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AIR FORCE SPACE COMMAND

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Safety

RANGE SAFETY USER REQUIREMENTS MANUAL, AIR FORCE COMMAND RANGE SAFETY POLICIES AND PROCEDURES

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This manual implements Air Force Instruction (AFI) 91-217, *Space Safety and Mishap Prevention Program* and the Memorandum of Agreement between Department of the Air Force and the Federal Aviation Administration on Safety for Space Transportation and Range Activities. This publication describes the Range Safety Program employed at Air Force Space Command (AFSPC) ranges and implemented by the Wing Safety Office. It defines safety responsibilities and authorities, delineates policies, processes, required approvals and approval/waiver levels for all activities from or onto AFSPC ranges, as describes investigating and reporting mishaps and incidents to include instructions for standing up a mishap interim safety board and impounding data. Range activities include any activities range users plan to perform on AFSPC ranges (aeronautical tests/operations, missile tests/operations, space launch, pre-launch processing, reentry activities, etc.). These range activities include the life cycle of launch vehicles, reentry vehicles (RVs) and payloads from design concept, test, checkout, assembly and launch to orbital insertion including space vehicle (or payload) separation from launch vehicle, reentry from orbit for reusable launch vehicles (RLVs)/RVs, flyback/landing of launch vehicle components not reaching orbit, or impact. This publication also defines Headquarters Air Force Space Command (HQ AFSPC), Space Wing (SW) and Range User responsibilities and describes Wing Safety and Range User interfaces for the 30 SW, [Western Range (WR)] at Vandenberg Air Force Base (VAFB), California and the 45 SW [Eastern Range (ER)] at Patrick Air Force Base (PAFB), Florida. Range Users should familiarize themselves with AFSPCI 91-701, Launch Safety Program Policy, to fully understand the overall AFSPC

Range Safety Program, the capabilities of the ranges and range management activities. AFSPCMAN 91-710 Volume 1 applies to all Range Users conducting or supporting operations on the AFSPC ranges. Range Users include, but are not limited to, any individual or organization that conducts or supports any activity on resources (land, sea or air) owned or controlled by AFSPC ranges. This includes such organizations as United States (US) government agencies, commercial and foreign government agencies and other foreign entities that use AFSPC range facilities and test equipment. Commercial users intending to provide launch services and use AFSPC ranges shall have a license or license application in process from the Department of Transportation's Federal Aviation Administration (FAA) or 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 publication applies to the Air National Guard (ANG). This publication does not apply to Air Force Reserve Command (AFRC) units. Requirements identified in this volume for expendable launch vehicles (ELVs), ballistic or suborbital vehicles or space vehicles may also apply to RLVs and RVs depending on their similarity in launch preparation, operations or phase of flight. Range Users should consult with Wing Safety Office to determine the applicability of safety requirements to RLVs/RVs. In addition to the applicability of ELV requirements to RLVs and RVs, this publication contains requirements unique to RLVs and RVs; which are identified in this document. 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. However, this instruction contains references to requirements stemming from higher headquarters instructions (e.g. AFI 91-217), as such, reference the specified instruction for Tier level waiver compliance. Ensure all Air Force records created as a result of the processes prescribed in this publication are maintained IAW Air Force Manual (AFMAN) 33-363, Management of Records, and disposed of IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). Refer to **Attachment 6** of this publication 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 847, Recommendation for Change of Publication; route 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. Major changes include a change to the acceptable public safety risk criteria, inclusion of ship risk in public risk criteria, and the addition of safety requirements for reusable launch vehicles and reentry vehicles.

