



Goddard Procedural Requirements (GPR)

DIRECTIVE NO. GPR 8710.3B

APPROVED BY Signature: Original signed by
R. Obenschain for

EFFECTIVE DATE: July 16, 2009

NAME: Robert Strain

EXPIRATION DATE: July 16, 2014

TITLE: Director

COMPLIANCE IS MANDATORY

Responsible Office: 540/Mechanical Systems Division

Title: Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems

PREFACE

P.1 PURPOSE

This directive establishes the requirements for the Goddard Recertification Program (RECERT) to provide Center organizations with test, inspection, certification, recertification, and consultation of ground-based pressure vessels and pressurized systems (PV/S). This Center program is implemented by the RECERT Manager and improves safety, and minimizes or prevents potential personnel injury or fatality, or damage to, or loss of, hardware and facilities.

This directive is not a substitute for applicable Federal, State, and Local requirements. The Occupational Safety and Health Administration (OSHA) requirements apply to all GSFC PV/S.

P.2 APPLICABILITY

- a. This directive is applicable to ground-based PV/S at Greenbelt, Wallops Flight Facility (WFF), and other areas under GSFC cognizance unless specifically excluded by this directive or by the RECERT Manager. It specifically includes, subject to Section 1.2, systems often referred to as "low pressure" such as building and facility services equipment (e.g., shop air), laboratory systems and equipment, and vacuum systems.
- b. When invoked as a contractual requirement by the applicable project, this directive is applicable to PV/S at off-site contractor installations supporting GSFC flight project work.
- c. When requested by the initiating organization, the responsible contracting officer and the RECERT Manager shall decide if non-NASA owned PV/S used in non-NASA operations poses a risk to NASA personnel, facilities, or equipment and if so, shall apply this directive to any contractor or tenant.

P.3 AUTHORITY

[NPD 8710.5](#), Safety Policy for Pressure Vessels and Pressurized Systems

P.4 REFERENCES

The following references are to the latest edition of the document, unless specifically noted otherwise.

- a. [NASA-STD-8719.17](#), NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PV/S)
- b. [NPR 8715.3](#), NASA General Safety Program Requirements
- c. GPR 1400.1, Waiver Processing
- d. GPR 8710.7, Cryogenic Safety
- e. GPR 8621.1, Reporting of Mishaps and Close Calls
- f. American Society for Nondestructive Testing (ASNT) *Recommended Practice No. SNT-TC-1A*, Personnel Qualification and Certification in Nondestructive Testing
- g. See Appendix A for additional references

P.5 CANCELLATION

GPR 8710.3A, Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems

P.6 SAFETY

None

P.7 TRAINING

None

P.8 RECORDS

Record Title	Record Custodian	Retention
Test & Inspection Reports for PV/S	RECERT Manager at Greenbelt, Deputy RECERT Manager at WFF	NRRS* 1/118A. Retire to FRC or approved storage facility when 5 years old. Destroy when 25 years old.
RECERT documentation	RECERT Manager	*NRRS 3/33G. Destroy 5 years after discontinues or completes training.

*NRRS – NASA Records Retention Schedules ([NPR 1441.1](#))

P.9 METRICS

The RECERT Manager shall document the number of deficiencies, incidents, or mishaps related to PV/S.

P.10 DEFINITIONS

Most of the terms used in this directive are defined in NASA-STD-8719.17 or NPR 8715.3. Those that are unique to this directive, or that require amplification for GSFC applications are listed below.

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- a. Alteration – Any change in the item described on the original Manufacturer's Data Report which affects the pressure retaining item. Non-physical changes such as an increase in the maximum allowable working pressure (internal or external) or design temperature of a pressure retaining item shall be considered an alteration. A reduction in minimum temperature such that additional mechanical tests are required shall also be considered an alteration.
- b. Certification - The official approval process for ensuring and documenting the integrity of PV/S. As used in this GPR, certification is a process performed by the RECERT Manager that leads to the initial qualification that a PV/S is safe to use within specific certification parameters, and includes, but is not limited to, PV/S compliance and documentation reviews, tests, inspections, nondestructive testing, and analyses.
- c. Certification Parameters - The parameters that characterize a pressure vessel or system for safe operation at the original design conditions or at reduced design conditions. These parameters include: (a) material, (b) wall thickness, (c) maximum allowable working pressure or maximum design pressure, (d) temperature, (e) size and shape of pressure vessel, (f) condition of welds (flaws, penetration, porosity, etc.), (g) overpressure protection set point, and (h) system configuration.
- d. Class R System - Class R, Research and Development (R&D) PV/S, applies to those PV/S that are assembled from RECERT Manager-approved components for a limited duration for the purpose of experimental support to a research and development project, or to support a specific flight project test.
- e. Configuration Management - The identification, control, accounting, and verification of requirements and implementation documentation for formal orderly control of the PV/S configuration.
- f. Commercial Off The Shelf (COTS) - Commercial items that require no unique Government modification or maintenance over the life cycle of the product to meet the needs of the procuring agency. A commercial item is one customarily used for non-Governmental purposes that has been or will be sold, leased, or licensed (or offered for sale, lease, or license) in quantity to the general public. An item that includes modifications customarily available in the commercial marketplace or minor modifications made to meet NASA requirements is still a commercial item.
- g. Deficiency – For the purposes of this GPR, a PV/S deficiency is defined as failure of the PV/S to meet one or more of its certification parameters. The certification of PV/S containing documented deficiencies shall be revoked and the PV/S shall be removed from service. Examples of deficiencies include leaks at piping joints, broken pipe supports, unauthorized system or component modifications or alterations, or unanticipated wall thinning resulting in remaining thickness below the design minimum value. An approved waiver shall be required for continued operation prior to correction of the deficiency(ies).
- h. Discrepancy – For the purposes of this GPR, a PV/S discrepancy is defined as a condition that could lead to a PV/S deficiency and revocation of the PV/S certification. Examples of PV/S discrepancies include accumulation of debris around piping or vessels, deterioration of PV/S protective coatings, excessive corrosion on PV/S supports, or failure to electrically insulate dissimilar metal joints.

