

**BY ORDER OF THE COMMANDER
AIR FORCE SPACE COMMAND**

**AIR FORCE SPACE COMMAND
MANUAL 91-710_VOLUME 4**

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Safety

**RANGE SAFETY USER
REQUIREMENTS MANUAL,
AIRBORNE FLIGHT SAFETY
SYSTEM DESIGN, TEST, AND
DOCUMENTATION REQUIREMENTS**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This manual implements Department of Defense Directive (DoDD) 3100.10, *Space Policy*; DoDD 3200.11, *Major Range and Test Facility Base*; DoDD 3230.3, *DoD Support for Commercial Space Activities*; Air Force Policy Directive (AFPD) 91-1, *Nuclear Weapons and Systems Surety*; AFPD 91-2, *Safety Programs*; AFPD 63-12, DoDI 3200.18, *Management and Operation of the Major Range and Test Facility Base*; *Assurance of Occupational Safety, Suitability, and Effectiveness*; Air Force Instruction (AFI) 91-202, *The US Air Force Mishap Prevention Program*, (AFSPC Sup 1); and the Memorandum of Agreement between the *Department of the Air Force and the Federal Aviation Administration on Safety for Space Transportation and Range Activities*. This publication incorporates information previously found in Eastern and Western Range 127-1, **Chapter 4**, *Airborne Range Safety System Design, Test*, and within previous publications of AFSPCMAN 91-710, **Chapter 4** and Documentation Requirements. It establishes the design and test requirements for the airborne flight safety system (FSS) and the associated ground support equipment (GSE) for vehicles launched from Air Force Space Command (AFSPC) ranges, including the Eastern Range (ER) and the Western Range (WR). GSE covered by Volume 4 and RCC-319 is test and support equipment provided by the range user directly related to flight hardware such as code/Mission Data Load (MDL) loading devices and automated ATP/QTP test equipment. The FSS safety approval process is defined along with the documentation requirements each Range User is expected to provide. Range Safety refers to the appropriate 30th and/or 45th Space Wing Safety Office representatives. This

volume applies to all Range Users conducting or supporting operations on the ranges. Range Users include the Department of Defense (DoD), non-DoD United States (US) government agencies, civilian launch operators, foreign government agencies and other foreign entities that use AFSPC range facilities and test equipment; conduct prelaunch and launch operations, including payloads, to orbital insertion or impact/landing; and/or require on-orbit; reentry/reuseable vehicles or other related support. Commercial users intending to provide launch services from one of the ranges shall have a license or license application in process from the Department of Transportation's Federal Aviation Administration (FAA) or have a DoD sponsorship and be accepted by the DoD to use the ER or WR. Foreign government organizations or other foreign entities shall be sponsored by an appropriate US government organization or be a customer of a Range User. This volume applies to the Air National Guard. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the Publication Office of Primary Responsibility (OPR) for non-tiered compliance items. Ensure that all records created as a result of the processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, and disposed of IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). Refer to AFSPCMAN 91-710, Volume 1, Attachment 6 for submitting/recommended supplemented changes and questions to HQ AFSPC Directorate of Safety (AFSPC/SE) using the wing's approved change request form or AF Forms 847s from the field through the appropriate functional's chain of command. This publication may be supplemented, but all direct Supplements must be routed to the OPR of this publication for coordination prior to certification and approval.

SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. ***AFSPCMAN 91-710 Volume 4 is to be used in concert with Range Commanders Council (RCC) 319.*** Each chapter of this document corresponds to chapters within RCC 319, however paragraph numbers have been renumbered to align with Air Force Publication Guidance. **NOTE:** Each individual AFSPCMAN 91-710 volume contains its own table of contents. Volume 7 contains a glossary of references, acronyms and abbreviations, and terms for use with all the volumes.; ***This Volume 4 adopts the requirements of the Range Commanders Council (RCC) Document 319, FLIGHT TERMINATION SYSTEMS STANDARD, as supplemented herein:*** The Chapter layout of this current AFSPCMAN 91-710, Volume 4 is identical to the Chapter layout of RCC 319; The Chapter layout of RCC 319 is identical to the earlier version, AFSPCMAN 91-710, Volume 4, 01 July 2004, with the following **exceptions:** **Chapter 2** of RCC 319 is "TAILORING;" For AFSPCMAN 91-710, Volume 4, **Chapter 2** was "RESERVED;" **Chapter 8** of RCC 319 is "DOCUMENTATION;" For AFSPCMAN 91-710, Volume 4, **Chapter 8** was "RESERVED;" **Chapter 9** was "DOCUMENTATION." Attachment 1 Glossary of References and Supporting Information has been added and directs the reader to AFSPCMAN 91-710, Volume 7. The content of the previous version of AFSPCMAN 91-710, Volume 4, 1 July 2004, is very similar to RCC 319, but they are not identical; Each chapter of this current AFSPCMAN 91-710, Volume 4, mandates the corresponding chapter of RCC 319; Each chapter of this current

AFSPCMAN 91-710, Volume 4, supplements the corresponding chapter of RCC 319, as necessary. Major additions are as follows: Triboelectrification mitigation identified as a Launch Commit Criteria item in AFSPCMAN 91-710, Volume 6, 1 July 2004, Attachment 7, paragraph A7.2.5.4.10 is now also reflected in AFSPCMAN 91-710, Volume 4, as a design/analysis requirement, as a prerequisite to determination of launch commit criteria for a specific vehicle/mission; Unique FTS requirements for reusable/re-entry vehicles have been added to AFSPCMAN 91-710, Volume 4. Where AFSPCMAN 91-710, Volume 4 (2017) supplements RCC 319, it is referring to RCC 319-14. A Change Notice (CN) will be issued to AFSPCMAN 91-710 as RCC 319 is updated/revised.

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Chapter 1

INTRODUCTION

1.1. Applicability. The requirements of RCC 319, **Chapter 1**, INTRODUCTION, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 1**.

1.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

1.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

1.2. Acceptability. Acceptability at any Range within the Major Range and Test Facility Base (MRTFB) (Corresponds to RCC 319, Paragraph 1.4).

1.2.1. (Added to RCC 319, as Paragraph 1.4.3) Adherence to the requirements stated in this document should produce an airborne system that can be flown at any MRTFB without modification or retest provided the flight vehicle and environment are identical to those used for the initial qualification. Conformance with the requirements of this volume does not relieve the Range User of the responsibility for compliance with parallel flight certification requirements for new designs/technologies before operations at any range.

1.2.2. (Added to RCC 319, as Paragraph 1.4.4) Adherence to the design requirements, including untailed bordered paragraphs, stated in this volume, plus testing in the specified manner, produces a hardware design that can be flown at any range without modification or retest provided the flight vehicle and environment are essentially identical to those used for the initial qualification. If modification is made to the qualified flight vehicle or Flight Termination System (FTS)/Flight Safety System (FSS) design, a review by the Range Safety Office of each affected launch range is mandatory and determines whether additional testing or FTS/FSS design modification is required before any flight of the modified vehicle.

1.3. FTS Frequencies. (Corresponds to RCC 319, Paragraph 1.6.3).

1.3.1. **(R/R RCC 319, Paragraph 1.6.3.a.)** General: Frequencies 421, 425, and 429.5 MHz are common FTS frequencies for the 30th and 45th Space Wings. However, there are operational constraints for use of these frequencies: 421 MHz (primary), 425 MHz (backup/alternate), or 429.5 MHz (test and maintenance). The use of any specific frequency must be coordinated with the affected range.

1.4. Tailoring. (Corresponds to RCC 319, Paragraph 1.8).

1.4.1. **(R/R RCC 319, Paragraph 1.8.a.)** It is the responsibility of the Range User to ensure that the tailoring encompasses all of the participating ranges. Ranges that were not involved in the original tailoring of the requirements have the right to restore the requirements of this volume for any program wishing to conduct flight tests or operations at these ranges.

