



Ames Procedural Requirements

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COMPLIANCE IS MANDATORY !

Subject: Material Control, Handling, Preservation and Protection

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TABLE OF CONTENTS !

PREFACE

- P.1 Purpose
- P.2 Applicability
- P.3 Authority
- P.4 Applicable Documents
- P.5 Measurement/Verification
- P.6 Cancellation

Chapter 1 RESPONSIBILITIES

Chapter 2 REQUIREMENTS

Chapter 3 PROCEDURES

Appendix A. DEFINITIONS

P.1 PURPOSE

This procedure defines requirements for the handling, protection, preservation, and control of aerospace flight and critical ground support material, hardware and software products as mandated by customer requirements. This procedure provides for control from receipt to pre-shipping review and will verify description, accuracy and structural integrity of material or products.

P.2 APPLICABILITY

This document applies to all activities and individuals at Ames Research Center that receive, accept custody, possess or process materials (including customer supplied) or equipment in accomplishing critical or complex aerospace and ground support work (design, analysis, research, handling, testing, manufacturing, etc.) and local procedures. The APR's applicability includes items supplied by external customers/organizations (i.e., private companies, educational institutions or other NASA organizations, etc.) supporting ARC's programs or projects.

For non-flight / non-critical program items, control, handling, preservation, security, receipt, shipping and packaging requirements shall be as agreed to between and among the design control process user, the program/project manager and customer/user as appropriate.

P.3 AUTHORITY

NASA Policy Directive (NPD) 6000.1, Transportation Management

P.4 APPLICABLE DOCUMENTS

10 CFR Part 71, Packaging and Transportation of Radioactive Material§

49 CFR Subtitle B, Chapter I, Pipeline and Hazardous Materials Safety Administration, Department of Transportation.

Federal Acquisition Regulation (FAR), Subpart 46.407, Nonconforming Supplies or Services

NPR 2190.1, NASA Export Control Program

NPR 6200.1, NASA Transportation and General Traffic Management

NPR 6000.1, Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

NPR 8730.1, NASA Quality Assurance Program Policy

APD 4530.1, Item Shipment Policies and Procedures

P.5 Measurement/Verification

Customer Satisfaction Surveys

P.6 CANCELLATION

Material Control, Handling, Preservation and Protection, dated April 12, 2015

/S/

Eugene Tu
Director

CHAPTER 1: RESPONSIBILITIES

1.1 Program/Project Manager (PM)/Principal Investigator (PI): Responsible for determining criticality of items, parts or assemblies being processed based on the mission definition (fragility during movement, sensitivity to contamination, necessity for security, etc.). The PM/PI shall ensure that specific or unusual requirements for material control, handling, preservation, protection, packaging and shipping are identified for program/research critical and/or quality sensitive hardware. The PM/PI shall define and provide all necessary requirements to be included in each customer agreement, i.e., definition of requirements, verification, risk assessments and mitigation strategies. The PM/PI shall ensure compliance with all applicable regulations and will ensure adequate funds are available to meet all transportation related costs.

1.1.2 The PM/PI shall ensure that requirements are included in the Project, Configuration Management, Handling/Moving, Test Preparation Sheet, and Quality Plans (PP/CMP/HP/TPS/QP), as appropriate, and are formally and accurately communicated to organizations involved in project/research activities. Strategic planning shall provide for supplier surveys, first article / in-process inspection, audit and onsite /shop reviews to assess and review quality issues.

1.1.3 The PM/PI shall ensure quality assurance requirements and inspections are done which require periodic monitoring of material handling, moving and processing to verify implementation of this procedure. Monitoring can be accomplished by SS&MA personnel supporting the program/project, or by designated program/project personnel that have been delegated the SS&MA function. The PM/Project Manager owns responsibility until accepted by the Logistics Transportation Officer.

1.2 The requestor shall ensure that adequate resources are available to accommodate requested requirements specified by PM, CMP, H&MP,TPS or other plans and that instructions for procurement, receiving, control, inspection, handling, protection, preservation, packaging and shipping are specific to the request for work and items being processed including first article inspection (fabrication, assembly and/or testing, etc.). Additionally, they shall ensure that material control measures specified by the project are current and are delineated in processing documents (routers, travelers, assembly and test planning, etc.).

1.3 Lab Manager or Lab POC shall ensure that planned activities affecting material and product quality (handling, processing, assembly, shipping, receiving, etc.) are appropriately assigned to personnel and product handlers who are qualified/trained, and that adequate resources are available to properly handle, protect, preserve and control materials and equipment according to specific plans, procedures, instructions and/or as indicated by routers, travelers, etc. Where plans, service requests, routers, travelers, etc. (including design or engineering change notices) specify certain material conditions to be verified prior to proceeding with the next planned operation (processing, storage, etc.), this shall be indicated on the process document (traveler, etc.).

