



Procedures and Guidelines (PG)

DIRECTIVE NO. 800-PG-8621.0.1B

EFFECTIVE DATE: December 19, 2018

EXPIRATION DATE: December 19, 2023

APPROVED BY Signature: Original Signed by

NAME: William A. Wrobel

TITLE: Director of Suborbital and Special Orbital Projects

COMPLIANCE IS MANDATORY

Responsible Office: 800/Suborbital and Special Orbital Projects Directorate

Title: Suborbital Research Program Anomaly Investigation and Reporting

PREFACE

P.1 PURPOSE

This directive establishes the procedure and the process for establishing an Anomaly Review Board (ARB). This process is not applicable to investigations performed under the guidance of NPR 8621.1, *NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping*.

P.2 APPLICABILITY

This directive is applicable to suborbital programs/projects identified in the current Suborbital Research Program Plan and managed by the Wallops Flight Facility (WFF). Specifically this procedure is applicable to the Science Mission Directorate's (SMD) Projects: Scientific Balloons, Airborne Science, Sounding Rockets, and Special Orbital Projects as assigned to the Code 800 Suborbital and Special Orbital Projects Directorate (SSOPD) by SMD. These projects may also be referred to as programs for historical reasons. This process may also apply to non-NASA customers based on tailored program requirements.

Any incident that meets the NPR 8621.1 criteria for a NASA Mishap or Close Call will be investigated via the NPR 8621.1 process.

- a. In this document citations are assumed to be the latest version unless otherwise noted.
- b. In this document, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission; "should" denotes a good practice and is recommended but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.

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P.3 AUTHORITY

- a. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
- b. GPR 8621.4, GSFC Mishap Preparedness and Contingency Plans

P.4 APPLICABLE DOCUMENTS AND FORMS

- a. NPD 8700.1, NASA Policy for Safety and Mission Success
- b. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
- c. NPR 7120.8, NASA Research and Technology Program and Project Management Requirements
- d. NPR 8715.3, NASA General Safety Program Requirements
- e. NPR 8715.5, Range Flight Safety Program
- f. Suborbital Research Program Plan (Current version)
- g. Research and Technology Program Commitment Agreement Suborbital Research Program (Current version)

P.5 CANCELLATION

800-PG-8621.0.1, Suborbital Anomaly Investigation and Reporting

P.6 SAFETY

N/A

P.7 TRAINING

N/A

P.8 RECORDS

Record Title	Record Custodian	Retention
Portfolio Project Plans	Program Office	*NRRS 8/103, Temporary. Destroy/delete between 5 and 30 years after program/project termination.
Anomaly Review Board Charter/Appointment Memorandum	Program Office	*NRRS 8/103
Anomaly Review Board Final Report	Program Office	*NRRS 8/103

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Program Office’s Response to Final Report	Program Office	*NRRS 8/103
Program Office confirmation of acceptable risk as the most likely cause of a failure	Program Office	*NRRS 8/103

* *NRRS 1441.1 – NASA Records Retention Schedule*

P.9 MEASUREMENT/VERIFICATION

N/A

PROCEDURES

Based on the risk posture of suborbital projects/programs, these projects knowingly accepts risks that more complex missions may not. The Suborbital Research Program is funded as a set of uncoupled Research and Technology (R&T) projects (which are referred to as programs for historical reasons), each with a separate funding and management structure. Each project conforms to the NASA project management processes detailed in NPR 7120.8, *NASA Research and Technology Program and Project Management*. These projects support a wide variety of fundamental scientific, technological, and educational investigations related to Earth science, heliophysics, planetary science, astronomy and astrophysics.

Each program/project has a portfolio of R&T investigations with unique science and platform requirements. Suborbital research missions must comply with all agency safety policies, including but not limited to NPR 8715.3, *NASA General Safety Program Requirements* and NPR 8715.5, *Range Flight Safety Program*. Suborbital research program/projects are typically low cost, level of effort activities, with less than Class D mission assurance requirements.