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- i. Division Office – For the purposes of this GPR, use of the term “Division Office” includes Project Offices, Program Offices, and Laboratories.
- j. Ground-Based PV/S - PV/S used for ground operations including pressure vessels, piping, flexible hoses, and components for cryogenic service, compressed gases, hydraulic service, and vacuum service. Ground-based PV/S also includes boilers, water towers, jet fuel storage tanks, pressurized research and development setups, and flight project ground support equipment such as purge carts, engineering test units, payload environmental transport systems, and other flight project-specific PV/S used for ground activities.
- k. In-service Inspections (ISI) - Those inspections, examinations, or tests conducted periodically by qualified inspectors that provide data necessary to determine that a certified PV/S continues to meet its certification parameters.
- l. Modification - Any change to a PV/S, including addition or deletion of components, rerouting of components, or replacement of components with those of a different size, type, or manufacturer, is considered to be a modification. In addition, any nonphysical change to a PV/S, such as changes to operational parameters, is considered to be a modification.
- m. Nondestructive Testing (NDT) - The development and application of technical methods to examine materials or components in ways that do not impair future usefulness and serviceability in order to detect, locate, measure and evaluate discontinuities, defects and other imperfections; to assess integrity, properties and composition; and to measure geometrical characteristics.
- n. RECERT Documentation - Files that are maintained for PV/S that include, but are not limited to, a unique PV/S identifier, the manufacturer’s/fabricator's documents, design data, field test data, safety analyses, results of engineering analyses, repair history, facility descriptions, records of safety variances, rerating, and correspondence.
- o. RECERT Manager and Deputy RECERT Manager/WFF – Positions appointed by the Center Director to implement and enforce the Center’s Ground-Based PV/S and Lifting Devices and Equipment (LDE) Program meeting NASA-STD-8719.17 and NASA-STD-8719.9 requirements, respectively. The RECERT Manager and Deputy RECERT Manager/WFF positions are a combination of the Pressure Systems Manager (PSM) and Lifting Devices and Equipment Manager (LDEM) positions described in both NASA Technical Standards.
- p. Recertification - The renewal of a previous certification with adjustments as necessary to accommodate new information, configuration or operating parameter changes, or PV/S degradation.
- q. Repair – The process of restoring a component or system to a safe and satisfactory condition such that the existing design requirements are met.
- r. Replacement – A type of repair completed by the fabrication and installation of spare or renewal components, appurtenances, and subassemblies, or parts of a component or system.

P.11 ACRONYMS

API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
AWWA	American Water Works Association
CGA	Compressed Gas Association, Inc.
CM	Configuration Management
COTS	Commercial Off The Shelf
DOT	U.S. Department of Transportation
FMD	Facilities Management Division
GPR	Goddard Procedural Requirements
GSC	Goddard Safety Council
GSFC	Goddard Space Flight Center
ISI	Inservice Inspection
NCS	National Consensus Codes and Standards
NDT	Nondestructive Testing
NRRS	NASA Records Retention Schedules
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
P&ID	Piping and Instrumentation Diagram
PRD	Pressure Relief Device
PV/S	Pressure Vessels and Pressurized Systems
RAC	Risk Assessment Code
RECERT	Goddard Recertification Program
WFF	Wallops Flight Facility

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. RECERT Program Requirements

1.1 PV/S Subject to RECERT. Ground-based PV/S are included in the RECERT Program and are subject to formal certification and recertification with the exception of those PV/S delineated in Section 1.2.