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7.1. This publication shall be reviewed and updated every four years; however, it may be updated more frequently, if required. 46

7.2. Permanent changes shall be performed IAW the requirements in Attachment 6. .. 46

7.3. Changes requiring immediate attention, such as previously unknown risk, safety compromise, or implementation of new technology, shall be made as necessary and distributed as Guidance Memorandums IAW AFI 33-360. 46

7.4. All changes to this publication shall be coordinated among the AFSPC ranges before being submitted to HQ AFSPC/SEK for incorporation. 46

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Chapter 1

INTRODUCTION

1.1. Overview. This manual establishes safety requirements for AFSPC Range Users to ensure the public, launch area and launch complex personnel and resources, recovery area and recovery site personnel and resources are provided an acceptable level of safety and all aspects of prelaunch, launch, and reentry operations adhere to applicable public laws (federal, state and local) and directives. The mutual goal of the ranges and Range Users shall be to conduct their missions safely, with a strong commitment to public safety. Acronyms, references, and definitions of terms used in all the volumes of AFSPCMAN 91-710 are contained in Volume 7.

1.2. Applicability:

1.2.1. Range Users. The requirements, policies, processes, procedures and approvals defined in this publication are applicable to all Range Users conducting or supporting operations on the AFSPC ranges, unless the programs are covered under previous Range Safety regulations (e.g.; EWR 127-1, Title). Currently, per 14 CFR Part 400 series, if the FAA has assessed the Federal launch range, through its launch site safety assessment, and found that an applicable range safety-related launch service or property satisfies AF and FAA common requirements, then the FAA will treat the Federal launch range's launch service or property as that of a launch operator without need for further demonstration of compliance For non-licensed launch activity, to include reentry and landing, carried out by the United States Government, on behalf of the United States Government, FAA regulations will not apply. For licensed launch activity, to include reentry and landing, AFSPC may choose to use its safety standards or standards established by other government agencies. AFSPC, in cooperation with the FAA, is working to streamline licensed launch provider access to AFSPC services and capabilities in order to improve efficiency, remove duplication, and minimize unwarranted constraints. The AFSPC/FAA partnership is long standing and has resulted in well-documented common standards and processes. The processes of both agencies however are predicated on interagency support and will take time to further streamline. As FAA processes and approvals for launch activity in support of commercial launch activity on federal ranges evolve, independent of AFSPC, AFSPC will continue to review all activity on, and in the proximity of, AFSPC operations and facilities to protect personnel, property, and national security interests

1.2.2. Tailoring. Based upon this document, a tailored edition may be developed for each specific Range User's program. The tailored edition shall be placed on the Range User's contract or applied through the applicable range Universal Documentation System (UDS). For FAA licensed launches or permitted operations, the tailored version of AFSPCMAN 91-710 is enforced through a Commercial Space Operations Support Agreement. Use of a tailored edition of this document is recommended and is beneficial to both the Range User and Wing Safety. See **Attachment 2** for further tailoring instructions.

1.2.3. New Programs. This publication is applicable to all new programs with Program Introduction (PI) submittals dated after the date of this publication. Range Users are encouraged to perform PIs at the earliest possible time. Formal PIs for launch vehicles and RVs are submitted to Wing Safety through the Space Wing Plans and Programs (SW/XP)

office. Informal PIs, such as those for payloads not going through the formal UDS process, may be provided through the sponsoring Range User. Before the PI, informal meetings to discuss safety requirements and their impact on conceptual designs may be arranged directly with the office of the Chief of Safety at the applicable range. Programs that began significant design before the PI should approach Wing Safety to discuss applicable requirements. Formal meetings with Wing Safety shall be made through the SW/XP office.

1.2.4. Previously Approved Programs. Existing program tailoring and noncompliance approved prior to the date of this publication will be honored. **Exception**: Existing programs shall comply with the latest version of applicable Range Safety requirements when the following occurs; (1) major modifications affecting the launch vehicle's operation or safety characteristics; (2) new applications of previously approved components, systems or subsystems; (3) discovery of previously undetected non-compliances; and (4) where hazard analyses, mishaps, incident investigations or other sources (i.e. as determined by wing safety) indicate the implementation of all or parts of the latest version of applicable Range Safety requirements are necessary.