1.4.2. (Added to RCC 319, as Paragraph 1.8.e.) The tailoring processes in AFSPCMAN 91-710, Volume 1 shall also be followed.

1.5. Waivers and Equivalent Level of Safety Certifications. (Corresponds to RCC 319, Paragraph 1.9).

1.5.1. **(R/R RCC 319, Paragraph 1.9.2)** The Range User shall submit adequate justification for waivers and equivalent level of safety (ELS) certifications from these requirements to those ranges originally involved. **Additionally, at AFSPC ranges, the waiver and ELS processes in AFSPCMAN 91-710, Volume 1 shall be followed.** All waivers shall be approved by all Range Safety Offices involved. Ranges that were not involved in the original process have the right to restore the requirements of this volume for any program wishing to conduct flight tests or operations at these ranges.

1.5.2. **(R/R RCC 319, Paragraph 1.9.3)** Supporting data for the waiver or ELS certifications request **shall** include:

1.5.2.1. A statement of technical or other requirements that make the waiver or ELS certification necessary.

1.5.2.2. A discussion of the effect on FTS performance functions if the waiver or ELS certification is granted.

1.5.2.3. A discussion of the effect on the program if the waiver or ELS certification is not granted.

1.5.2.4. A detailed description of the proposed flight tests or operations.

1.5.2.5. A detailed description of rationale for acceptance and any mitigating factors.

1.5.2.6. A get-well plan to meet the requirements in question by the time the approved waiver/ELS effectivity expires.

1.6. Responsibilities and Authorities. (Corresponds to RCC 319, Paragraph 1.12).

1.6.1. (Added to RCC 319, Paragraph 1.12.2.e.) **Note:** Range User may be required to provide a flight-configured FTR for compatibility test between the range transmitters and the FSS components on launch vehicles.

Chapter 2

TAILORING

2.1. Applicability. The requirements of RCC 319, **Chapter 2**, TAILORING, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 2**.

2.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

2.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

2.2. NO SUPPLEMENT TO RCC 319 IN THIS CHAPTER.

Chapter 3

COMMON FTS SYSTEM AND COMPONENT PERFORMANCE REQUIREMENTS

3.1. Applicability. The requirements of RCC 319, **Chapter 3**, COMMON FTS SYSTEM AND COMPONENT PERFORMANCE REQUIREMENTS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710 Volume 4, **Chapter 3**.

3.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

3.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

3.2. FTS Functional Requirements. (Corresponds to RCC 319, Paragraph 3.1).

3.2.1. Reentry Vehicles (RV) (Excluding Warheads).

3.2.1.1. (Added to RCC 319, Paragraph 3.1.3.b.) The reentry flight safety system, through ground command or other range safety approved method, shall maintain positive control of the RV from de-orbit initiation of a planned, contingency, or emergency abort flight condition and throughout the full period of Range Safety responsibility as identified in Flight Analysis section in AFSPCMAN 91-710, Volume 2.

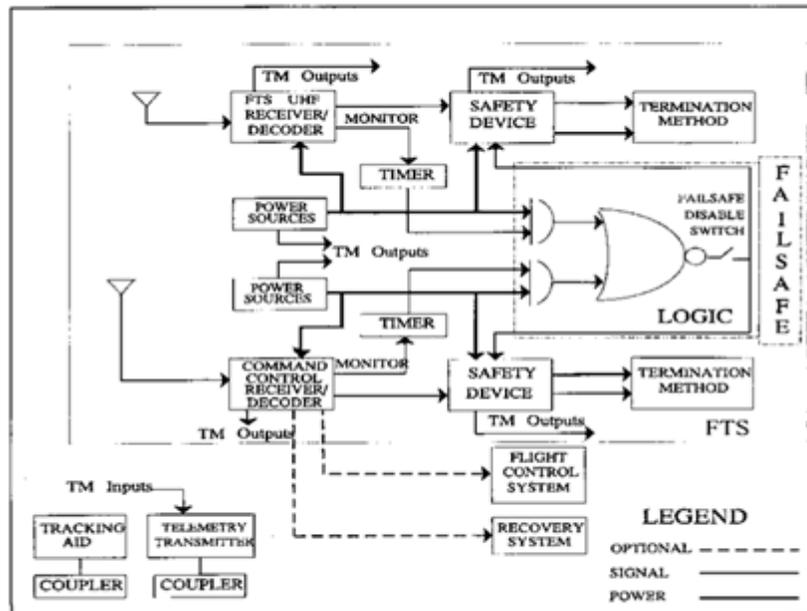
3.2.1.2. **(R/R RCC 319, Paragraph 3.1.3.e.)** In order to protect the public in the event of a vehicle failure, FTS components shall be designed to survive and function properly in the vehicle-induced maximum predicted environment (MPE), plus a margin, over the entire timeframe of the mission. **The MPE shall, at a minimum, consider shock, vibration, thermal range, rate of heating, space-based radiation, corona effects, vacuum, and acoustics.**

