmental Procedural Requirements (canceled)

D.2 Programmatic Authority – Associate Center Director for Programs

a. APR 7100.1, Management of Basic and Applied Research

b. APR 7120.5, Program and Project Management for Space Flight Systems

c. APR 7120.7, Program and Project Cost Estimating for Space Flight Systems

D.3 Safety and Mission Assurance, and Health and Medical Authorities - Director, Safety & Mission Assurance Directorate

a. APR 1700.1, Ames Health & Safety Procedural Requirements

b. APR 7170.1, Human Research Planning & Approval Guidelines

c. APR 8000.4, Risk Management Process Requirements

d. APR 8705.1, System Safety and Mission Assurance

D.4 Engineering Technical Authority - ARC Chief Engineer

a. APR 7120.6, Ames Research Center Lessons Learned Collection and Dissemination

b. APR 7120.7, Program/Project Cost Estimating for Space Flight Systems

c. APR 7120.51, Program/project Reviews for Space Flight

d. APR 7123.1, Systems Engineering Process Requirements

e. APR 7150.2, Ames Software Engineering Design Requirements

f. APR 8040.1, Configuration Management

g. APR 8070.1, Engineering Design Requirements for Space Flight Systems

h. Project requirements as specified in project documents

i. Research requirements as specified in funded Research Plans and process documents.

APPENDIX E. RECORDS

Records shall be retained as defined in Table 2 Record Retention.

Table 2 Record Retention

Record	Retained By	Min. Retention
Nonconformance Report	Center PRACA Manager	5 years after product delivery, project, service or research completion
Deviations/Waivers	Center PRACA Manager	5 years after product delivery, project, service or research completion
Corrective Action Request/Corrective Action Plans	Center PRACA Manager	5 years after product delivery, project, service or research completion