1.4 The Chief, Systems Safety & Mission Assurance Division or designee shall provide support to contracting officers and program/project managers in the selection of the customer requirements and the review of Quality Planning (Project Quality Plan / Test Plans, other) to ensure they include provisions for vendor/supplier qualification as appropriate, and incorporate surveillance, inspection (including first article) process monitoring and audit of project activities at ARC and their subcontractors/suppliers, etc. to verify adequacy of material handling, control, protection, preservation and compliance with requirements.

CHAPTER 2: REQUIREMENTS

2.1 Planning/Preparation

The customer agreement for services (including contracts for development, research, test and inspection plans) shall provide detailed documented requirements for material control, protection, preservation, handling and packaging/shipping (including customer supplied material or equipment).

2.2 Services and deliverables shall be clearly defined to include requirements for material control and whether specific handling and moving plans are required. This shall be specific to either routine/standard industry practices, or where more stringent requirements apply for handling of Program Critical Hardware (PCH), Quality Sensitive Hardware (QSH) or specifically designated material (including customer supplied).

CHAPTER 3: PROCEDURE(S)

3.1 Provision of Services shall be provided in accordance with the customer agreement, approved Project/Research, Configuration Management, Handling/Moving and Quality Plans as applicable. Planning issued to effect work (service/work request, test plans, travelers, routers, etc.) shall specify minimum requirements supported by Ames Procedural Requirements (APR) and Ames Policy Directives (APD). Work and/or written Instructions are to provide elemental directions for complying with customer agreements for material control and verification.

3.2 Project Planning (PP/CMP/H&MP/TPS/QP/other) Plans shall be developed to specify any routine and/or special (out of the norm) requirements unique to program product/material criticality class I, II, III, IV and /or as specified in the customer agreement (Ref. PCH def).

3.3 Requests for Purchase or Service Specific and detailed material and quality requirements (deliverables, first article, final inspection, performance etc.), shall be incorporated into purchasing, contract or processing documents Purchase "Order/Contract". Receiving/Shipping Documents, Manufacturing Travelers/Routers, Assembly and/or Test Plans, Contractor Planning, etc.

3.4 Process Documents (travelers, routers, assembly, manufacturing or test documents) including those involving procured or customer supplied material shall include as necessary, planned and unplanned and /or strategic occasions and times for verification of material control. In-process checks shall be established and implemented by the service provider organization, with quality verification by SS&MA personnel or designee (examples: receipt of materials, before & after movement, handling/lifting, entry/removal from storage, during/post processing, testing, decontamination / cleaning, impact meter review, pre-shipment packaging and after packing) Checks, verification, surveillance and inspections performed shall be indicated on process documents by personnel performing these activities.

3.5 Receiving & Shipping of procured, manufactured or supplied materials or parts shall be in accordance with specific instructions or procedures provided by PM/PI as indicated by appropriate plans or instructions (PP, CMP, HP QP, etc.). Where the procuring organization is other than program management, they shall flow down PM/PI planned requirements for receiving and pre-shipment instructions regarding custody, control and protection of procured or supplied items or equipment. The PM/PI may determine through consultation with the customer that guidance from the manufacturer, supplier and or carrier is acceptable regarding packaging, handling and shipping, and requirements shall be indicated in appropriate planning documents.

3.6 Items requiring special handling, protection, security or storing upon receipt or prior to shipment may include but not limited to parts or materials comprised of or containing elements that are biological, radioactive, explosive, flammable, highly pressurized, corrosive or reactive, temperature sensitive or potentially subject to affects of electrical static discharge, etc. Items in this category shall be accompanied by specific instructions (MSDS special handling instructions, etc.) in order to process and prevent potential harm to individuals. Packaging, preservation, processing for shipping shall be specified to the service provider, manufacturer or contractor and other organizations that may have a responsibility to receive, process, store, preserve or control material. For critical or flight hardware, it is the responsibility of the requestor to provide the Transportation Office with written instructions in the form of a transportation plan or check list for the warehouse staff to follow. All shipments must have the appropriate Ames shipping form (ARC66). If shipping hazmat, the MSDS/SDS needs to accompany the shipment. Please reference APD 4530.1 Item Shipment Policies and Procedures for further instructions.