3.3. FTS Design.

3.3.1. Survivability (Corresponds to RCC 319, Paragraph 3.2.4).

3.3.1.1. **(R/R RCC 319, Paragraph 3.2.4.b.)** Remotely Piloted Vehicles (RPVs) and full-Scale aerial target aircraft shall incorporate an FTS that provides the control needed to protect the public in the event of a vehicle failure. The typical FTS for these vehicles is shown in Figure 3.1.

Figure 3.1. Typical FSS with FTS for RPVs, Sub- and Full-Scale Aerial Targets, and RLVs.



3.3.2. Component Storage, Operating and Service Life (Corresponds to RCC 319, Paragraph 3.2.10).

3.3.2.1. (Added to RCC 319, as Paragraph 3.2.10.c.) Ordnance shelf/service life extensions, limited to specific lots, can be considered on a case-by-case basis.

3.3.2.1.1. Lot service life extension requests of up to six months may be approved as Equivalent Level of Safety (ELS) based on the data provided with the request (i.e., history of ordnance, performance, available test history, etc.). This determination will be made on a case-by-case basis.

3.3.2.1.2. Lot extensions beyond six months, but less than a year, may be approved as an ELS based on a lot service life extension test with fewer test units than required. This determination will be made on a case-by-case basis.

3.3.2.1.3. Lot extension requests beyond six months (without re-test) may only be approved as a Waiver. This determination will be made on a case-by-case basis. If service life testing is a viable option, a waiver will not be granted.

3.4. Environmental Design. (Corresponds to RCC 319, Paragraph 3.3).

3.4.1. (Added to RCC 319, as Paragraph 3.3.14.) Triboelectrification Mitigation Launch vehicles shall be treated for surface electrification if the flight path will go through any clouds above the -10°C level up to the altitude at which the vehicle's velocity exceeds 3,000ft/sec. A vehicle is considered "treated" for surface electrification if:

3.4.1.1. All surfaces of the vehicle susceptible to precipitation particle impact have been treated to assure:

3.4.1.1.1. That the surface resistivity is less than 10^9 ohms/square; **and**

3.4.1.1.2. That all conductors on surface (including dielectric surfaces that have been treated with conductive coatings) are bonded to the vehicle by a resistance that is less than 10^5 ohms; **or**

3.4.1.2. It has been shown by test or analysis that electrostatic discharges (ESDs) on the surface of the vehicle caused by triboelectrification by ice particle impact will not be hazardous to the launch vehicle or the mission. The correct unit for surface resistivity is **ohms/square**. This means that any square area of any size measured in any units has the same resistance in ohms when the measurement is made from an electrode extending the length of one side of the square to an electrode extending the length of the opposite side of the square. The area-independence is literally valid only for squares; it is not true for other shapes such as rectangles and circles.

Chapter 4

FLIGHT TERMINATION SYSTEM (FTS) COMPONENT TEST AND ANALYSIS REQUIREMENTS

4.1. Applicability. The requirements of RCC 319, **Chapter 4**, FTS COMPONENT TEST AND ANALYSIS REQUIREMENTS shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 4**.

