



## Procedures and Guidelines (PG)

**DIRECTIVE NO.** 400-PG-1410.2.1D  
**EFFECTIVE DATE:** March 28, 2011  
**EXPIRATION DATE:** March 28, 2016

**APPROVED BY Signature:** Original Signed by:  
**NAME:** John E. Decker  
**TITLE:** Assoc. Director of Flight Projects

### COMPLIANCE IS MANDATORY

**Responsible Office:** 400 / Flight Projects Directorate

**Title:** CONFIGURATION CONTROL

## PREFACE

### P.1 PURPOSE

This document establishes configuration management (CM) requirements for Code 400 divisions, programs and projects. It addresses Code 400-unique requirements for implementing GPR 1410.2.

### P.2 APPLICABILITY

This document applies to all Code 400 organizations.

### P.3 AUTHORITY

GPR 1410.2 Configuration Management

### P.4 REFERENCES

NPR 7120.5 NASA Space Flight Program and Project Management Requirements  
 GPR 1280.1 GSFC Quality Manual  
 GPR 1410.1 Directives Management  
 GPR 5310.4 Identification and Traceability of Products  
 GSFC Form 4-35 Configuration Change Request

### P.5 CANCELLATION

400-PG-1410.2.1C, Configuration Control

### P.6 SAFETY

None

### P.7 TRAINING

None

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## **P.8 RECORDS**

Records are as specified in GPR 1410.2.

## **P.9 MEASUREMENT/VERIFICATION**

Projects shall define metrics based on configuration status accounting and audits, and review these metrics periodically for trends and improvements at intervals of six months or less. Configuration managers shall review these metrics with their respective division, program, or project manager, as appropriate.

## **PROCEDURES**

In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will,” and descriptive material by “is.”

### **1. RESPONSIBILITIES**

The Director of Flight Projects designates a Directorate Configuration Manager who shall serve as the senior configuration manager in Code 400,

Program and project managers shall ensure effective CM in each of their programs and projects and shall fulfill the responsibilities identified for organization heads in GPR 1410.2. They shall designate a Configuration Management Officer (CMO) responsible for oversight and coordination of their organization’s CM activities.

It shall be the mutual responsibility of document originators and CMOs to ensure that copies of each original and/or revised document and approved changes are included in the appropriate library.

The Systems Assurance Manager shall ensure change implementation by hardware/ software verification and validation.

The Contracting Officer shall review all proposed changes that have a potential impact to their assigned contracts.

The Financial Manager shall review all proposed changes and evaluate the impacts of their costs.

### **2. PROGRAM/PROJECT IMPLEMENTATION**

#### **2.1 CONFIGURATION MANAGEMENT PROCEDURES**

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### 2.1.1 Division and Program CM Procedures

Division and program offices shall establish CM requirements for the projects within their organizations. Program office CM procedures shall be issued as PGs (see GPR 1410.1). A division or program CM procedure may delegate some or all CM procedures to projects, but division and program offices should minimize the need for individual project-specific procedures for out-of-house projects. All in-house projects shall have project-specific procedures.

CM procedures for new programs are required to be signed and available 60 days after program approval by Headquarters. These procedures should be reviewed by the Directorate CMO prior to implementation.

### 2.1.2 Project CM Procedures (CMPs)

Every FPPD project shall have approved CMPs in place, issued either by the program office or by the project itself. New projects should implement CM procedures as early in Formulation as needed, in time to support Key Decision Point 2 (KDP-2) as defined in NPR 7120.5.

A project office may adopt the procedures established by the program office, when the program office's procedures adequately address the project's CM requirements as defined in GPR 1410.2. Project CMPs shall be issued as PGs.

New and revised project CMPs shall be submitted to the Code 400 Configuration Manager for review/approval before release. Release occurs when the approved document is posted on GDMS.

