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NASA Procedural Requirements

COMPLIANCE IS MANDATORY**NPR 8715.7A**
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Subject: Expendable Launch Vehicle (ELV) Payload Safety Program

Responsible Office: Office of Safety and Mission Assurance[| TOC](#) | [Preface](#) | [Chapter1](#) | [Chapter2](#) | [AppendixA](#) | [AppendixB](#) | [AppendixC](#) | [AppendixD](#) | [ALL](#)

Chapter 1. Program Overview

1.1 Introduction

NASA ELV payloads often incorporate hazards which can pose significant risk to life and property. NASA ELV payload missions require the coordination of efforts among a diverse group of participants who have varying responsibilities and authorities. These missions can present unique challenges to the payload safety assurance process, which often involves numerous organizations internal and external to the Agency. The Office of Safety and Mission Assurance (OSMA) has established the NASA ELV Payload Safety Program to assist ELV payload projects in achieving safety design objectives, obtaining the necessary safety approvals, and assuring that the objectives are satisfied for all ELV payload missions. This chapter describes the general roles, responsibilities, and requirements of the NASA ELV Payload Safety Program.

1.2 ELV Payload Safety Program Purpose

Note: NPR 8715.3, NASA General Safety Program Requirements, Chapter 3, contains safety policy applicable to all types of payloads controlled by NASA. The following is consistent with that general Agency policy.

1.2.1 Consistent with its policies in NPD 8700.1, NASA Policy for Safety and Mission Success, NASA has a responsibility to safeguard people and resources (including flight hardware and facilities) from hazards associated with ELV payloads, payload to launch vehicle integration, multiple payloads, and payload-related GSE by eliminating the hazards or reducing associated risks to an acceptable level.

1.2.2 As part of this responsibility, NASA maintains the ELV Payload Safety Program to:

a. Establish and maintain technical and procedural safety requirements applicable to NASA ELV payload design, production, processing and testing, vehicle integration, launch through payload separation, and planned return-to-Earth recovery or sample return.

Note: The ELV Payload Safety Program's involvement with payload system safety during launch and the ascent flight phase through payload separation from the launch vehicle is to ensure that a payload does not cause a launch failure with potential public safety consequences.

b. Coordinate with U.S. and foreign entities that participate in NASA ELV payload projects as needed to identify and ensure compliance with tailored safety requirements that apply to each payload.

Note: The requirements of this NPR (including requirements incorporated by reference) apply to all NASA ELV payloads. Most NASA ELV payloads of high priority and national significance are launched through the NASA Launch Services Program. Special cases may include NASA payload launches on Department of Defense or foreign launch vehicles. Other NASA payloads of lower priority are often for space technology gains and may not use NASA Launch Services Program. The requirements tailoring process defined in this NPR and NASA-STD 8719.24, NASA Expendable Launch Vehicle Payload Safety Requirements, is designed to address typical NASA missions as well as special cases (see paragraph 1.5 and 1.6 of this NPR).

- c. Ensure that relevant safety requirements are incorporated into the overall requirements for each NASA ELV payload, the contracts for any related procurements, and any related cooperative and grant agreements.

Note: It is the intent of this NPR to ensure adherence to applicable safety requirements that provide an equivalent level of safety for all NASA ELV payloads, other resources, and personnel regardless of where the payload is being processed, including commercial facilities.

- d. Maintain an independent payload safety review and approval process designed to ensure that each NASA ELV payload project properly implements all applicable safety requirements as part of its risk management process.

1.3 ELV Payload Safety Program Roles and Responsibilities

1.3.1 The Chief, Safety and Mission Assurance:

- a. Oversees and provides funding for administration of the ELV Payload Safety Program.
- b. Approves and promulgates Agency-level ELV payload safety policy and requirements, including the provisions of this NPR and associated implementation documents.
- c. Designates (or assures the flow down of) SMA Technical Authority per NPR 7120.5 as applicable to ELV payload missions and the requirements of this NPR.

Note: For most NASA ELV payload projects, there is an SMA Technical Authority with overall SMA responsibility for the project who would generally be located within the responsible Center SMA organization. There is also an SMA Technical Authority with responsibility for the launch area processing activities, who is generally the SMA Technical Authority for ELV launches conducted under the NASA Launch Services Program. It is possible for a safety issue to overlap two areas of SMA responsibility. In this case, both SMA Technical Authorities would participate in resolving the issue.