1.3. General Description of the Eastern and Western Ranges:

1.3.1. Eastern Range (ER):

1.3.1.1. The ER is part of the National Launch Range facilities, operated by the 45th Space Wing, part of Air Force Space Command, and located at Patrick Air Force Base, Florida; the range includes the operational launch and base support facilities located at Cape Canaveral Air Force Station, Florida; owned or leased facilities on downrange sites such as Ascension; as well as the Jonathan -Dickson Missile Tracking Annex (Jupiter, Florida), and in the context of launch operations, the Atlantic Ocean. For reentries/flyback at the ER, the ER may be expanded to involve the land, sea and air space within the reach of the RV during its descent until it impacts or is recovered. **Figure 1.1** illustrates the typical launch sector for launches from the ER.

1.3.1.2. Range management activities are concentrated at Patrick AFB, Florida.

1.3.1.3. Launch vehicle and payload prelaunch and launch activities are concentrated at CCAFS, Kennedy Space Center (KSC), and miscellaneous outlying support locations.

1.3.1.4. Launch activities conducted by ER personnel operating outside the geographical limits described above may occur under DoD or USAF direction or under the auspices of agreements made by these agencies. In such cases, the term ER is expanded to include prelaunch, recovery, launch area, recovery area and impact area.

Figure 1.1. Typical Sectors for ER Launches.

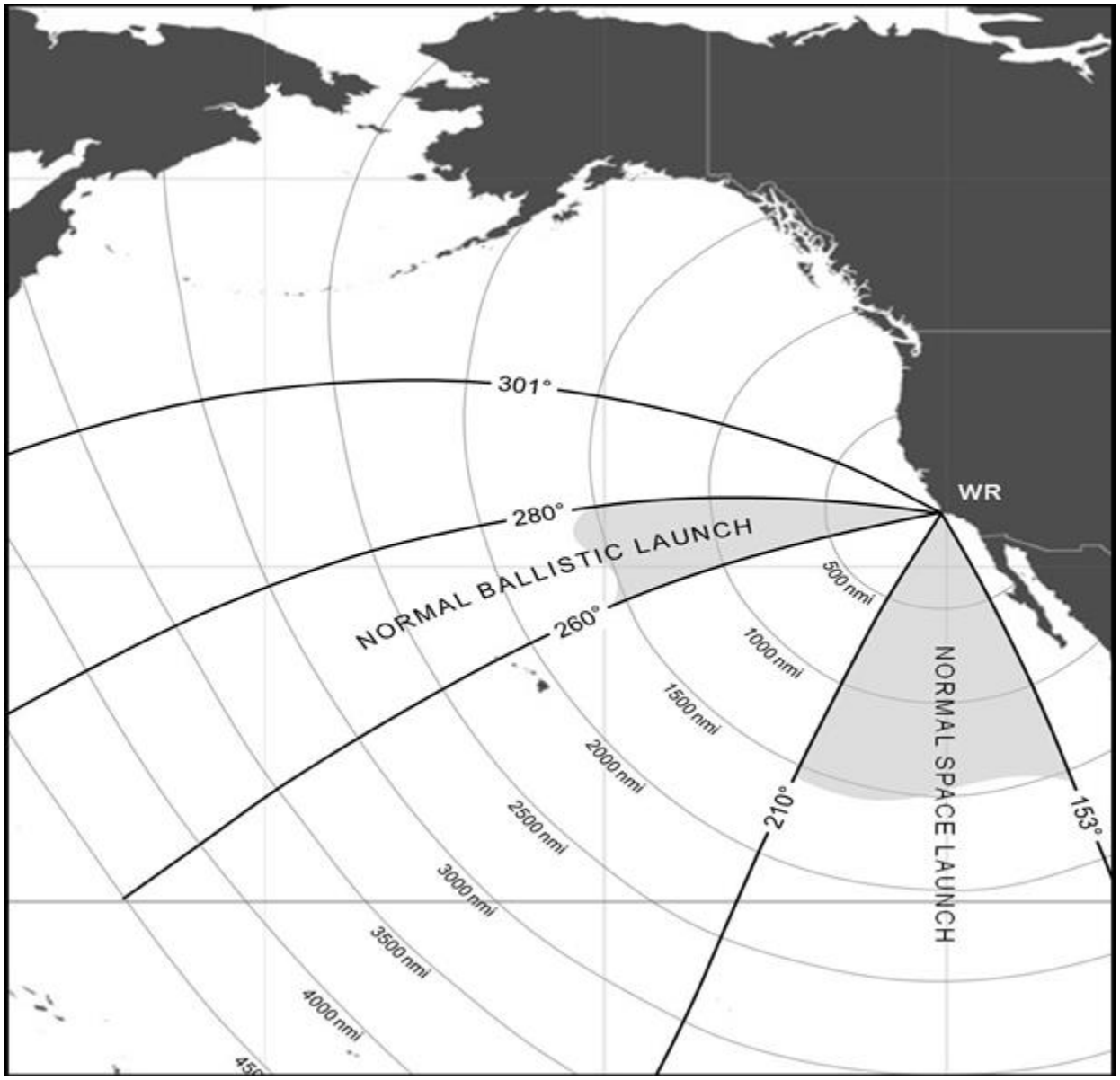
1.3.2. Western Range (WR):