## 2.2 CONFIGURATION IDENTIFICATION

### 2.2.1 Identification (e.g., numbering) conventions to be applied to documents

Document identification numbers shall be assigned to all controlled documents. The responsibility for assignment of document numbers and a description of the numbering system shall be defined in program or project CM procedures.

A recommended numbering system is:

**(org Code) - (document type descriptor) – (3- or 4-digit consecutive document number).**

For example, 400-AGMT-043 might be an agreement issued by Code 400, and it would be the 43rd controlled document issued by Code 400.

Projects establishing their document numbering systems after the effective date of this document shall use a numbering system that uses the organization code or project name (acronym) as its first characters. A list of typical document type descriptors is given in Appendix C.

### 2.2.2 Identification of product

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<b>EFFECTIVE DATE:</b>	<u>March 28, 2011</u>
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Numbering of hardware and software products requires special conventions to control part numbers, assembly numbers, revision numbers, and other factors that give traceability to hardware or software. Product identification requirements shall be described in project CM procedures and shall be in accordance with GPR 5310.4.

### **2.2.3 Identification of contractor items**

Each contractor responsible for design and/or fabrication shall be responsible for assigning contractor-unique document, drawing, and product identifiers. The contractor's numbering system shall be subject to approval by the project to ensure that the numbering system is adequate and does not conflict with other project numbering systems. Contractor identification of product is especially important to meet the requirements of GPR 5310.4.

Contractor-delivered documents shall be clearly identified as such with the name of the contractor and the contract number. Any contractor-prepared document to be released as a NASA publication shall go through the processes described in GPR 1410.1 or GPR 1410.2.

## **2.3 CONFIGURATION CHANGE REQUESTS (CCRs)**

Projects may use their own CCR form, or use or modify the generic GSFC Form 4-35 as described in GPR 1410.2.

CCRs shall be supported by sufficient technical, cost, and schedule data for the Configuration Change Board (CCB) to evaluate the merits of the change. Document CCR requirements shall be those required to clearly identify and evaluate proposed new issuances and changes. Product CCRs shall contain the following information as a minimum:

- a. Technical description of the proposed change(s), including specific referenced document(s) and document rewording necessary to effect the change.
- b. Rationale for change.
- c. Schedule for completion, anticipated impact on the overall schedule, and the reasons therefore.
- d. Cost and delivery impact.
- e. Identification of specific documents and/or hardware affected.
- f. Priority of the CCR: routine, urgent, or emergency.
- g. Responsibility and procedure for confirmation of proper implementation of the change and closure.

## **2.4 SEPARATION OF CLASS I AND CLASS II CHANGES**

Where a program or project chooses separate processes for Class I and Class II changes, program and/or project procedures shall define the processing requirements.

### **2.4.1 Class I changes**

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<b>EFFECTIVE DATE:</b>	<u>March 28, 2011</u>
<b>EXPIRATION DATE:</b>	<u>March 28, 2016</u>

A change shall be classified Class I when one or more of the items listed below is affected:

- a. Baselined documentation (except for typographical errors or clarification).
- b. Technical requirements of the product (form, fit, or function).
- c. Contract end items/requirements (cost or schedule).

Class I changes shall be submitted for CCB approval and should be limited to those which are necessary or offer significant benefit to the Government.

## **2.4.2 Class II changes**

A change may be classified Class II when it does not fall within the definition of a Class I change as given above. Examples of Class II changes are:

- a. A change in documentation only (for example, correction of errors, addition or clarifying notes or views).
- b. A minor change in hardware (for example, substitution with an approved alternative material) which does not affect any item listed under Class I changes.
- c. Drawing changes that do not affect a baseline, interface, etc.

Class II changes normally do not require project CCB approval unless they are written against project CM-controlled documents.

## **2.5 EVALUATION**

All Class I CM changes require CCB evaluation, and GPR 1410.2 states that the CCB may vary in size as appropriate to the new requirements. The CCB may range in size from one person for minor document reviews to multi-discipline groups reviewing complex technical issues. The organization shall determine the extent of review needed.