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1.2 Excluded PV/S

- 1.2.1 The PV/S delineated in NASA-STD-8719.17, Section 4.2, Excluded PV/S, are excluded from the Certification requirements of this GPR. Excluded PV/S are subject to the requirements of OSHA, the applicable NCS, and NASA safety requirements. Operation of Commercial Off the Shelf (COTS) systems shall be within manufacturers' placard limitations. The RECERT Manager has the authority to include any excluded system due to the hazards presented by its use in a particular application.
- 1.2.2 Items excluded from the RECERT Program may be reviewed and evaluated for compliance with test and inspection requirements of applicable codes and standards by the RECERT Manager at the specific request and funding by the item owner organization.

1.3 PV/S Design and Installation. New PV/S and components, including flexible hoses, shall be designed, fabricated, assembled, erected, inspected, examined, and tested in accordance with the appropriate national consensus standards, codes, and regulations (NCS).

- 1.3.1 New metallic pressure vessels, including heat exchangers, shall be ASME Section VIII Code stamped as specified within the scope of the Division being used and registered with the National Board of Boiler and Pressure Vessel Inspectors (National Board).
- 1.3.2 New nonmetallic pressure vessels shall employ the applicable Code as determined by the RECERT Manager.
- 1.3.3 Pressure vessels designed for the transport of pressurized fluids but that are to be used in permanent or semi-permanent installations shall meet the requirements in Paragraphs 4.7.8 and 4.10.6 of NASA-STD-8719.17.
- 1.3.4 Vacuum vessels shall be ASME Section VIII Code stamped and registered with the National Board except as provided in paragraphs 4.2.1.14, 4.4.3.3, and 4.4.3.4 of NASA-STD-8719.17.
- 1.3.5 Power boilers shall be ASME Section I Code stamped and registered with the National Board.
- 1.3.6 Heating boilers shall be ASME Section IV Code stamped and registered with the National Board.
- 1.3.7 Power boiler piping shall meet ASME B31.1, Power Piping. Boiler External Piping shall be ASME Code stamped.
- 1.3.8 Process piping shall meet the requirements of ASME B31.3, Process Piping.
- 1.3.9 Other piping shall meet the requirements of the most applicable Section of the ASME Code for Pressure Piping, B31, as determined by the RECERT Manager.

1.4 PV/S Analysis and Certification. PV/S shall be certified before entering service and after compliance with NASA-STD-8719.17 and this GPR is verified by the RECERT Manager.

- 1.4.1 Requests for Certification of new or previously uncertified PV/S shall be submitted via GSFC Form 4-44, GSFC Work Request for RECERT Services to the RECERT Manager by the owning organization prior to the planned operation.
- 1.4.2 The original service life of each PV/S shall be documented at the time of certification based on relevant failure modes, projected cyclic service, rates of degradation, damage mechanisms, or other appropriate factors.

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- 1.4.3 Prior to certification, an initial comprehensive integrity assessment shall be performed and documented. The PV/S integrity assessment shall include an inspection plan that addresses credible damage mechanisms for the specific PV/S, and initially defines inspection methods and intervals providing the necessary confidence that the PV/S will remain in a state of continuous compliance with the requirements of this GPR, NASA-STD-8719.17, and the applicable NCS.
- 1.4.4 System operation for the purposes of code compliance pressure testing or acceptance testing shall be permitted so long as the RECERT Manager is notified in advance of the testing.
- 1.4.5 PV/S that do not meet applicable NCS, guides, and regulations shall only be certified and allowed to operate if a risk and hazard assessment has been performed, the owner acceptance of residual risk has been documented, and the Center approval has been formally documented by means of a variance in accordance with Paragraphs 4.6 or 4.7 and 4.11 of NASA-STD-8719.17, and GPR 1400.1. Note that this GPR does not endorse the purchase of new non-Code PV/S, but this Paragraph 1.4.5 offers guidance for those rare cases where a new PV/S is essential to mission success but cannot reasonably meet all of the requirements of the appropriate NCS.
- 1.4.6 Risks shall be identified, documented, assessed, and a Risk Assessment Code (RAC) determined for all PV/S within the scope of this GPR. The risk status shall be updated during the certification/recertification process, and new risks shall be identified as appropriate throughout the life of a PV/S.
- 1.4.7 When the risk associated with operation of any PV/S is unacceptable, the risk shall be mitigated in accordance with the risk reduction protocol in Paragraph 1.7.1 of NPR 8715.3, NASA General Safety Program Requirements, or the PV/S shall be removed from service.
- 1.4.8 Formal notification of PV/S certification, including all applicable constraints and schedules, shall be made by the RECERT Manager to the owning organization and documented in the configuration management system.