4.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

4.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

4.2. NO SUPPLEMENT TO RCC 319 IN THIS CHAPTER.

Chapter 5

FLIGHT TERMINATION SYSTEM (FTS) COMPONENT, SUBSYSTEM, AND SYSTEM PRELAUNCH TEST AND LAUNCH REQUIREMENTS

5.1. Applicability. The requirements of RCC 319, **Chapter 5**, FTS COMPONENT, SUBSYSTEM, AND SYSTEM PRELAUNCH TEST AND LAUNCH REQUIREMENTS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 5**.

5.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

5.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

5.2. Prelaunch System and Subsystem Level Tests. (Corresponds to RCC 319, Paragraph 5.3).

5.2.1. Standard Flight Termination Receiver (FTR) System, Automatic destruct and Fail-Safe.

5.2.1.1. **(R/R RCC 319, Paragraph 5.3.4.a.(1) .3.)** If the flight is delayed and the FTS configuration is not broken or modified, the 3 day requirement may be extended on a case-by-case basis. A re-test is mandatory after 14 days of launch opportunity (L-3 day end-to-end test + 17 days) or whenever the conditions in RCC 319, Paragraph 5.3.4.a.2.a apply.

5.3. Post-Mission Data Analysis. (Corresponds to RCC 319, Paragraph 5.6).

5.3.1. **(R/R RCC 319, Paragraph 5.6.1)** The Range User shall review all in-flight telemetry to validate all FTS parameters met their performance requirements. In-flight anomalies, to include Maximum Predicted Environment (MPE) violations, shall be reported immediately to Range Safety. Anomalies refers to not only FTS hardware, but also Mission/Vehicle hardware with commonality to FTS.

5.3.2. **(R/R RCC 319, Paragraph 5.6.3.a.)** In the event of an in-flight failure resulting in FTS action, an investigation shall be initiated. Range Safety representatives shall participate in the investigation and be given sufficient notice to support all activities. Range Safety representatives shall be given all required data to determine if the FTS functioned as required. Flight approval for future flights will not be granted until it has been determined that the FTS functioned correctly.

5.3.3. (Added to RCC 319, as Paragraph 5.6.4) Components that have failed on one program could affect FTS approval on another program using the same or similar design. Range Users are highly encouraged to share FTS safety data with other Range Users to the maximum extent allowable. In the interest of public safety, nonproprietary data shall be separated from proprietary data, where allowable, so as to allow sharing of lessons learned. Nondisclosure agreements shall be used when necessary to facilitate data sharing between non-government entities.

5.4. Prelaunch Data Analysis. (Added to RCC 319, [Chapter 5.7](#)).

5.4.1. (Added to RCC 319, as Paragraph 5.7.1) The Range User shall review all FTS data taken during prelaunch operations and compare it to Acceptance Test data, with unacceptable deviation reported to Range Safety.

5.4.2. (Added to RCC 319, as Paragraph 5.7.2) The Range User shall review all FTS data taken during prelaunch operations and compare it to data taken on previous missions, with out-of-family occurrences reported to Range Safety. This includes any umbilical data taken during the terminal count.

Chapter 6

FLIGHT TERMINATION SYSTEM (FTS) GROUND SUPPORT AND MONITORING EQUIPMENT DESIGN REQUIREMENTS

6.1. Applicability. The requirements of RCC 319, **Chapter 6**, FTS GROUND SUPPORT AND MONITORING EQUIPMENT DESIGN REQUIREMENTS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 6**.

6.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

6.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

6.2. NO SUPPLEMENT TO RCC 319 IN THIS CHAPTER.

Chapter 7

FLIGHT TERMINATION SYSTEM (FTS) ANALYSIS

7.1. Applicability. The requirements of RCC 319, **Chapter 7**, FLIGHT TERMINATION SYSTEM ANALYSIS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 7**.

7.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

7.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter “(Added).”