- d. Designates, in writing, the NASA ELV Payload Safety Manager (see paragraph 1.3.3 of this NPR).
- e. Designates, in writing, the members of the ELV Payload Safety Agency Team (see paragraph 1.3.4 of this NPR).
- f. Resolves any conflicts within the ELV payload safety process requiring an Agency-level decision.

1.3.2 Each SMA Technical Authority responsible for a payload:

- a. Approves tailoring of safety requirements and Equivalent Level of Safety (ELS) determinations per paragraph 1.4 of this NPR.

Note: In accordance with NPD 1000.0, NASA Governance and Strategic Management Handbook, any delegation of the Technical Authority role is traceable to the Administrator and funded independent of Programmatic Authority.

- b. Concurs on waivers to safety requirements per paragraph 1.4.3 of this NPR.

Note: The Technical Authorities for Engineering and Health and Medical may also be involved in the tailoring, ELS, and waiver processes as applicable.

c. Concur on the issuance of the Certificate of ELV Payload Safety Compliance per paragraph 2.4.2 of this NPR.

1.3.3 The NASA ELV Payload Safety Manager leads the ELV Payload Safety Program. In this capacity, the NASA ELV Payload Safety Manager:

- a. Serves as the Agency focal point for matters involving ELV payload safety.
- b. Assists the OSMA in developing, maintaining, and overseeing the implementation of Agency-level ELV payload safety requirements.
- c. Maintains the safety review and approval process for NASA ELV payloads.

Note: The ELV Payload Safety Review and Approval Process is defined in Chapter 2 of this NPR. The NASA ELV Payload Safety Manager's responsibilities specific to the process are provided in paragraph 2.3.5 of this NPR.

- d. Provides input and guidance to NASA officials responsible for development of ELV payload-related contracts, grants, and cooperative agreements with entities internal and external to NASA, including foreign entities.
- e. Reports to the OSMA on any ELV payload safety concern requiring an Agency-level decision.
- f. Ensures, for NASA payloads and payload contributions, the establishment of both a Payload Safety Working Group (PSWG) and a safety review and approval process.
- g. Participates as an element of the NASA Headquarters Safety and Mission Assurance Audits, Reviews, and Assessments program defined by NPR 8705.6 for the area of ELV payload safety.
 - (1) Participates in appropriate assessments of payload safety processes at NASA Centers, component and range facilities, payload processing facilities (including contractor facilities used to process NASA ELV payloads), and launch sites.
 - (2) Coordinates independent assessments of payload safety processes with the audits, reviews, and assessments performed by the OSMA to ensure an effective and efficient overall safety assessment process.
- h. Coordinates with the Office of International and Interagency Relations (OIIR) to open and further enhance communications with U.S. and international governments, foreign entities, and space agency partnerships regarding NASA ELV payload safety.
- i. Ensures that safety review activities and actions are coordinated with the NASA Centers, ELV payload projects, launch vehicle contractors, ELV Payload Safety Agency Team, and appropriate approving authorities (including the SMA Technical Authority when appropriate) to resolve payload safety concerns in support of overall mission success.
- j. Establishes and maintains ELV payload safety training courses addressing NASA ELV payload safety requirements, safety review and approval process, and related activities.
- k. Provides a forum for payload safety technical interchange and lessons learned, including educational workshops for the benefit of the ELV payload community.
- l. Tracks and implements recommended improvements regarding the safety review process and updates processes and requirements as needed.
- m. Develops and maintains a NASA ELV Payload Safety Web site as a tool that may be used by ELV payload projects and other involved organizations to provide access to applicable documents, schedules, notices of special events, and other project and ELV Payload Safety Program information.
- n. Develops, tracks, documents, and reports metrics data on the success of the ELV Payload Safety Program and develops recommendations for continuous improvement and areas of emphasis.
- o. Ensures, in coordination with the OIIR, that appropriate agreements exist with Air Force Range Safety and other external organizations for their participation in ELV Payload Safety Program activities.
- p. Leads the NASA ELV Payload Safety Agency Team (Agency Team) which:
 - (1) Establishes and documents the activities and processes needed for the Agency Team to satisfy the responsibilities identified in paragraph 1.3.4 of this NPR.
 - (2) Ensures decisions have been coordinated with all Agency Team members.

q. Coordinates with the Agency Team and each PSWG Chairperson as necessary to ensure consistent tailoring, waivers, and ELS approaches for all NASA ELV payload requirements.