1.5 PV/S Recertification

- 1.5.1 PV/S shall be recertified on or before one-half the documented initial service life or one half the recertified remaining life.
- 1.5.2 Formal notification of PV/S recertification, including all applicable constraints and schedules, shall be made by the RECERT Manager to the owning organization and documented in the configuration management system.
- 1.5.3 The remaining safe life and integrity of each PV/S shall be assessed and documented at the time of recertification through a detailed integrity assessment based on nondestructive testing (NDT) and inspection results, relevant damage mechanisms, cyclic service history, rates of degradation, and other appropriate factors.
- 1.5.4 Recertification shall be performed:
 - 1.5.4.1 When the PV/S service changes (e.g., commodity, design parameters, location, and orientation);
 - 1.5.4.2 In the case of NCS changes that reduce the estimated remaining life or increase the known risk of continued operation;
 - 1.5.4.3 If any unanticipated service degradation is identified during a scheduled or unscheduled system inspection that reduces estimated service life, changes probability of failure or failure modes, or changes the risk assessment; or
 - 1.5.4.4 If a PV/S undergoes any alterations or modifications.

1.6 Alterations, Modifications, and Repairs. Alterations, modifications, and repairs to PV/S shall be performed in accordance with ANSI/NB-23, National Board Inspection Code (NBIC).

- 1.6.1 PV/S Modifications. Any alteration or modification to a PV/S voids its certification. Proposed alteration or modification designs shall be submitted by the owner organization to the RECERT Manager for review prior to execution.
- 1.6.2 PV/S Component Repairs. Repairs to PV/S components shall be permitted without prior approval of the RECERT Manager provided that the fit, form, and function of the component is not altered, or that the repair does not affect the operational parameters of the component or system. No repairs to overpressure protection devices shall be permitted without the prior written permission of the RECERT Manager.
- 1.6.3 ASME Code stamped items shall only be repaired or altered by National Board (NB-23) certified organizations (for example “R” and “VR” stamp holders) in strict conformance with their approved quality manual. Government or contractor organizations that do not have an “R” or “VR” stamp do not meet the requirement.
- 1.6.4 System Recertification. Upon completion of modifications or replacements, the RECERT Manager shall recertify the system. The system shall not be put into service prior to recertification.
- 1.6.5 System operation for the purposes of code compliance pressure testing or acceptance testing shall be permitted so long as the RECERT Manager is notified in advance of the testing.

1.7 In-service Inspection.

- 1.7.1 In order to maintain certified status, PV/S shall be subject to RECERT in-service inspections (ISI).
- 1.7.2 The RECERT Manager shall develop an ISI Plan for each PV/S listing the components to be inspected, the inspection method(s), and the interval between inspections taking into account all relevant damage mechanisms.
- 1.7.3 ISI shall be performed to obtain sufficient data to ensure that unanticipated forms or rates of degradation, service changes, or other factors have not changed the remaining life.
- 1.7.4 Verification of integrity of each in-service PV/S shall be performed and documented at each periodic ISI interval as specified in the inspection plan in compliance with the appropriate NCS.
- 1.7.5 The RECERT Manger may authorize the performance of RECERT-required test and inspections at Government Owned, Contractor Operated facilities by the applicable contractor organization provided that:
 - 1.7.5.1 the contractor has a test and inspection plan satisfactorily addressing GSFC requirements, including personnel qualifications,
 - 1.7.5.2 the contractor’s plan has been reviewed, approved, and documented by the RECERT Manager, and
 - 1.7.5.3 copies of all PV/S ISI reports and other documentation pertinent to continuation of PV/S certification shall be forwarded to the RECERT Manager annually.
- 1.7.6 If at any time a PV/S is not fit for its intended service, the PV/S shall be removed from service immediately by its owner/operator and the certification of the PV/S shall be revoked.

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- 1.7.7 Deficiencies resulting from ISI shall be documented and immediately reported to the PV/S owner. The PV/S shall be removed from service immediately by its owner/operator and shall remain out of service until the deficiency is corrected. Alternatively, a technical variance may be processed in accordance with Section 3 of this directive in order to resume operation of the PV/S until the deficiency can be corrected.
- 1.7.8 Discrepancies resulting from ISI shall be documented and reported to the PV/S owner. The owner shall provide a discrepancy correction plan to the RECERT Manager detailing the corrective actions to be taken and the schedule for accomplishing the actions. Unless specifically approved by the RECERT Manager, all discrepancies shall be resolved prior to the next scheduled ISI.
- 1.7.9 Disregard of maintenance or inspection shall be cause for revocation of the certification at the discretion of the RECERT Manager.
- 1.7.10 ISI intervals shall be reviewed and adjusted throughout the life of a PV/S to incorporate safety related Code changes, unanticipated rates of degradation, results of trending analyses, or other relevant factors.
- 1.7.11 If component tests specified in the ISI Plan are not completed within the prescribed interval, the PV/S certification shall be revoked unless a variance to extend the period of an overdue item past the interval is processed in accordance with Section 3 of this GPR.

1.8 Tagging

Tags indicating the certification status of pressure systems and the inspection status of components within pressure systems shall be as authorized by the RECERT Manager. Code PV/S that have been re-designated as non-Code shall be clearly and visibly marked to indicate the non-Code status.