7.2. System Reliability. (Added to RCC 319, as Paragraph 7.2.1).

7.2.1. (Added to RCC 319, as Paragraph 7.2.1.a.) A reliability number shall be calculated for each mode of flight termination, e.g., command destruct, autodestruct, etc. The reliability number shall be the composite of both strings in a redundant system, not individual strings.

7.2.2. (Added to RCC 319, as Paragraph 7.2.1.b.) A reliability number shall be calculated for inadvertent safing of the FTS. The reliability number shall be the composite of losing both strings in a redundant system, not individual strings.

7.2.3. (Added to RCC 319, as Paragraph 7.2.1.c.) Reliability numbers shall account for factors external to the FTS, such as the interface between the launch vehicle/payload systems and the FTS.

7.3. Failure Analysis. (R/R RCC 319, Paragraph 7.11). Any failure/anomaly occurring in an FTS or any identical component shall be reported. A failure analysis shall be performed. The failure analysis shall identify the cause of the failure, the mechanism of the failure, and isolate the failure to the smallest replaceable item or items and ensure that there are no generic design, workmanship, or process problems with other flight components of similar configuration. In accordance with RCC 319, Paragraph 8.1.2 a formal report containing a description of the failure, an analysis of the failure, and planned corrective actions shall be submitted to Range Safety within 30 calendar days of the failure analysis completion regardless of when or where the failure occurred.

Chapter 8

DOCUMENTATION

8.1. Applicability. The requirements of RCC 319, **Chapter 8**, DOCUMENTATION, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, **Chapter 8**.

8.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

8.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter “(Added).”

8.2. FTS Procedures and Plans. (Added to RCC 319, as Paragraph 8.1.3).

8.2.1. (Added to RCC 319, as Paragraph 8.1.3.a.) FTS Installation and Checkout Procedures: A Range User shall establish and implement written procedures to ensure that all FTS components are installed on a launch vehicle according to the qualified FTS design. The procedures shall ensure the following:

8.2.2. (Added to RCC 319, as Paragraph 8.1.3.a.1.) Procedure Content: Detailed procedures for checkout, calibration, and installation of all components of the FTS and its associated ground checkout equipment shall contain, or incorporate by reference, test procedures for each system or piece of equipment to be used for a launch. The procedures shall include the following information:

8.2.2.1. The pass/fail criteria for each system or piece of equipment to be used for a launch.

8.2.2.2. A description of each task to be performed, each facility to be used, and each hazard involved.

8.2.2.3. A checklist of tools and equipment required.

8.2.2.4. A list of personnel required for performing each task.

8.2.2.5. Step-by-step directions written with sufficient detail for a qualified person to perform each task.

8.2.2.6. Identification of any tolerances that shall be met during the installation.

8.2.2.7. Steps for inspection of installed FTS components, including quality assurance oversight procedures.

8.2.3. (Added to RCC 319, as Paragraph 8.1.3.a.2.) Procedure Submittal and Revision.

8.2.3.1. The required procedures shall be developed by the Range User and submitted to Range Safety for review and approval no later than 45 calendar days before the need date. **Note:** Previously used procedures may be submitted 30 calendar days before the need date.

8.2.3.2. Once approved, these procedures shall not be revised. **Note:** Revisions to any part of an approved procedure require that the procedure be resubmitted to Range Safety for review and approval.

8.2.3.3. A list of all procedures shall be incorporated as an appendix to the Flight Termination System Report (FTSR).

8.2.4. (Added to RCC 319, as Paragraph 8.1.3.a.3.) Procedure Personnel Requirements.

8.2.4.1. Installation personnel shall use calibrated tools to install ordnance when a specific standoff distance is necessary to ensure that the ordnance has the desired effect on the material it is designed to cut or otherwise destroy.

8.2.4.2. The Range User shall ensure each person involved is qualified for each task that person is to perform.

8.2.4.3. The engineer or quality assurance personnel overseeing an FTS installation procedure shall signify that the procedure is accomplished and record the outcome and any data verifying successful installation.