Per NPD 8700.1, *NASA Policy for Safety and Mission Success*, the Suborbital Research Program will establish mission assurance requirements within their projects in conjunction with the designated Center Technical Authority at a level of rigor commensurate with the cost and complexity of the project. Each Suborbital Research Program Office (Balloon, Aircraft, and Sounding Rockets) shall be responsible for providing the required mission assurance for the respective carrier. The aggregate mission success (launch vehicle and experiment success) is expected to be on the order of 85 percent in a given year for suborbital rocket and balloon projects. Accepted risks associated with the project or science investigation are documented in the projects’ portfolio plan and/or annexes to ensure that the risk is understood and agreed to by the Principal Investigator (PI) and the project, such that no further specific mitigating action is required. The PI shall be responsible for the mission assurance of the payload.

The program/project’s Mishap Preparedness & Contingency Plan (MPCP) will delineate responsibilities in regards to which organization will be responsible for the anomaly review.

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1.0 Risk

It is the responsibility of each Suborbital Research Program Office to establish and document the accepted risks for their missions. Program Offices implement risk management plans at a level commensurate with the cost, complexity, and risk of their Program, identifying acceptable risks for both the carrier and the payloads. These acceptable risks will be the basis for risk acceptance for each of the investigations (missions)/projects conducted by the program office except as noted in the individual investigation (mission)/project plans (Mishap Preparedness and Contingency Plans). Individual investigations (missions) within the portfolio may choose to accept more or less risk depending on customer requirements. Accepted risks associated with the project or science investigations are documented in the investigation (mission)/project plan to ensure that the risk is understood and agreed to by the program/project, such that no further specific mitigating action is required.

2.0 Appointment of Anomaly Review Board

When a program/project does not obtain minimum success requirements due to one or more of the accepted risks occurring, the affected Program Office Chief will appoint (by charter memorandum with approval from the Director of SSOPD), an independent ARB. The chair of the ARB will be a government employee from a technical organization other than the affected Program. At the discretion of the Program Office Chief, with the approval of the Director of SSOPD, an experienced contractor employee may be allowed to chair the ARB as long as there is Government employee participation in the ARB (with the Government employee(s) being sufficiently experienced in the topic of the anomaly and having sufficient tenure or longevity with the Government). The remainder of the board members will be comprised of qualified civil servants and contractors.

Note: Exception to the above paragraph: On a case-by-case basis, the ARB chair may be a member of the Program Office. This shall require approval from the Director of SSOPD.

When a program/project encounters a technical anomaly that does not negatively impact minimum success it is at the discretion of the Program Office Chief on how best to investigate the technical anomaly.

The board shall consist of a minimum of three members plus an executive secretary. The executive secretary may be someone without an engineering or science (technical) background responsible for scheduling meetings, note taking, production of the final report, etc. The appointing official is encouraged to add a board member with little or no experience in the investigation process. This will allow for employees to learn the investigation processes.

The affected Program Office shall provide support and consultation to the ARB as required.

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If the ARB determines the suspected anomaly is not due to an accepted risk, but is actually a mishap or close call as defined in the NPR 8621, the ARB Chair will implement the appropriate GSFC mishap investigation process (GPR 8621.4, *GSFC Mishap Preparedness and Contingency Plans*) at the earliest possible date.

3.0 ARB Reporting

The ARB interim and final reports will be delivered to Program Office Chief for approval. The final report shall be delivered in a timely manner as defined in the approved ARB charter, but shall not exceed 90 calendar days.

The affected Program Office shall provide an ARB documentation package (either electronically or in paper form) to the Director of SSOPD for review. This documentation package will include: charter letter, corrective action plan, completion of corrective items, closure of the review, final report, etc. The Anomaly Review Board process shall not be formally closed until all corrective actions have been implemented by the assigned organization and approval of closure is obtained from the Director of SSOPD.

Failure of a PI's supplied payload to perform to acceptable standards is normally considered a standard accepted risk for the suborbital programs. Should this occur, the PI will be tasked to perform the anomaly review with the expectation that the PI will provide a final report to the supporting program office. The program office will review these reports to determine if any action is required by the program office.