Class I CM actions shall be initiated by CCR. Anyone may initiate a CCR and forward it directly to the CMO. The CMO shall enter new CCRs into a log and/or CM database, review the CCR for completeness and accuracy and ensure review of the CCR by the appropriate project personnel. When a CCR is ready for CCB action, the CMO shall publish the notice of CCB meeting or review. The CCB chairperson shall approve or disapprove the change after consideration of CCB member recommendations. The status of all CCRs shall be tracked and reported through their completion by the CMO.

## **2.6 CCRs REQUIRING CUSTOMER APPROVAL**

All CCRs judged to require customer approval shall be categorized as Class I. The customer shall be able to participate in any CCB action affecting the final deliverable product. Providing customer notification and obtaining approval shall be the responsibility of the CCB chairperson.

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<b>EFFECTIVE DATE:</b>	<u>March 28, 2011</u>
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## 2.7 DOCUMENTATION OF CCR APPROVAL/DISAPPROVAL

All CCB decisions, recommendations, and action items shall be documented and maintained as defined in program/project-specific CM Procedures. The CCR record shall indicate the approval or disapproval, and include supporting attachments as deemed necessary by the CCB chairperson. All CCB directives shall be signed by the CCB chairperson.

CCR initiators and other concerned parties shall be notified of CCB results. Disapproved CCRs shall be filed and a copy returned to the originator, with direction for further action if required.

## 2.8 SIGNATURE AND APPROVAL CONTROLS

A necessary part of all approvals is signature control. The ability to tell who signed or approved a drawing or document, and verify that they were authorized to do so, is a key requirement. Therefore, all Code 400 organizations, and organizations doing work for Code 400, shall:

- a. Develop a list or matrix of authorized approvers, by name or title, for the different types of documents and drawings the project maintains;
- b. Drawing and document approval lists or matrices shall be under configuration control;
- c. Approval signatures or initials shall be clear, legible, and leave no question of who approved an item, whether by signature, initials, or electronic means;
- d. Drawings shall be approved in accordance with GSFC Drawing Requirements and GSFC CM-001. To accomplish this, the project shall define, in its procedures or other project documentation, a list or matrix of approvers for different drawings/drawing levels.

These requirements shall apply to all Code 400 programs and projects. They shall also apply to all personnel and organizations planning and performing work for a flight project, when that work is subject to the WOA controls identified in GPR 5330.1. Project managers shall be responsible for ensuring that the records from all work done in support of their projects meet these requirements.

## 2.9 IMPLEMENTATION AND VERIFICATION OF CHANGES

2.9.1 Implementation. Approved changes may be implemented via Engineering Orders, Change Notices, document revisions, contract changes, or other means, depending on the type of documentation affected (e.g., document, specification, or drawings). Changes to CM-controlled documentation shall be released and distributed in a timely manner.

2.9.2 Verification. The project shall formally verify the incorporation of approved hardware changes and shall ensure that all approved software changes are implemented.

Hardware verification shall consist of:

- a. Ensuring that approved engineering changes are incorporated into engineering, manufacturing, and/or source inspection requirements.

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<b>EFFECTIVE DATE:</b>	<u>March 28, 2011</u>
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- b. Ensuring that engineering changes are incorporated into each item in accordance with the released engineering documentation and manufacturing orders.
- c. Ensuring that engineering changes are incorporated into all engineering release records and operation and logistics documentation affected, and that required retrofit action is properly completed.
- d. Ensuring that engineering changes are incorporated in supplier purchase orders and the List of Materials.
- e. Ensuring that certification documents have been provided for hardware when used on space flight items and in critical ground support applications.
- f. Notifying the CMO that changes have been fully implemented.

Software verification shall ensure that:

- a. All software code changes have been analyzed for completeness.
- b. Only approved changes are incorporated into the software code.
- c. Approved changes are properly incorporated into the software code.
- d. All documentation changes have been properly incorporated.
- e. Any affected software modules are loaded, compiled, and linked to ensure no complications are present.
- f. Revised software code has been released.
- g. Software used for formal testing is generated from controlled masters.
- h. The software version number is updated.

