



Ames Procedural Requirements

APR 1120.2

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COMPLIANCE IS MANDATORY

Subject: Ames Engineering Technical Authority

Responsible Office: Code D / Office of the Chief Engineer

CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Revision	2	3/13/2018	Updated to the new APR template, updated Applicability and Measurement/Verification sections. Brought in the figures from the Appendix to the APR sections as appropriate. Added APR 1000.1, Ames Dissenting Opinion Process to the Applicable documents. Updated Chapters 2 and 3 requirements and document number.
Revision	3	3/23/2021	Change references to “Dissenting Opinion” to “Formal Dissent” per NPD 1000.0 and other administrative edits.
Revalidate	4	2/22/2023	Replaced the section P.1 requirement that the Center ETA is responsible for assuring projects use proper engineering resources with the responsibility to assure the Center has ETA policies and practices, consistent with Agency policies and standards. Added residual risk and de minimus safety to section P.1. Deleted Center Director and NESC Chief Engineer responsibilities, grammatical edits to reflect the use of the word “shall,” deleted formal dissent content that is captured in APR 1000.1, and added content empowering the ACE to direct Centerwide ETA related resources in support of ETA related issues. Applicability (section P.2) clarified to specifically include research and technology systems; clarifies applicability in situations when ARC is part of another Center’s project and situations when ARC is serving as a procurement agent with no technical contribution.

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PREFACE

P.1 PURPOSE

- a. There are three distinct types of Technical Authority (TA): Engineering, Safety & Mission Assurance, and Health and Medical. This APR addresses how the Engineering Technical Authority delegated to the Center Director is implemented and managed at Ames Research Center (ARC).
- b. The Center Engineering Technical Authority (ETA) system is established to provide:
 - (1) The Center's ETA policies and practices, consistent with Agency policies and standards.
 - (2) Checks on technical decision making and validation against programmatic constraints to assure that any residual risk does not exceed a project's agreed to risk posture for mission success or the Center's de minimus level for safety.
 - (3) A reporting chain for engineering staff independent of program/project management (e.g., for waivers, anomalies, formal dissents, and reviews).

P.2 APPLICABILITY

- a. This document is applicable to flight and ground segments of airborne, space flight, and research and technology systems; technology matured to readiness levels for end-use in systems; mission critical software systems; and new and/or changes to both human rated and critical facilities. Additionally, this document is applicable to other technical issues as delegated by the Center Director to the Ames Chief Engineer. This document is expected to be applied in its entirety in situations covering the above categories where the Center is solely responsible for developing and delivering technical products and services.
- b. The degree of applicability of this document to situations where the Center is not responsible for the delivery of the technical work (e.g., contract administration) is negotiated between the Program/project Manager and the Center Chief Engineer.
- c. The degree of applicability of this document to situations where the Center is responsible for a task within a project led by an organization outside of ARC are to be negotiated by the Program/project Manager and the Center Deputy Director and delineated in the statement of work or customer agreement for the task.
- d. This directive is applicable to ARC and associated facilities.
- e. This directive applies to contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, grants, or agreements.
- f. 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 an expected outcome, and "are/is" denotes descriptive material.
- g. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 AUTHORITY

- a. NPD 1000.0, NASA Governance and Strategic Management Handbook
- b. NPD 1000.3, The NASA Organization
- c. NPR 7120.5, NASA Space Flight Program and Project Management Requirements

P.4 APPLICABLE DOCUMENTS AND FORMS

- a. APR 1000.1, Ames Formal Dissent Process
- b. APR 7123.1, Systems Engineering Process Requirements
- c. APR 8735.2, Deviation/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.

P.6 CANCELLATION

None.

Eugene Tu
Director

DISTRIBUTION STATEMENT:

Internal and external distribution.

CHAPTER 1 ROLES AND RESPONSIBILITIES

1.1 Overview

The Center Director is the TA at Ames and has delegated responsibility for Engineering TA (ETA) to the Ames Chief Engineer (ACE). This delegation provides the ACE the authority to direct Center resources as required to resolve issues within the ETA purview.

1.2 Specific Roles and Responsibilities

1.2.1 The Ames Chief Engineer (ACE) shall:

- a. Develop the Center's ETA policies and practices, consistent with Agency policies and standards.
- b. Review reports and issues from Lead Discipline Engineers (LDEs) and Systems Engineers (SEs) concerning risks, non-conformances, problems, and anomalies.
- c. Approve Non-Conformance Reports (NCRs) and waivers, per APR 8735.2, to technical requirements or delegate this authority to the Program/Project Lead Systems Engineer (LSE).

Note: the term LSE is interchangeable with Project Systems Engineer (PSE) as used in APR 7123.1.
- d. Approve Project Systems Engineering Management Plans (SEMP)s.
- e. Assimilate the information provided by the LDEs and LSEs to assess the technical risk posture of the Ames programs/projects.
- f. Examine trends across Ames programs/projects to identify potential revisions needed to local standards and/or other engineering requirement documents.
- g. Attend Project reviews and Project Control Review Boards (material, electronic parts, and software) during system development, test and/or operations or delegate this responsibility to the Program/Project Lead Systems Engineer (LSE).
- h. Develop the annual ETA budget and manage the technical resources.
- i. Approve or concur with center processes, standards, procedures, and best practices for systems engineering and engineering design, development, test, and evaluation including:
 - (1) Safety, mission assurance, and risk management processes
 - (2) Requirements review
 - (3) Problem/failure reporting requirements
 - (4) Anomaly/non-conformance resolution
 - (5) Trend analysis
- j. Approve all ETA funded LSE appointments made by Line Management.
- k. Establish formal review boards and ad-hoc problem resolution and process improvement teams for ETA related matters.
- l. Approve Project facilitated technical review team membership.