1.9 RECERT Configuration Management System

A RECERT Configuration Management system (CM) shall be maintained by the RECERT Manager to ensure that the documentation for each PV/S reflects its field configuration and certification status and limitations. Such documentation shall be made available to owner organizations. The CM documentation shall include:

- 1.9.1 PV/S Class and Category;
- 1.9.2 certified design configuration;
- 1.9.3 documentation necessary for Code compliance review (Refer to Appendix B);
- 1.9.4 records of PV/S alterations, modifications, repairs;
- 1.9.5 PV/S certification status and limitations, including any applicable variances;
- 1.9.6 date of initial Certification;
- 1.9.7 due date for Recertification;
- 1.9.8 identification of PV/S deficiencies and status of corrective actions; and
- 1.9.9 ISI schedules.

The CM system shall be capable of providing traceability to component manufacturer's make, model, serial number, and other distinguishing information to enable component searches in response to safety

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alerts or manufacturer's recalls.

1.10 Personnel Qualification and Certification Requirements

1.10.1 Personnel Performing Inspections and Tests

Personnel performing PV/S NDT, including visual inspections, shall be qualified and certified by their employer in accordance with written practices meeting the requirements contained in American Society for Nondestructive Testing (ASNT) *Recommended Practice No. SNT-TC-1A*, Personnel Qualification and Certification in Nondestructive Testing. System and component performance verification testing shall be performed by skilled, adequately trained, and qualified personnel who shall be certified by their employer.

1.10.2 Pressure System Operators

PV/S shall be operated and maintained by skilled, adequately trained, and qualified personnel who shall be certified by their supervisor in accordance with NPR 8715.3.

1.11 Procurement

Prior approval for procurement of PV/S subject to RECERT requirements as stipulated herein must be obtained from the RECERT Manager or Deputy RECERT Manager/WFF. Prior approval of PV/S or component procurement is not necessary so long as the engineering design and specification has been reviewed and approved by the RECERT Manager in accordance with this GPR. Credit card holders shall verify that this approval has been obtained prior to making purchases. In addition, replacement parts or components for maintenance or repair of existing equipment are excluded from this requirement provided that they are identical to the existing parts or components and the fit, form, or function of the original item is not altered.

1.12 Special Considerations for Class R System Certification

It is recognized that special considerations exist in the Certification of some pressure systems within GSFC Research and Development (R&D) labs. In order to comply with the safety requirements contained within NASA-STD-8719.17, and to provide for effective and efficient use of the Center's resources, the RECERT Manager may designate specific R&D labs as Class R Labs and provide Certification of PV/S components used within the labs as a Class R System, provided that all of the following requirements are met. Note that designation as a Class R Lab applies to temporary or portable Class R systems, not fixed building or facility systems.

1.12.1 The Lab adopts RECERT Manager-approved design rules covering the Class R PV/S.

1.12.2 The RECERT Manager reviews components to be used in the Lab for NCS and NASA compliance.

1.12.3 Test and R&D equipment, whether custom fabricated or COTS, is used for its intended purpose.

1.12.4 The RECERT Manager performs an annual audit for compliance with this GPR.

1.12.5 Component ISI is performed on the Certified components by RECERT.

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As an alternative to 1.12.5 above, detailed protocols between the RECERT Manager and individual Labs/Branches addressing issues including, but not limited to, periodic component testing, component tagging, and configuration management may be developed and documented in a Code 540/RECERT Work Instruction (WI).

2. Responsibilities

2.1 Center Director shall appoint the RECERT Manager and Deputy RECERT Manager/WFF for PV/S and LDE.

2.2 RECERT Manager shall:

- a. Maintain overall responsibility for the management, implementation, and enforcement of the Center's PV/S Recertification Program;
- b. Provide technical direction to the Deputy RECERT Manager and the RECERT Support Contractor;
- c. Serve as the GSFC interface with NASA Headquarters and other NASA Centers on matters pertaining to PV/S;
- d. Serve as the GSFC representative on the NASA PV/S Working Group;
- e. Participate on the Goddard Safety Council (GSC);
- f. Serve as the Certifying Authority for the certification and recertification of ground-based PV/S to which this directive is applicable;
- g. Provide formal notification of PV/S Certification and Recertification to the system owner;
- h. Interpret the requirements of NASA-STD-8719.17 as they apply to the GSFC RECERT Program;
- i. Provide assistance to PV/S owners in the determination of original service life of their systems;
- j. Provide assistance to PV/S owners in the identification and assessment of risks posed by their PV/S, and document the associated risk assessment code (RAC) in the RECERT Configuration Management (CM) system;
- k. Perform an initial integrity assessment for PV/S including development of an ISI Plan addressing credible damage mechanisms and defining initial inspection methods and intervals;
- l. Establish and maintain a system for periodic PV/S ISI;
- m. Identify deficiencies and discrepancies arising out of periodic ISI to the PV/S owner, and track the completion of required corrective actions;
- n. Assess the remaining safe life and integrity of each PV/S through a detailed integrity assessment at the time of the system recertification;
- o. Ensure that certification and recertification tests and inspections are performed by personnel properly qualified and certified in accordance with applicable codes and standards;
- p. Provide consultation on PV/S compliance including design, specification, and modification;
- q. Approve the rerating of PV/S;
- r. Review and concur/nonconcur with variance requests in accordance with GPR 1400.1;
- s. Establish and maintain a RECERT Configuration Management (CM) system for PV/S;
- t. Perform compliance spot checks of PV/S to ensure that the requirements of this GPR are being followed;
- u. Provide Division Offices with an inventory of Division-owned PV/S for review and update as required; and
- v. Coordinate with affected Center safety offices on issues of mutual interest.