1.3.2.1. The WR consists of the launch head at VAFB, California and extends along the West Coast of the continental US westward through the Pacific and Indian Oceans. For reentries/flybacks intended at the WR, the WR may be expanded to involve the land, sea and air space within the reach of the RV during its descent from orbit until it impacts or is recovered. **Figure 1.2** illustrates the typical launch sectors for launches from the WR.

1.3.2.2. Range management activities as well as launch and prelaunch processing activities are concentrated at VAFB in California.

1.3.2.3. Launch and reentry activities conducted by WR personnel operating outside the geographical limits described above may occur under DoD or USAF direction or under the auspices of agreements made by those agencies. In such cases, the term Western Range or WR is expanded to include these situations and apply, as required, to the specific mission, launch, recovery, launch area, recovery area and impact area.

Figure 1.2. Typical Sectors for WR Launches.



1.3.3. Range Differences. Although the Range Safety requirements are the same at both the ER and WR, there are some differences in the implementation of these requirements. The differences are caused by geographical differences that change risk levels for launch operations, organizational variations and different Range User requirements. Examples include safety requirements associated with specific activities at each range. Safety requirements for sea-launched submarine launched ballistic missile (SLBM) test launches

and aeronautical test flights associated with manned space flights at the ER. At the WR, safety requirements for land-launched intercontinental ballistic missile (ICBM) test launches into the Reagan Test Site, Missile Defense Agency (MDA) intercept test launches and aircraft test flights. At present, where a requirement differs, the Range User may standardize to the more stringent requirement or meet the requirements of each range, whichever option is technically or economically more desirable. Specific WR and ER differences are noted throughout this publication.

1.3.4. Multi-Range/Location Operations. Operations involving the use of more than one range/location shall employ the lead range concept as described in DoDI 3200.18. The lead range will initiate discussions with the other affected ranges. The roles and responsibilities of each range shall be defined and documented by the lead range and coordinated with all affected organizations prior to the initiation of any operation.