### **3. CONTRACTOR CM**

Contractors, suppliers, and vendors are normally responsible for controlling their own documentation. The methods they use for controlling their documentation shall meet project requirements for deliverables. Projects should perform periodic contractor configuration audits to ensure that configuration control practices are effective, and the appropriate records are kept.

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<b>EFFECTIVE DATE:</b>	<u>March 28, 2011</u>
<b>EXPIRATION DATE:</b>	<u>March 28, 2016</u>

Page 8 of 10

## Appendix A – Definitions

- A.1 Customer – Any organization or person who will receive a product or service from GSFC. Unless otherwise defined in the GPR 1280.1, the GSFC Quality Manual, the customer is assumed to be external to GSFC.
- A.2 Waiver – A written authorization to depart from a particular performance or design requirement for that item. Waivers are processed in the same manner as Class I changes.

## Appendix B – Acronyms

CCB	Configuration Change Board
CCR	Configuration Change Request
CM	Configuration Management
CMO	Configuration Management Officer
CMP	Configuration Management Procedure
GDMS	Goddard Directives Management System
PG	Procedures and Guidelines

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<b>EXPIRATION DATE:</b>	<u>March 28, 2016</u>

Page 9 of 10

## Appendix C – Suggested Document Descriptors for Document Numbering

The following are suggested descriptors to be used as part of a project's numbering system for Controlled Documents. This list is not meant to be all-inclusive, and projects are free to tailor their descriptors as desired. Such descriptors shall be described in their explanation of their numbering system in their CMP. The listing does not need to be continually kept up to date; instead, the list in the CMP may be supplemented by an on-line listing that is continually kept up to date.

ADP	Acceptance Data Package
AGMT	MOU, MOA or Other Agreement
ANYS	Analysis
CORR	Correspondence
FORM	Form controlled by the project or program
HDBK	Handbook
ICD	Interface Control Document
LIST	List
LOG	Log or Logbook
MGMT	Management
OPS	Operations Requirements
PLAN	Plan
PROC	Procedure
PROP	Proposal
PSLA	Project Service Level Agreement
QA	Quality Assurance
REF	Reference
RPT	Report
RQMT	Requirement
SFTY	Safety
SPEC	Specification
STD	Standard

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**DIRECTIVE NO.** 400-PG-1410.2.1D  
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**EXPIRATION DATE:** March 28, 2016

Page 10 of 10

**CHANGE HISTORY LOG**

<b>Revision</b>	<b>Effective Date</b>	<b>Description of Changes</b>
Baseline	1/8/99	Initial Release Baseline document, numbered 400-PG-8700.2.1
A	02/23/00	Complete rewrite to accommodate provisions of GPG 1410.2. Deleted subjects explicitly covered by GPG 1410.2. Changed document number from 400-PG-8700.2.1 to 400-PG-1410.2.1.
B	06/30/03	Updated records requirements to comply with GPG 1440.7. Added definition of waiver so that separation of deviations from waivers is no longer necessary. Clarified CCMS responsibilities. Defined when CM is implemented for new organizations. Eliminated document numbering system compatibility with CCMS. Deleted section on configuration milestones. Deleted procurement change order classification from CCRs. Clarified requirements for identifying contractor-prepared documents and rewrote section on Contractor CM.
C	11/24/04	Removed training requirement from P.7. Clarified all requirements to clearly distinguish them from supporting text.
	11/24/2009	Administratively extended the expiration date of Rev C from 11/24/09 to 11/24/10.
D	3/28/2011	Reworded as necessary to accommodate divisions managed by Code 400 program managers in the Code 400 organization. Added metrics requirements in P.9 that are tied to normal configuration status accounting. Added signature control requirements in 2.8. Removed all references to CCMS. Populated Appendix B. Added Appendix C.

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