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2.3 Deputy RECERT Manager shall serve as the RECERT Manager's alternate and shall represent the RECERT Manager at WFF for day-to-day operations by performing the duties in Section 2.2.

2.4 Division Offices shall:

- a. Ensure documented compliance with this directive;
- b. Ensure that the design, fabrication, assembly, erection, inspection, examination, and testing of new PV/S, and that alterations, modifications, and repairs to existing PV/S are in compliance with the requirements of this directive;
- c. Ensure that the design of new PV/S, or proposed alterations of modifications to existing PV/S are submitted to the RECERT Manager for compliance review prior to procurement and request the RECERT Manager to certify the PV/S when installation, modifications, or alterations are complete;
- d. Ensure that all applicable documentation listed in Appendix B of this GPR is furnished to the RECERT Manager for equipment certification prior to operation of new, modified, altered, repaired, or transferred PV/S. The supply of such documentation should be made a part of any PV/S procurement;
- e. Ensure that new, modified, repaired, relocated, or transferred PV/S are certified or recertified prior to use;
- f. With the RECERT Manager's assistance, determine the original service life of their new PV/S;
- g. With the RECERT Manager's assistance, identify and assess risks posed by their PV/S and determine the associated RAC;
- h. Control uncertified PV/S to preclude inadvertent use;
- i. Notify the RECERT Manager prior to any changes in PV/S configuration;
- j. Maintain responsibility for day-to-day operations of PV/S under their cognizance;
- k. Ensure that PV/S are operated within their certification parameters;
- l. Maintain PV/S and their components in accordance with the manufacturer's recommendations or with a suitable maintenance plan to ensure continued compliance with the certification or recertification. In some cases, due to operational, environmental, or other parameters, maintenance procedures in addition to the manufacturer's recommendations may be necessary.
- m. Submit requirements to the appropriate budget to bring Division-owned PV/S into compliance with this directive;
- n. Ensure that any research and development or test and evaluation activities conducted within or in association with a PV/S will not adversely impact the structural integrity or safety of the PV/S;
- o. Notify the RECERT Manager in advance of any non-NASA projects making use of PV/S that may pose risk to NASA personnel or equipment so that applicability of RECERT Program requirements may be determined;
- p. Provide availability of PV/S for the scheduled RECERT ISI required to maintain certification;
- q. Coordinate ISI with the RECERT Manager to minimize schedule conflicts;
- r. Notify the RECERT Manager immediately of all PV/S deficiencies or anomalies, perform corrective actions as required by the RECERT Manager, and initiate and process the appropriate Incident/Mishap Report in accordance with GPR 8621.1;
- s. Immediately remove from service any PV/S for which the RECERT Manager has identified deficiencies until the deficiencies have been corrected. Alternatively, a variance may be processed in

accordance with Section 3 of this directive in order to resume operation of the PV/S until the deficiencies can be corrected.

- t. Initiate repair of PV/S deficiencies discovered during ISI, and notify the RECERT Manager upon completion of corrective actions;
- u. Notify the RECERT Manager of any PV/S that is removed from service;
- v. Perform compliance spot checks to verify operations are conducted within the operational parameters of the PV/S; and
- w. Ensure that PV/S are operated and maintained by skilled, adequately trained, and qualified personnel who shall be certified in accordance with NPR 8715.3.

2.5 Safety and Environmental Division shall:

- a. Review RECERT operations for compliance with OSHA, NPD 8710.5, and NASA-STD-8719.17; and
- b. Monitor the institutional safety requirements of this directive.

2.6 Facilities Management Division (FMD) shall notify the RECERT Manager of any planned PV/S acquisition, installation, modification, repair, relocation, or removal as part of any facilities project. To ensure compliance and certifiability, all PV/S designs and specifications shall be supplied to the RECERT Manager for review prior to contract implementation.

3. Variances

NOTE: NASA does not have approval authority for variances to Federal, State, or local regulations (e.g., OSHA), nor to consensus standards that are required by Federal regulations that apply to NASA (e.g., ANSI, Compressed Gas Association (CGA), American Conference of Governmental Industrial Hygienists (ACGIH)). Any variance of a Federal, State, or local regulation must be reviewed by NASA Headquarters Office of Safety and Mission Assurance prior to submittal to the appropriate Federal, State, or local agency for approval.