1.3.5. Lead and Support Range Roles and Responsibilities. Lead and support range roles and responsibilities shall be defined and documented by the lead range. The following items (as a minimum) shall be addressed in the documentation: planning, launch safety analysis, flight/airspace/sea control, scheduling, mishap and investigation responsibilities, and flight safety system (FSS) certification and operation. The lead range, typically the range from which the operation originates, is responsible for interfacing with the range user and performs the integration function to ensure all tasks are accomplished in support of a program, test or series of tests, including flight safety. Support ranges/locations are additional ranges/locations, agencies with unique capabilities or designated authorities that provide support to the program's operations. Support roles and responsibilities may be defined for specific mission segments. A "mission segment" may be either a portion of the planned flight/operation/test, a vehicle involved in a multi-vehicle mission or an aspect of the mission requiring unique expertise or capability. The "lead range" ensures all mission support, including flight safety, is fully coordinated and integrated with all supporting ranges/locations and agencies involved in the program's operation. Support ranges/locations or individual agencies designated as the lead for a particular mission segment can be delegated full responsibility for the planning and execution of their particular mission segment, including ensuring compliance with applicable service and local regulations, policies and procedures. Although flight safety responsibilities may require separate memorandums of agreement (MOA), these agreements shall not interfere with individual range or agency authorities, responsibilities and liabilities.

1.3.6. Area of Responsibility (AOR) Handoff Points and Protocols. Geographical and organizational boundaries may result in an operation traversing more than one AOR or may involve areas with shared or overlapping responsibilities. The handoff points for these responsibilities shall be identified, agreed upon by all affected organizations, documented and signed by all responsible organizations and command authorities at the earliest time possible in the PI process. The final agreed to responsibilities and agreements shall be presented at a Mission Readiness Review.

1.3.7. Scheduling. The lead range shall establish scheduling and coordination groups to facilitate activities among the ranges/locations and affected organizations. These groups should meet on a routine basis to ensure inter-range/organization/location activities are thoroughly coordinated.

1.3.8. Mishaps and Investigations. A lead mishap investigation authority shall be presented at the Launch Readiness Review or equivalent meeting. Responsibilities, procedures and protocols may involve multi-range/location and/or multi-organization participation. Therefore, memorandums of understanding (MOUs) may be required to ensure all agencies are aware of their specific responsibilities. MOUs, if used, should identify each organization's responsibilities, participation and access to mishap investigation sites, material, meetings, etc. (e.g., Memorandum of Understanding Between the National Transportation Safety Board, Department of the Air Force, and the Federal Aviation Administration Regarding Space Launch Accidents).

1.4. Source Documents. This publication is consistent with or based on, but not limited to, the responsibilities or standards contained in or applied by the following laws and directives:

1.4.1. 42 United States Code (USC), **Chapter 116**, *Emergency Planning and Community Right To-Know*, current edition.

1.4.2. 51 USC, Subtitle V, Chapter 509 (Commercial Space Launch Activities).

1.4.3. Title 14, Code of Federal Regulations (CFR), *Aeronautics and Space*, Chapter III, *Commercial Space Transportation*, Subchapter C, *Licensing*, Part 400 series, current edition.

1.4.4. Title 29, CFR, Subtitle B, Chapter XVII, Part 1910, *Occupational Safety and Health Standards*, current edition.

1.4.5. Title 40, CFR, Chapter I, Subchapter C, Part 68, *Chemical Accident Prevention Provisions*, current edition.

1.4.6. Title 40, CFR, Chapter I, Subchapter J, Part 355, *Emergency Planning and Notification*, current edition.

1.4.7. Presidential Directive (PD)/National Security Council (NSC) Memorandum-25, *Scientific or Technological Experiments with Possible Large-Scale Adverse Environmental Effects and Launch of Nuclear Systems into Space*, dated December 14, 1977, with change letter dated May 8, 1996.