1.3.4 The ELV Payload Safety Agency Team's role is to provide Agency-wide perspective and insight on ELV payload safety-related activities and requirements in support of Payload Safety Working Groups (PSWG), (see paragraph 2.2 of this NPR), OSMA, and SMA Technical Authorities. The Agency Team:

- a. Promotes the consistent implementation of the policy and requirements of this NPR (including requirements incorporated by reference) throughout the Agency.
- b. Remains cognizant of payload safety concerns and disseminates related information to applicable payload projects.
- c. Establishes positions regarding concerns, guidance, or comments applicable to a payload project and provides those positions to the project's PSWG (see paragraph 2.2 of this NPR) as early as possible in the safety review process.
- d. Provides advice to the Chief, Safety and Mission Assurance, and the SMA Technical Authorities on ELV payload safety concerns, including any issues requiring an Agency-level decision.
- e. Provides consistent interpretation of payload safety requirements (including determination of requirements applicability) and guidance on the proper implementation of those requirements.
- f. Issues interim guidance to the NASA ELV payload community on safety requirements, processes, and specific payload design concerns as needed to assure the policy and requirements of this NPR are satisfied.
- g. Coordinates with the PSWG as needed to provide the SMA Technical Authorities with assessments of alternative approaches proposed as part of tailoring, ELS determination, and waivers of requirements in accordance with paragraphs 1.4.1 through 1.4.9 of this NPR.
- h. Evaluates the need for improvements of ELV payload safety-related practices or requirements necessitated or made possible by technological and methodological advances or organizational changes.
- i. Coordinates with other SMA programs and disciplines to assure consistency of practices and requirements and efficiency of processes.
- j. Reports annually to OSMA on the state of the ELV Safety Program, including the effectiveness of program elements and near- and long-term challenges and objectives.

1.3.5 Each Center Director responsible for a Payload, Payload Processing Facility, or Launch Site shall support the ELV Payload Safety Program (Requirement). The Center Director (or designee):

- a. Establishes the Center-level processes and associated requirements needed to ensure that the policy in paragraph 1.2 of this NPR is satisfied for each ELV payload project that uses the Center's resources.
- b. Supports safety assessments of ELV payload activities and responds to all findings and recommendations for which the Center is responsible.
- c. Ensures that relevant Center personnel working on or with the NASA ELV payload safety requirements, safety review and approval process, and related activities are qualified and able to perform their associated duties.

Note: The ELV Payload Safety Manager is responsible for developing an ELV payload safety training program per paragraph 1.3.3.j of this NPR.

d. Ensures that Center institutional resources (including any GSE and facilities) provided to the payload project to support the processing, testing, vehicle integration, launch, and planned return-to-Earth payload recovery or sample-return activities of NASA ELV payloads comply with applicable NASA and Center technical and procedural requirements.

1.3.6 Each NASA Center SMA Director responsible for a Payload, Payload Processing Facility, or Launch Site shall support the ELV Payload Safety Program (Requirement). The SMA Director (or designee):

- a. Ensures implementation of this NPR for each ELV payload project that uses the Center's resources.
- b. Provides each payload project with the SMA expertise needed to ensure the project successfully completes the safety review and approval process defined in Chapter 2 of this NPR.

1.3.7 Mission Directorates and Programs shall ensure (Requirement):

- a. Funding and other resources needed are available to meet the requirements of this NPR regardless of the launch

vehicle provider or launch vehicle procurement method.

b. Contract, Grant, Cooperative Agreement, or Other Agreement Officers are provided with the requirements documentation and provisions to satisfy the requirements of NASA-STD 8719.24 and this NPR for incorporation into contracts and agreement(s).

c. The ELV Payload Safety Program, through the PSWG, is provided adequate information to meet the requirements of this NPR, including:

(1) Information on payload/launch vehicle interface safety concerns.

(2) Notification of project and program meetings to include design, launch vehicle coordination, ground operations, and others.

1.3.8 NASA Contract, Grant, Cooperative Agreement, or Other Agreement Officers shall ensure that requirements documentation provided by the program manager, project manager, or their designee that is necessary to comply with this NPR and obtain the approval of relevant authorities is incorporated in the contracts and agreement(s) governing each payload (Requirement).