- 3.1 Variances to the requirements of this directive shall be prepared and approved as outlined in NPR 8715.3, NPD 8710.5, NASA-STD-8719.17, and GPR 1400.1 prior to operation.
- 3.2 If a mandatory requirement of this directive cannot be met, a detailed variance request package shall be prepared by the requesting organization in accordance with NPR 8715.3.
- 3.3 A risk acceptance plan shall be developed with supporting information including, but not limited to, operational and maintenance parameters, special constraints or instructions required for safe operation, any special training needs, required personal protective equipment, engineering and procedural controls, and any special inspection requirements.
- 3.4 The safety variance request package shall be reviewed and the risk accepted by the initiating Division Office and forwarded to the RECERT Manager for review and concurrence.

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- 3.5 Upon concurrence by the RECERT Manager, the variance shall be routed as stipulated in GPR 1400.1. Variance requests approved by the Center shall be forwarded to NASA HQ/QS within 14 days.

Appendix A: Codes, Standards, and Guides for Ground-Based PV/S

Conformance to the codes, standards, and guides delineated herein is mandatory. Where reference is made to any of these documents, it is to the latest edition of that document, unless specifically noted otherwise. Regulations promulgated by Federal, State, or Local authorities which are applicable to specific PV/S shall be considered to be included herein. In the event of a conflict between the requirements of a referenced document and the requirements of this directive, this directive takes precedence, with the exception that the requirements contained in Federal Regulations always take precedence. The RECERT Manager may invoke the requirements of other codes, standards, and guides when specific situations warrant.

- a. ASME B19.1, Safety Standard for Air Compressor Systems
- b. ASME Boiler and Pressure Vessel Code
- c. ASME B31 Code for Pressure Piping
- d. American Petroleum Institute (API) Codes
- e. NB-23, National Board Inspection Code, published by the National Board of Boiler and Pressure Vessel Inspectors
- f. ASME B40.1, Code for Gauges, Pressure Indicating Dial Type - Elastic Element
- g. CGA P-1, Safe Handling of Compressed Gases in Containers

Appendix B: DOCUMENTATION REQUIREMENTS SPECIFIC TO GSFC PV/S

The following documentation for the applicable PV/S Class shall be provided to the RECERT Manager prior to placing the component or system in service. For all Classes of PV/S, Manufacturer's O&M manuals shall be provided where applicable.

Class A: ASME Code Compliant Pressure Vessels

Manufacturer's Data Reports (MDR) for:

1. Section VIII, Division 1 Vessels: ***MDR Form U-1 or U-1A, as applicable.***
2. Section VIII, Division 2 Vessels: ***MDR Form A-1***
3. Section VIII, Division 3 Vessels: ***MDR Form K-1***

4. Section X, Fiber-Reinforced Plastic Pressure Vessels: *MDR Form RP-1 or RP-3, as applicable.*

Class A: ASME Code Compliant Pressure Piping

Provide the engineering design¹ including:

1. Design and operating conditions
2. Material and Component Specification (ASTM or ASME or ANSI)
3. Pipe/tubing Size
4. Pipe/tubing Wall thicknesses
5. Pipe/tube fitting type and class (socket weld, butt weld, threaded, mechanical (swage), etc)
6. Valve type, manufacturer, model number, material of construction (body, stem, seat(s)), pressure and temperature rating
7. Overpressure protection: Manufacturer, model number, type, size, capacity, set point, seat material
8. Pressure Regulators: Manufacturer, model number, type (single stage, dual stage), material, size, max inlet pressure, max outlet pressure
9. Pressure gages: Manufacturer, model number, inlet size, range
10. As-built P&ID
11. Welding Procedure Specification (WPS) or Brazing Procedure Specification (BPS), including applicable Procedure Qualification Record (PQR).
12. Copy of welder performance qualification (WPQ) or brazer performance qualification (BPQ).
13. Record of Code-required NDT
14. Record of Code-required pressure test

Class B: Other Code Compliant Pressure Vessels and Piping Systems

1. Documentation designating the Code of Record (American Petroleum Institute (API), U.S. Department of Transportation (DOT), Compressed Gas Association (CGA), American Water Works Association (AWWA), etc.) used for design; materials; fabrication and assembly; and inspection, examination, and testing, together with the design and operating conditions.

¹ *Engineering Design* is defined by ASME B31.3, Process Piping, as the detailed design governing a piping system, developed from process and mechanical requirements, conforming to Code requirements, and including all necessary specifications, drawings, and supporting documents.