3.7 Inspection upon Receiving and prior to Shipment shall be performed to verify description and actual product being received. An inspection will be done on all items being shipped to ensure proper packing and protection is provided for all shipments. Item packaging and protection for shipments shall be in accordance with industry standards unless otherwise specified by the customer. Documentation of non-conformances are done by the office completing the shipment. Deviation from industry standards must be approved by the Transportation Officer.

Upon receipt, where material handling indicators such as shock/motion indicators, temperature registers, or other special devices, etc., located either inside or outside of the

package or container indicate moving or handling may have exposed or subjected the item to potentially harmful or damaging conditions, a report of nonconformance shall be submitted.

3.8 Deviation and Waiver Request

Technical changes, deviations, or waivers sought from any requirement in this APR shall be requested from and approved in writing by, the applicable Transportation Office. When requesting technical changes, deviations or waivers, the requestor shall provide a detailed justification outlining the uniqueness associated with their request, the timeline that the deviation and/or waiver is needed, the program and/or project office supporting it, the Contract Number (if applicable), and suspense date needed for implementation.

3.9 Material Preservation and Control (during storage or processing) will be in accordance with the customer agreement and stipulated in the PP, CMP, HP, TPS, QP, and/or as formally directed by Project Management and reflected in travelers, routers, service and purchase requests. Standard industry practices shall be provided for material protection and storage (routine handling and warehouse /shop storage without consideration of contamination, temperature or moisture issues) and this shall be considered acceptable, unless otherwise specified by customer or stipulated by PM. Storage other than ARC warehouses, shops, laboratories or similar areas shall be designated or approved by the responsible manager.

3.10 Special handling and control measures in excess of routine industry standards to prevent damage or deterioration from environmental or work processing conditions (including protection against electrostatic discharge) shall be determined by the PM/PI and indicated in appropriate planning documents (PP, CMP, HP, TPS, QP, etc.) and transmitted to the service provider and with implementation verified as required by SS&MA.

3.11 For electronic media or products. An office or similar condition is considered an acceptable environment if normal protection and security as specified by the customer is provided. This includes loss protection of stored electronic data with storage on parts and /or components, with prevention and protective measures from the affects of electro-static discharge or other potentially harmful surroundings or substances.

3.12 Long term storage and security shall be subject to periodic review by the service provider organization and verified by SS&MA or designee for identification, adequacy of protection against damage or deterioration, exposure to hostile environments (excessive temperature variations, material grinding or other particulate dust and contamination, radiation, or caustic substances, etc.) and expiration of shelf life as applicable.

3.13 Non-conformance Reporting

Departures from specified material control requirements require initiation of a non-conformance report to include methods and responsibilities for documenting, identifying,

controlling, dispositioning, accepting, and obtaining corrective action on non-conformances (NCs) against hardware, software, tooling, or material, during receiving, fabrication, assembly, storage, or repair processing, with notification and agreed/approved by the customer.

4.0 Quality Assurance

The service provider/s (applicable ARC codes) shall perform periodic review during the agreement project time period, with oversight verification by SS&MA or designee.

4.1 Closeout Activities

Project Completion/Final Transmittals/Data Delivery

At the completion of the service, a final product or material deliverable, as specified in the customer agreement along with any changes and reported non-conformances, deviation requests, approved waivers, is made to the customer.

5.0 Customer Feedback

Service providers use a variety of feedback techniques, including self-evaluation and lessons learned, in order to gain a better understanding of the strengths and weakness of the service delivered. These feedback and self-evaluation shall be considered for implementation for continuously improving the services. The outcome shall be documented, retained, and filed for reference. Customer will also be notified in writing of any corrective actions that were implemented for mitigating the occurrence of the corresponding non-conformance. The corrective actions shall be regularly evaluated for its effectiveness and adjustments shall be made as needed.

Appendix A: Definitions

Article	A unit of hardware, software, or any portion thereof required by the contract.
Component	A combination of parts, devices, and structures, usually self-contained, which performs a distinctive function in the operation of the overall equipment; e.g., a “black-box,” transmitter, encoder, or cryogenic pump.
Coupon	A piece cut or removed from an article of material (whether rough, processed, composite lay-up or welded connection etc.) that may be tested mechanically and /or chemically for comparison to a specific standard or requirements document in determining acceptability of material, integrity of composition, process or weldment /connection and integrity. Coupons may be developed (created) to mimic or duplicate a specialized process and used for verification of a process in order to confirm adherence to requirements process/procedure, and facilitate testing and analysis or workmanship integrity being representative of design requirements.
Date Code	A number which indicates a specific date in code. A date code may consist of a series of numbers that indicate day, week, month, or year. This would be used to identify effective use or disposal period.
Delivery	Handling of products which occurs after final ARC inspection and test. Includes the shipment to final destination or other location as specified by the customer.
First Article	A formal technical review (inspection, verification and documentation) of a representative product item (configuration baseline) from the first production run of a new part, or following any subsequent change that invalidates. The previous first article inspection result.
Handling	Processing, arranging, installing, aligning, lifting, (manually, or using hoisting equipment) loading, transporting, towing, or other similar operations performed on hardware during it’s lifetime while under ARC control.