1.4 Tailoring, Equivalent Level of Safety, and Waiver Processes

1.4.1 The overall intent of the ELV payload safety requirements tailoring process is to ensure appropriate oversight of Agency requirements while providing the Centers and project managers with the authority and flexibility needed to accomplish their tasks. There are three levels of requirement relief with respect to the requirements in this NPR and NASA-STD 8719.24: tailoring, equivalent level of safety, and waiver.

a. Tailoring. For the purposes of this NPR, tailoring is defined as the process of assessing the applicability of safety requirements within this NPR and NASA-STD 8719.24 and other documents applicable to a payload project and evaluating the project's potential implementation in order to generate a set of specific safety requirements for the project.

(1) Tailoring may result in the deletion of a requirement, a change to a requirement, or an approach that differs from the stated requirement.

(2) The Payload Project Office shall coordinate with their mission PSWG as soon as the project identifies a potential noncompliance with a safety requirement (Requirement). A noncompliance may result in an Equivalent Level of Safety (ELS) or a waiver.

b. ELS. For the purposes of this NPR, an ELS determination is a noncompliance with a requirement where, as part of the tailoring process, the cognizant authorities concur on an alternate approach that does not provide additional risk as determined by qualitative or quantitative means.

c. Waiver. For the purpose of this NPR, a waiver is defined as a written authorization granting relief from an applicable requirement and documenting the acceptance of associated safety risk.

Note: The waiver terminology and process defined in this NPR are consistent with that of the launch range and payload processing community generally involved in NASA ELV payload missions. This consistency is considered essential to allow clear communication and resolution of waiver issues with the ELV payload community, which includes numerous organizations internal and external to NASA. There may be other Agency policy and terminology related to waivers that are exclusively internal to NASA. The ELV Payload Safety Program remains cognizant of NASA policy related to waivers and works with the payload projects and PSWGs to resolve any implementation concerns. In general, the Tailoring Process, coupled with the ELS and Waiver Processes, meet the overall intent of NASA policy to provide for appropriate oversight of Agency safety requirements while allowing the flexibility to accept reasonable risks necessary to accomplish ELV payload missions.

1.4.2 The Payload Project Office, in coordination with the PSWG, shall tailor NASA-STD 8719.24 Annex into a set of mission-specific payload safety requirements (Requirement).

1.4.3 The Payload Project Office, in coordination with the PSWG, shall ensure that ELS determinations that are part of the tailoring are clearly identified in the project-specific payload safety requirements and that the documentation contains or references approval rationale for each ELS determination that makes it credible that the determination does not result in additional risk (Requirement).

1.4.4 The Payload Project Office, with concurrence from the PSWG, shall obtain approval of the project-specific payload safety requirements, including ELS determinations, from the SMA Technical Authority and other relevant authorities, as determined by the PSWG, in accordance with NASA-STD 8719.24 (Requirement).

1.4.5 Following completion and signature of the project-specific payload safety tailored requirements, the Payload Project Office, with concurrence from the PSWG, shall obtain approval for any changes to the project-specific payload safety requirements and post-tailoring ELS determinations from the original signatures and, if appropriate, any authorities newly impacted by the change, as determined by the PSWG (Requirement).

Note: Post-tailoring ELS determinations are documented on the NASA Form NF1826 NASA ELV Payload Safety Post Tailoring Equivalent Level of Safety (ELS) Request found on the NASA ELV Payload Safety Web site at <http://kscsma.ksc.nasa.gov/ELVPayloadSafety/Default.html> under the "ELV Payload Safety Forms" button.

1.4.6 The Payload Project Office shall request a waiver (per paragraph 1.4.7 and 1.4.8 of this NPR) when the PSWG determines that noncompliance with or changes to a requirement result in an increased safety risk (Requirement).

1.4.7 The Payload Project Office shall obtain waivers from the SMA Technical Authorities and other relevant authorities, as determined by the PSWG and ELV Payload Safety Manager, using the NASA ELV Payload Safety Waiver Request NF1827 found on the NASA ELV Payload Safety Web site at <http://kscsma.ksc.nasa.gov/ELVPayloadSafety/Default.html> under the "ELV Payload Safety Forms" button (Requirement). Other relevant authorities may include, but are not limited to, the following:

- a. Engineering, Health and Medical Technical Authorities, as applicable.
- b. The NASA Center Director (or NASA designee) responsible for the payload project and any additional NASA Center Director (or NASA designee) responsible for people or property subject to additional risk due to the noncompliance.
- c. The Project Manager (or designee) responsible for the Payload Project requesting the waiver.
- d. Non-NASA officials responsible for ranges or facilities utilized by the project.