1.4.8. DoD Directive (DoDD) 3100.10, *Space Policy*.

1.4.9. DoDD 3200.11, *Major Range and Test Facility Base*.

1.4.10. DoDD 3230.3, *DoD Support for Commercial Space Launch Activities*.

1.4.11. DoD Instruction (DoDI) 3200.18, *Management and Operation of the Major Range and Test Facility Base (MRTFB).*

1.4.12. Air Force Policy Directive (AFPD) 91-1, *Nuclear Weapons and Systems Surety*.

1.4.13. AFPD 91-2, *Safety Programs*.

1.4.14. AFPD 63-1, *Integrated Life Cycle Management*.

1.4.15. AFMAN 91-201, *Explosives Safety Standard.*

1.4.16. AFI 91-202, *Air Force Mishap Prevention Program* and AFSPC Supplement.

1.4.17. AFI 91-204, *Safety Investigations and Reports* and AFSPC Supplement.

1.4.18. AFI 91-217, *Space Safety and Mishap Prevention Program.*

1.4.19. AFMAN 91-221, *Weapons Safety Investigations and Reports* and AFSPC Supplement.

1.4.20. AFMAN 91-222, *Space Safety Investigations and Reports* and AFSPC Supplement.

1.4.21. AFMAN 91-224, *Ground Safety Investigations and Reports* and AFSPC Supplement.

1.4.22. AFSPCI 91-700, *Range Safety Publications Series*.

1.4.23. AFSPCI 91-701, *Launch Safety Program Policy*.

1.4.24. AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems.*

1.4.25. *Memorandum of Agreement between the Department of the Air Force and the Federal Aviation Administration on Safety for Space Transportation and Range Activities.*

1.4.26. *Memorandum of Understanding Between Air Force Space Command and Federal Aviation Administration Office of Commercial Space Transportation for Resolving Requests for Relief from Common Launch Safety Requirements.*

1.4.27. Range Commanders Council (RCC) Standard 319, *Flight Termination Systems Commonality Standard.*

1.4.28. RCC Standard and Supplement 321, *Common Risk Criteria Standards for National Test Ranges.*

1.4.29. RCC Standard 324, *Global Positioning and Inertial Measurements Range Safety Tracking Systems.*

Chapter 2

RESPONSIBILITIES AND AUTHORITIES

2.1. General. Range safety is a joint responsibility of the United States Air Force (USAF), as the owner and operator of AFSPC ranges, the Range Users, and in instances of commercial launches, the Department of Transportation. The responsibility for protecting the public, launch area, recovery area, launch complex personnel and resources and recovery site personnel and resources is of paramount consideration in range operations.

2.2. Headquarters Air Force Space Command Responsibilities. HQ AFSPC operates the AFSPC ranges, including providing base support, personnel and other government assets. The AFSPC Commander (AFSPC/CC) is responsible for establishing Range Safety policy for AFSPC ranges as outlined in AFSPCI 91-701, *Launch and Range Safety Program Policy and Requirements*. HQ AFSPC Directorate of Safety (HQ AFSPC/SE) is responsible for establishing common Range User safety requirements as outlined in this publication and 14 CFR Part 400 series (Commercial Space Transportation) for the AFSPC space wings to implement and enforce.

2.3. Space Wing Responsibilities:

2.3.1. Commander, 30th Space Wing and 45th Space Wing (SW/CCs).

2.3.1.1. SW/CCs have overall authority and responsibility for public safety at AFSPC ranges as directed by DoDI 3200.18 and delegated by the AFSPC/CC. This delegation is provided via the MAJCOM chain of command, specifically the AFSPC/CC, and AFI 91-202, as supplemented.

2.3.1.2. SW/CC or Vice Commander (SW/CV) or Launch Decision (LDA) shall establish and enforce the requirements of this publication as it applies to Range User programs on their range.

2.3.1.3. Where feasible, the SW/CC shall coordinate all actions between the ranges to ensure consistent and standard Range Safety requirements and approvals are levied on all Range Users.

2.3.1.4. The SW/CC shall ensure range-owned resources are protected. Where government property or facilities are leased to launch system operators, the SW/CCs shall ensure the government agency responsible for the resource identifies the requirements for resource safety in the appropriate lease agreements.

2.3.1.5. The SW/CCs, SW/CVs or the LDA shall approve or disapprove all waivers affecting public safety. (See page 2 “Purpose” for a description of the waiver authority tier levels).

2.3.1.6. The SW/CCs, SW/CVs or the LDA shall ensure users are notified of risks to their resources posed by the range or other range users when those risks exceed acceptable limits.