8.2.5. (Added to RCC 319, as Paragraph 8.1.3.a.4.) FTS Prelaunch Test Results: The following test results for each launch shall be submitted to Range Safety in a timely manner to facilitate a launch-ready status:

8.2.5.1. One copy of the range prelaunch test results shall be submitted to Range Safety for each FTS component specified by serial number no later than 30 calendar days before launch.

8.2.5.2. Any additional data that Range Safety deems necessary shall be submitted on a case-by-case basis.

8.2.6. (Added to RCC 319, as Paragraph 8.1.3.a.5.) Countdown Plan: A countdown plan shall describe the personnel and equipment that shall be in place, the conditions that shall be met, and the timed sequence of events that shall take place to initiate flight of a launch vehicle while ensuring public safety. A countdown plan shall:

8.2.6.1. Cover the period of time when launch support personnel are to be at their designated stations through initiation of flight. **Note:** The period of time that a countdown plan covers may vary with launch vehicle configuration, the complexity of the supporting infrastructure, and complexity of vehicle processing leading to a flight attempt.

8.2.6.2. Include procedures for handling anomalies that occur during a countdown and events and conditions that may result in a constraint to initiation of flight.

8.2.6.3. Include procedures for delaying or holding a launch when necessary to allow for corrective actions, to await improved conditions, or to accommodate a launch wait.

8.2.6.4. Describe a process for resolving issues that arise during a countdown and identify each person responsible for approving corrective actions.

8.2.6.5. Include a written countdown checklist that provides a formal decision process leading to flight initiation.

8.2.6.6. A countdown checklist shall include the preflight tests of an FSS required and shall contain, but need not be limited to, the following:

8.2.6.6.1. Identification of operations and specific actions completed and verifications performed that there are no constraints to flight and that all launch safety rules and launch commit criteria are satisfied.

8.2.6.6.2. Time of each event.

8.2.6.6.3. Identification of personnel responsible for each operation or specific action, including reporting to the launch conductor.

8.2.6.6.4. Identification of communication channel to be used for reporting each event.

8.2.6.6.5. Identification of communication and event reporting protocols.

8.2.6.6.6. Polling of personnel who oversee all safety critical systems and operations to verify their readiness to proceed with the launch.

8.2.6.6.7. Provisions for recording the status of countdown events.

8.2.6.6.8. Identify primary and backup communications circuits for critical positions.

8.2.7. (Added to RCC 319, as Paragraph 8.1.3.a.6.) Launch Abort or Delay Recovery and Recycle Plan: The launch countdown plan shall have a procedure for recovering from a launch abort or launch delay that results during a launch countdown and recycling for the next launch attempt following procedures that provide for public safety. The plan shall:

8.2.7.1. Contain, or incorporate by reference, all procedures for recovery from a launch abort or delay, e.g. hangfire, misfire, etc.

8.2.7.2. Identify the conditions that shall exist in order to make another launch attempt.

8.2.7.3. Include a schedule depicting the flow of tasks and events in relation to when the abort or delay occurred and the new planned launch time.

8.2.7.4. Identify all technical and readiness reviews scheduled to be conducted during the recovery period.

8.2.7.5. Identify the interfaces and supporting entities needed to support recovery operations.

8.2.8. (Added to RCC 319, as Paragraph 8.1.3.a.7.) Communications Plan: A communications plan shall be developed that ensures clear concise communications between personnel involved in launch processing, countdown, and flight.

8.2.8.1. A communications plan shall list and describe all forms of communication that ensure public safety and any voice and data circuits required to allow real-time interface among launch control and safety personnel for each task during the conduct of hazardous operations, launch processing, countdown, and flight. This includes communications to locations outside of the launch site boundaries when those communications are necessary for public safety and includes those communications that are part of any FSS.

8.2.8.2. A communications plan shall delineate clear lines of communication and unimpeded flow of reporting and direction. The plan shall define precise and formal communication protocols using well defined terminology and acronyms that can be clearly understood over a voice network.