Note: The required NASA signatures are in addition to any local approvals required when utilizing a non-NASA range or facility, such as approval by the Air Force Range Commander for payload missions utilizing an Air Force range. Such local approvals may be documented on the same waiver document as the NASA signatures or on a separate equivalent document depending on local agreements and procedures.

1.4.8 Prior to submitting a waiver request to relevant authorities, the Payload Project Office shall obtain concurrence for the request from the PSWG and the ELV Payload Safety Program Manager (Requirement). Concurrence indicates a determination that:

- a. The waiver request and accompanying data are correct and complete.
- b. Safety risks and related cost, schedule, and performance considerations are properly characterized and the increase in risk is identified and acceptable to the Agency.
- c. Effects the waiver might have on other projects, resources, or requirements are properly characterized.
- d. The Payload Project Office intends to request concurrences or consents, as appropriate, for the waiver from all relevant NASA and non-NASA authorities.

1.4.9 In the event that a relevant authority does not concur with or consent to Tailoring, an ELS, or a Waiver, and the issue cannot be resolved through coordination with the PSWG, the Agency Team, or the SMA Technical Authority or Authorities, all interested parties shall brief their position to the Chief, Safety and Mission Assurance to identify the best approach to achieve resolution (Requirement).

1.5 Auxiliary Payloads Ridesharing on Launch Services Program Contracted Launch Vehicles

1.5.1 For small satellites that are easily accommodated as auxiliary payloads ridesharing on a launch vehicle procured by the NASA Launch Services Program for a primary mission, the auxiliary payload provider shall obtain a determination from the SMA Technical Authority for the ELV, based on an evaluation of energy sources and other potential hazards, whether the safety review and approval process for the small satellite must be in accordance with Chapter 2 of this NPR and NASA Standard 8719.24 (Requirement).

Note: This requirement applies to so-called CubeSats, Nano-satellites, Picosatellites, and other small research satellites launched by LSP with a primary payload.

1.5.2 The ELV SMA Technical Authority shall inform the NASA ELV Payload Safety Manager of any determination and associated rationale concerning the safety review and approval process made in accordance with paragraph 1.5.1 in this NPR (Requirement).

1.5.3 For small auxiliary satellites for which the safety review and approval process is not required to be in accordance with Chapter 2 of this NPR and NASA Standard 8719.24, per section 1.5.1 of this NPR, the Payload Project Office shall plan and implement an alternate safety review and approval process with the concurrence from the ELV SMA Technical Authority (Requirement).

Note: Safety for NASA small satellites is implemented per their Program or Project SMA Plan, as required by NPR 8715.3, NASA General Safety Program Requirements, with inclusion of safety requirements as dictated by the payload processing facility, launch vehicle, range safety organizations, and local safety authorities.

1.6 Payloads Not Using Launch Services Program Procured Launch Vehicle Services

1.6.1 For payload projects not using the NASA Launch Services Program to procure launch vehicle services, the SMA Technical Authority responsible for the payload, in consultation with the project and the NASA ELV Payload Safety Program Manager, shall determine whether the project follows the safety review and approval process in this NPR (Requirement).

1.6.2 For payload projects that do not follow the safety review and approval process in this NPR per paragraph 1.6.1, the project, with concurrence from the SMA Technical Authority responsible for the payload and in consultation with the ELV Payload Safety Program Manager, shall plan, document, and implement an alternate process that meets the objectives of paragraph 1.2.2 (Requirement).

1.7 Missions Involving Payload Recovery

1.7.1 For missions involving payload recovery operations, the Payload Project Office, with concurrence from the project SMA Technical Authority, shall plan and implement a process to address hazards and safety requirements associated with recovery operations (Requirement).

1.7.2 The project SMA Technical Authority, in consultation with the ELV Payload Safety Manager, shall ensure the implementation of an independent safety review process, at PDR, CDR, PSR, and during the mission, and involving relevant authorities, to evaluate the mitigation of hazards associated with recovery operations (Requirement).

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