2.3.2. Chiefs of Safety, 30th and 45th Space Wings. The Chiefs of Safety, 30 SW/SE and 45 SW/SE, as the designated safety representatives for the SW/CCs, are responsible for the following:

2.3.2.1. Establishing and enforcing the Safety Program.

2.3.2.2. Providing single points of contact at the range for each Range User safety program.

2.3.2.3. Ensuring the Safety Program meets the needs of the ranges and Range Users and does not impose undue or overly restrictive requirements on Range User programs.

2.3.2.4. Approving or disapproving waivers other than those affecting public safety.

2.3.2.5. Approve tailored versions of AFSPCMAN 91-710 that do not affect public safety. (SW/CC may waive this requirement and authorize Chief of Safety approval of tailoring that does affect public safety).

2.3.3. Wing Safety Offices. Unless otherwise noted, the use of the term "Wing Safety" in this publication refers to 30 SW/SE and 45 SW/SE and is synonymous with the term "Range Safety". The Wing Safety Offices perform the following functions in support of range operations: 1) flight safety engineering assessment; 2) ground support equipment and facility safety engineering assessment; 3) launch site safety (operations); 4) termination system assessment/engineering; and 5) launch safety (flight and risk analysis). In addition, Wing Safety provides direct support to the 1st Range Operations Squadron (1 ROPS) and 2nd Range Operations Squadron (2 ROPS) mission flight control function for all missions from or to the ranges that use ground commanded flight termination. The Wing Safety Offices also provide traditional Air Force occupational, weapons, and flight safety programs. The responsibilities of the Chiefs of Safety or their designated representatives apply throughout all phases of a launch and/or reentry program (planning, generation, execution and recovery) and include, but are not limited to, the following:

2.3.3.1. Enforce safety requirements to ensure public safety, launch area safety, launch complex safety, recovery area safety and recovery site safety are adequately provided by and for all programs using AFSPC ranges.

2.3.3.1.1. Provide oversight, review, approval and monitoring for all public safety and launch area safety concerns during prelaunch operations at launch complex, launch vehicle and payload processing facilities.

2.3.3.1.2. Provide oversight, review, approval and monitoring for all public safety and recovery area safety concerns during reentry/flyback operations at recovery area facilities.

2.3.3.2. Program Planning Phase (Tailoring, Non-Compliance Resolution, Launch Safety Analysis)

2.3.3.2.1. Determine the need for and serve as approval authority for vehicle FSS; review and approve the design, ensuring compatibility with the ground instrumentation baseline to include recent and on-going changes to ground instrumentation resulting from upgrades, etc., test and documentation for vehicle FSSs; monitor and verify the installation, checkout and status of the flight termination system (FTS) IAW wing safety instructions at locations designated by Wing Safety.

2.3.3.2.2. Determine criteria for flight termination action; assess risks to protect the general public, launch area, recovery area, launch complex personnel and property and recovery site personnel and property; develop and use mathematical models to

increase the effectiveness of errant vehicle control while minimizing restrictions on launch and reentry vehicle flight; establish mission rules and criteria for flight termination action in conjunction with the Range User.

2.3.3.2.3. Approve or disapprove equivalent level of safety (ELS) requests.

2.3.3.3. Program Generation Phase (Vehicle, Payload, Ground Support Equipment, Range Safety System and Facility Design and Test; Program Operations Tests; and Wing Safety Approval for Launch Operations Phase)

2.3.3.3.1. Evaluate, train and approve Range Users who wish to assume "control authority" for launch complex safety or recovery site safety IAW **Attachment 8**.

2.3.3.3.2. Review and approve flight plans, design, inspection, procedures, testing and documentation of all hazardous and safety critical launch vehicles, payloads, reentry/flyback vehicles, and ground support equipment, systems, subsystems, facilities and material to be used at the ER and WR. Review and approval shall be IAW the requirements of AFSPCMAN 91-710 volumes 2 through 6.