8.2.8.3. The communications plan shall identify communication system reliability and backup circuits.

CLARK H. RISNER, Colonel, USAF
Director of Safety

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

See AFSPCMAN 91-710 Vol 7, *Range Safety User Requirements manual Volume 7 - Glossary of references, Abbreviations and acronyms, and Terms*

Prescribed Forms

See AFSPCMAN 91-710 Vol, *Range Safety User Requirements manual Volume 7 - Glossary of references, Abbreviations and acronyms, and Terms 7*

Adopted Forms

See AFSPCMAN 91-710 Vol 7, *Range Safety User Requirements manual Volume 7 - Glossary of references, Abbreviations and acronyms, and Terms*

Abbreviations and Acronyms

See AFSPCMAN 91—710 Vol 7, *Range Safety User Requirements manual Volume 7 - Glossary of references, Abbreviations and acronyms, and Terms*

Terms

See AFSPCMAN 91—710 Vol 7 - *Range Safety User Requirements manual Volume 7 - Glossary of references, Abbreviations and acronyms, and Terms*

Attachment 2**SOFTWARE/FIRMWARE INDEPENDENT VERIFICATION AND VALIDATION
(CORRESPONDS TO RCC 319, APPENDIX A)**

A2.1. The requirements of RCC 319, APPENDIX A, SOFTWARE/FIRMWARE INDEPENDENT VERIFICATION AND VALIDATION, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, Attachment 2.

A2.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

A2.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

A2.2. Independent Verification and Validation Analysis Support.

A2.2.1. **(R/R RCC 319, Appendix A.1.1.)** Requirements: The independent verification and validation (IV&V) effort shall be performed by an independent third party. A department not reporting to the same first-level supervisor is not considered sufficiently independent. An independent third party is an organization that is technically, managerially, and financially independent of the development organization. A department not reporting to the same first-level supervisor is not considered sufficiently independent. The IV&V process is applied to ensure an extremely high level of confidence. The work shall consist of the following steps: (the steps listed in RCC 319, A.1.1-A1.3 are unchanged.)

Attachment 3**ELECTRONIC PIECE-PART UPSCREENING REQUIREMENTS (CORRESPONDS TO RCC 319, APPENDIX B)**

A3.1. The requirements of RCC 319, APPENDIX B, ELECTRONIC PIECE-PART UPSCREENING REQUIREMENTS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, Attachment 3.

A3.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

A3.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

A3.2. NO SUPPLEMENT TO RCC 319 IN THIS ATTACHMENT.

Attachment 4**ELECTRONIC PIECE-PART DERATING REQUIREMENTS (CORRESPONDS TO
RCC 319, APPENDIX C)**

A4.1. The requirements of RCC 319, APPENDIX C, ELECTRONIC PIECE-PART DERATING REQUIREMENTS, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, Attachment 4.

A4.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

A4.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

A4.2. NO SUPPLEMENT TO RCC 319 IN THIS ATTACHMENT.

Attachment 5**GLOSSARY (CORRESPONDS TO RCC 319, APPENDIX D)**

A5.1. The requirements of RCC 319, APPENDIX D, GLOSSARY, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, Attachment 5.

A5.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

A5.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

A5.2. NO SUPPLEMENT TO RCC 319 IN THIS ATTACHMENT.

Attachment 6

CITATION (CORRESPONDS TO RCC 319, APPENDIX E)

A6.1. The requirements of RCC 319, APPENDIX E, CITATION, shall apply, as supplemented by new/modified requirements contained in the paragraphs of this AFSPCMAN 91-710, Volume 4, Attachment 6.

A6.1.1. RCC paragraphs that have been removed and replaced are annotated in this AFSPCMAN 91-710 chapter as “(R/R).”

A6.1.2. RCC paragraphs that are a new, numbered paragraph are annotated in this AFSPCMAN 91-710 chapter as “(Added).”

A6.2. NO SUPPLEMENT TO RCC 319 IN THIS ATTACHMENT.