Review of the Suborbital Research Program's anomalies will be conducted annually by the SSOPD, with attendance by the SMD, Office of the Chief Engineer, NASA Office of Safety and Mission Assurance (OSMA), and the GSFC Safety and Mission Assurance (SMA) Directorate.

4.0 Anomaly Notification

The WFF Safety Office will assist the Program Office Chief in the determination of the classification of the suspected anomaly. When it has been verified that a failure occurred as the result of an accepted risk the following notification chain will be implemented:

- a. Project Manager
- b. Program Office Chief
- c. WFF Safety Office Chief
- d. Director of SSOPD
- e. Program Executive
- f. Program Scientist
- g. Center Deputy Director
- h. Center Director

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5.0 Anomaly Investigation Guidelines

Below are minimum guidelines of the anomaly investigation process. The affected Program Office Chief and the Chief of the WFF Safety Office may tailor these guidelines for the specific anomaly.

- a. Narrative description of the facts including what, when, and where.
- b. Description explaining why the incident occurred including all findings(s) such as proximate cause(s), root cause(s), contributing factors(s), and the evidence upon which the findings are based.
- c. Description of the type of data gathered and evaluated during the investigation.
- d. An executive summary that does not contain privileged or proprietary information, material subject to the privacy act, International Traffic in Arms Regulations (ITAR) information, or Export Administration Regulations (EAR)
- e. Conclusions, including short-term and long-term recommendations to prevent recurrence.
- f. A list of advisor(s) signatures demonstrating that he/she has reviewed the investigation report that any privileged or proprietary information, ITAR information, EAR information, or material subject to the privacy act has been identified and marked as non-releasable to the public; and that sections that are releasable to the public are marked releasable and, to the best of his/her knowledge, are ready for public release.
- g. Investigating authority signature demonstrating their approval of the investigation report. (Same person who assigned the anomaly investigation).
- h. Minority report or Dissenting Opinion from any person, if there is one.
- i. A Corrective Action Plan detailing the implementation of recommended actions identifying the owning organization and expected completion date.

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Appendix A – Definitions

- A.1 Accepted Risk** – the risk that is understood and agreed to by the program/project, governing Mission Directorate, Principal Investigator (PI) and other customer(s) such that no further specific mitigating action is required.
- A.2 Anomaly** - any isolated accident, failure, or event that results in damage to flight hardware or could cause a significant schedule slip, significant cost growth, inability to meet mission requirements, and/or inability to transmit or process data.
- A.3 Risk Posture** – denotes the amount of risk a program can accept while still meeting NASA program requirements.

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Appendix B – Acronyms

ARB	Anomaly Review Board
EAR	Export Administration Regulations
ITAR	International Traffic in Arms Regulations
MPCP	Mishap Preparedness & Contingency Plan
OSMA	Office of Safety and Mission Assurance
PI	Principal Investigator
R&T	Research and Technology
SMA	Safety and Mission Assurance
SMD	Science Mission Directorate
SSOPD	Suborbital and Special Orbital Projects Directorate
WFF	Wallops Flight Facility

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	9/10/2009	Initial Release
	9/19/2014	Administratively Extended - no changes other than the signature block reflecting the current Director of SSOPD
	11/30/15	Administratively Extended – no changes
A	8/23/2018	Re-written to align with the Suborbital Research Program Plan
B	12/19/2018	Section 2.0 revised to include approval from the Director of SSOPD. Also Revised Note: Section 3.0 revised to state that the ARB process is not formally closed until approval is received from the Director of SSOPD. Section 3.0 Added 90 day requirement for getting the report accomplished. Deleted the references to “Mission Failure”. Section 5.0 (f. & g.) changed “mishap” to “investigation”

For Best Practices refer to:

<https://gs279gdmsias.gsfc.nasa.gov/GDMSv2/downloadFile.htm?docId=28819>

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