Hand-Carry	Items which are a maximum of 35 pounds and smaller than 25" by 25" by 25" and can be moved by one person. An item not meeting these criteria may also be considered a hand-carry if it can be moved by one person as approved by supervision.
Handling/Moving	Processing, arranging, installing, aligning, lifting (manually or using hoisting equipment), loading, or similar operations performed with or upon hardware during its lifetime. The act of transporting, towing, shipping, and/or other similar operations involved in transfer of hardware from one location to another
Handling/Moving Plan	A document that provides a sequence of steps, preparatory and operational, for conducting a handling/moving operation.
Identification Number	Number assigned and attached (when feasible) to hardware/software used in maintaining identification of items and parts etc. during processing and storage.
Generic Handling &/Moving Plan	A plan dedicated to the limited aspects of handling/moving Program Critical or Quality Sensitive items. This may be a stand-alone plan/document and be reused for similar hardware and operations.
Marking	The application or use of marks, symbols, and addresses for the purpose of guiding or directing the safe handling and shipping of packaged items.
Material Safety Data Sheets (MSDS)	Pertinent safety and health information provided by chemical manufacturers/importers concerning a hazardous material.
NASA Critical Item label	A distinctive label/tag prominently displayed on or near Program Critical Hardware (PCH), but not permanently affixed to flight items. This label is on the interior and exterior packages and shipping containers. The purpose of the label is to alert all personnel handling and shipping such hardware of its criticality to the program effort. NASA Critical Labels are obtained through supply channels NASA Form No. F and size (S) are as follows:.F-1368 is 8 by 4 inches, F-1368A is 6 by 3 inches, F-1368B is 3 ½ by 2 inches.
Outsized	Any product that is greater than 10,000 pounds or products that are of configurations which cannot be readily handled with conventional material handling equipment.

Packaging	Application of adequate protective measures to prevent damage from physical hazards or conditions including wrapping or cushioning the exterior, interior, or interior of containers, and completely identifying unit and intermediate packages or containers.
Part	One piece or two or more pieces joined together, which are not normally subject to disassembly without destruction.
Preservation	Application or use of protective measures to prevent deterioration of a product from environmental hazards or conditions. Protective measures may include segregation, the use of cleaning and drying methods, preservation, and wrappings.
Product	Any customer, ARC, or vendor-supplied items including hardware, equipment, software, material, data, reports, and/or service provided.
Product Handler (PH)	Any individual who handles or processes hardware.
Program Critical Hardware (PCH)	An item which supports the critical path in a program schedule, requires special handling, and/or is designated as hardware Class I, II or III as defined in NPR 6000.1. This definition generally excludes raw material and basic hardware such as nuts, bolts, brackets, and electronic piece parts that will be consumed or become part of or designated as PCH (Ref. NPR 6000.1).
Quality Sensitive Hardware (QSH)	Flight hardware, flight software, and flight-associated ground support equipment; deliverable products that are to be assembled into a launch vehicle and associated equipment for testing, handling, launching, servicing, and maintaining a vehicle in space; qualification and re-qualification hardware, and hardware or software procured for development activities when data resulting from development activities will be used in the "justification for qualification" of flight hardware, software, or flight-associated hardware. Hardware to be used in a hazardous operation may also be designated as quality sensitive by the responsible organization.
Risk Release	Release of an item (on a risk basis that recall may be required) to facilitate processing of assemblies or components prior to receipt, inspection and/ or verification (review) of items or required certification documentation. An item identified as non-conforming might be released on a risk release basis.

Storage Area	An area designated for storing material, equipment, and/or product. This includes any holding areas for receiving, staging, inspection, or bonded segregated storage for non-conforming items pending disposition by MRB authority.
Test Preparation Sheet (TPS)	A detailed handling plan used during the course of hardware testing within the functional perimeter of "ARC".
Class I	Mission-essential items that, in the event of loss, damage, or delay in shipment, would adversely affect the program or project.
Class II	Delicate or sensitive items not covered by Class I or Class III. These items are those that may be damaged readily by improper handling.
Class III	Items requiring special handling and monitoring.
Class IV	Those items that may be transported or handled through the use of normal commercial transportation means.