- m. Resolve issues brought by engineers through their line organizations or support the Center's Formal Dissent process as required in APR 1000.1.
- n. Ensure ETA matters are addressed with the participation from the appropriate technical and safety line organizations.
- o. Report to and keeps the Center Director (or their delegate) informed of issues requiring their awareness or action.

1.2.2 Technical Line Managers shall:

- a. Promote engineering excellence and technical authority amongst their staff by ensuring that applicable policies, procedures, best practices, and standards are followed.
- b. Respond to conflicts and formal dissents by facilitating or supporting their resolution.
- c. Support the ACE as requested (to include providing engineering subject matter experts for formal review boards and ad-hoc problem resolution and process improvement teams).
- d. Raise technical issues to the ACE as deemed necessary.
- e. Keep the ACE abreast of line management's various program/project oversight activities and/or the outcomes of such activities when they may impact the Center's technical excellence or authority.
- f. Appoint the LSE (after gaining ACE approval for ETA-funded LSEs) and providing other systems engineering staff as required.

1.2.3 Program/Project Lead Systems Engineers (LSE) shall:

- a. Ensure the integrity of their project's technical work.
- b. Ensure the Project Systems Engineering Management Plan (SEMP) is adhered to as developed per APR 7123.1.
- c. Evaluate their project's technical requirements and assessing any non-conformances.
- d. Decide on the classification of concerns as problems, anomalies, or non-conformances and decide their risk level with ACE concurrence.
- e. Assess system level trades, decision making, risks, and processes against the requirements.
- f. Report independently at project reviews as to the project's technical readiness to proceed.
- g. Report project status to ACE (schedule to be negotiated with ACE).
- h. Review requests for waivers.
- i. Approve waivers or Non-Conformance Reports (NCRs) as delegated by the ACE and/or specific Center NCR and Deviation/Waiver processes.

1.2.4 Lead Discipline Engineers (LDE) shall:

- a. Support the LSE requested or documented in the Project Systems Engineering Plan (SEMP).
- b. Perform duties as described in Table 1.

1.3 Engineering Technical Authority and Responsibilities Summary

The responsibilities delineated above, with the exception of the Technical Line Managers, are presented graphically in Table 1.

Table 1. Engineering Technical Authority Levels and Responsibilities

Increasing Authority				
	Lead Discipline Engineer	Program/Project Lead Systems Engineer	ARC Chief Engineer & Technical Organization Directors	ARC Center Director
Technical Requirements	Recommendation	Concurrence or Approval	Approval	Awareness or Approval
Risk/Hazard Analysis	Assessment	Assessment	Concurrence or Acceptance of Analysis	Awareness or Acceptance
Waivers	Concurrence	Requestor or Approval	Approval	Awareness or Approval
Reviews	Board Member	Team Member	Board Members/Board Chair	Convening Authority/Board Chair
Problem Trends	Investigation	Project Resolution	Center Assessment/Resolution	Awareness
Formal Dissent	Investigation/Resolution	Investigation/Resolution	Resolution	Awareness or Resolution
Issue Resolution	n/a	n/a	Resolution	Awareness or Resolution

CHAPTER 2 ISSUE RESOLUTION PROCESS

2.1 Submission of Issues to the ACE

Issues raised to the ACE consist of formal dissents by the engineering staff (addressed in APR 1000.1), conflicts between the LDE and LSE, and Project requests for relief from technical requirements (addressed in APR 8735.2).

2.2 Assessment and Resolution of Issues between the LDE and LSE

2.2.1 Upon receipt of a request for consideration of an issue, not governed by either APRs 1000.1 or 8735.2, the ACE determines if other technical expertise or information are required or addresses the issue directly.

2.2.2 The ACE shall notify other resources, if required, providing them with an agenda and preliminary material relevant to the issue to be addressed. All parties to an issue under contention shall be notified of the meeting and requested to attend and be prepared to further explain the decision they made or their concern.

2.2.3 After all issue meetings, the ACE shall document all decisions and action items. The person who submitted a request for consideration of an issue shall be notified of the resolution of the issue, at which time they may choose to accept the resolution or escalate the issue to the Center Director. Issues not resolved by the Center Director are escalated to the NASA Office of the Chief Engineer.

2.3 Waiver Review and Approval

Requests for relief (via waiver) from an Engineering Technical Authority controlled requirement shall be submitted per APR 8735.2.

CHAPTER 3 RECORDS

The following records shall be maintained according to Table 3:

Table 3. Records

Record	Retained By	Min. Retention
Issue Resolution Meeting Action Items and Decisions	ACE	5 years

APPENDIX A. ACRONYMS

ACE	Ames Chief Engineer
APR	Ames Procedural Requirement
ARC	Ames Research Center
ETA	Engineering Technical Authority
LDE	Lead Discipline Engineer
NCR	Non-Conformance Report
LSE	Program/Project Lead Systems Engineer
SE	Systems Engineer
TA	Technical Authority