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2. Manufacturer's O&M manual, if applicable
3. Material and Component Specification (ASTM or ASME or ANSI)
4. Pipe/tubing and/or Vessel Size
5. Pipe/tubing and/or Vessel Wall thickness
6. Pipe/tube fitting type and class (socket weld, butt weld, threaded, mechanical (swage), etc)
7. Valve type, manufacturer, model number, material of construction (body, stem, seat(s)), pressure and temperature rating
8. Overpressure protection: Manufacturer, model number, type, size, capacity, set point, seat material
9. Pressure Regulators: Manufacturer, model number, type (single stage, dual stage), material, size, max inlet pressure, max outlet pressure
10. Pressure gages: Manufacturer, model number, inlet size, range
11. As-built P&ID
12. Welding Procedure Specification (WPS) or Brazing Procedure Specification (BPS), including applicable Procedure Qualification Record (PQR).
13. Copy of welder performance qualification (WPQ) or brazer performance qualification (BPQ).
14. Record of Code-required NDT
15. Record of Code-required pressure test

Class C: Non-Code PV/S

PV/S that do not meet all of the requirements of applicable codes, standards, guides, and regulations are classified as Class C: Non-Code PV/S. Since the degree of noncompliance varies from system to system, Class C documentation requirements shall be determined on a case-by-case basis. In all cases, the following shall be provided to the RECERT Manager prior to Certification.

Class C PV/S shall only be certified and allowed to operate if:

1. A documented risk and hazard assessment has been performed,
2. The Owner acceptance of residual risk has been documented, and
3. Center approval has been formally documented by means of a variance in accordance with NASA-STD-8719.17 and GPR 1400.1.

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In addition to the documentation requirements delineated above, the following shall also be provided to the RECERT Manager prior to Certification. To the extent possible, Code design and construction techniques shall be utilized on Class C PV/S, in particular through the use of:

1. Documented Code material, i.e., material whose specifications and grades are approved for use by the Code that would otherwise apply to construction.
2. Documented components, (i.e. valves, fittings, elbows, etc.) that are certified to standards approved for use by the Code that would otherwise apply.
3. Documented Code-certified welding processes, personnel, and “U” authorized shops (pressure vessels only) that meet all applicable ASME Quality Assurance and certification requirements for Code construction.

Note: NASA fabrication shops that do not possess an ASME “U” authorization (for pressure vessel fabrication), regardless of individual personal training, qualifications, and certifications, shall not be considered equivalent to Code certified shops and hence shall only perform Non-Code pressure vessel welding.

4. Documented assurance of material design factors of safety of no less than a Code PV/S.

Class D: Ground Support Equipment (GSE)

1. Documentation designating the Code of record used for design; materials; fabrication and assembly; and inspection, examination, and testing.
2. Design and operating conditions
3. Material and Component Specification (ASTM or ASME or ANSI)
4. Pipe/tubing and/or Vessel Size
5. Pipe/tubing and/or Vessel Wall thickness
6. Pipe/tube fitting type and class (socket weld, butt weld, threaded, mechanical (swage), etc)
7. Valve type, manufacturer, model number, material of construction (body, stem, seat(s)), pressure and temperature rating.
8. Overpressure protection: Manufacturer, model number, type, size, capacity, set point, seat material
9. Pressure Regulators: Manufacturer, model number, type (single stage, dual stage), material, size, max inlet pressure, max outlet pressure
10. Pressure gages: Manufacturer, model number, inlet size, range
11. Welding Procedure Specification (WPS) or Brazing Procedure Specification (BPS), including

applicable Procedure Qualification Record (PQR).

12. Copy of welder performance qualification (WPQ) or brazer performance qualification (BPQ).
13. Record of Code-required NDT
14. Record of Code-required pressure test
15. As-built P&ID

Class E: Excluded PV/S

Documentation requirements shall be established on a case-by-case basis, and will generally include information necessary to validate inclusion in Class E. Excluded systems are subject to the requirements of OSHA, the applicable NCS, and NASA safety requirements. Operation of excluded commercial off-the-shelf (COTS) systems shall be within manufacturers placard limitations.

Class R: Research and Development PV/S

Documentation requirements shall be established on a case-by-case basis, and will generally include the same types of information required for Class D GSE.

Class W: PV/S Operating Under an Approved Variance

Documentation requirements shall be established on a case-by-case basis.

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	03/12/2004	Initial Release
A	12/29/04	As directed during the FY04 Center Rules Review, the Responsible Office modified this document to remove requirements that were no longer needed and to clearly distinguish requirements from supporting information. Administrative changes were made throughout to correct responsible organization names and codes, and to retitle Goddard Procedures and Guidelines (GPG) to Goddard Procedural Requirements (GPR). All changes were reviewed and approved by the Goddard Quality Management System Council (QMSC).
A	10/26/05	Administrative change – Directive was changed to reflect a change in the responsible organization from code 540, the Mechanical Systems Division, to code 250, the Safety and Environmental Division.
B	07/16/09	Return Responsible Office to 540/Mechanical Systems Division from 250/Safety and Environmental Division. In addition, the document was updated in its entirety to reflect requirements stipulated in NASA-STD-8719.17.