2.3.3.3.3. Audit operations at a launch complex or recovery site and associated support facilities for launch complex safety or recovery site safety concerns IAW a jointly accepted Launch Complex Safety Training and Certification program (**Attachment 8**). If the Range User elects not to or cannot implement the plan, Wing Safety shall assume this safety responsibility.

2.3.3.4. Program Execution Phase

2.3.3.4.1. Safety Review with the SW/CC. Prior to each launch or reentry from orbit, Wing Safety shall brief the SW/CC of the safety status of the launch/reentry vehicle. The briefing shall include vehicle hazards, the status of any applicable waivers and any other issues contributing to the risk of the flight/reentry. The briefing may be accomplished at the Launch Readiness Review (LRR) or via a separate safety briefing.

2.3.3.4.2. Collision Avoidance (COLA). The SW/CC shall establish the pre-launch and/or pre-reentry COLA process for the protection of manned spacecraft and active satellites as well as for avoiding debris (including inactive spacecraft) to minimize the generation of orbital debris. The process will implement the policy and direction defined in AFI 91-217 and higher headquarters direction, the guidance provided in RCC Standard 321 and the safety requirements and criteria specified in AFSPCMAN 91-710 **Volume 6**. For controlled reentries, the COLA process will consider the conjunction(s) of the reentering object (including RLVs) with any and all orbiting objects of a sufficient mass to compromise the integrity of the vehicle or alter its intended trajectory such as to create further hazards and risk to the public. More conservative miss criteria may be used to compensate for increased uncertainty in the location of the reentering object. For example, a larger miss distance to avoid manned objects in low earth orbit may be appropriate for pre-programmed upper stage reentry from a geo-transfer orbit. If not operationally responsible for implementing the SW/CC COLA process, Wing Safety will work with higher headquarters to aid in establishing collision avoidance policy, requirements and criteria.

2.3.3.4.3. Launch Collision Avoidance (LCOLA). All launches from Air Force ranges and all Air Force launches from non-Air Force ranges shall accomplish LCOLA procedures accounting for all launched objects (e.g. booster segments, payloads, jettisoned components, and debris) with an altitude capability equal to or greater than 150km. COLA analysis may not be required if the three-sigma maximum altitude capability of the launch vehicle, jettisoned components or planned debris is greater than 50 km below the orbital perigee of a manned object or 25 km below an active satellite or 2.5 km below any other catalogued object.

2.3.3.5. Provide applicable Range Safety Operations Requirement (RSOR) and Operations Supplement (Ops Sup) documents; provide Wing Safety launch operations approval at the LRR; evaluate and issue safety approval for personnel authorized to remain in hazardous launch areas; and provide the final Wing Safety approval to launch.

2.3.3.6. Provide Wing Safety personnel to support launch and reentry operations; coordinate and maintain a close working relationship with Mission Flight Control Officers (MFCOs) to ensure waivers to requirements are followed; monitor MFCO actions during Integrated Crew Exercises for each mission; exercise safety operations waiver authority as delegated by the SW/CC.

2.3.3.7. During the day-of-launch (DoL) countdown, Wing Safety shall work safety waivers that are generated and will work real-time waivers. Documentation for any real-time waivers will be created and provided after the operation.

2.3.3.8. Support the Emergency Operations Center (LEOC, ER only) and advise the on-site commander regarding disaster preparedness, response and as necessary provide technical assistance in the event of failures and mishaps.

2.3.3.9. Assess Wing Safety Critical Launch Commit Criteria for launch operations and Reentry Commit Criteria for reentry/flyback operations.

2.3.3.10. Establish a configuration control process for maintaining Wing Safety documentation in a timely, technically correct, easily understood manner accessible to Range Users, including tailored Wing Safety requirements and standards developed jointly with other agencies.

2.3.3.11. IAW DoDI 3200.18, manage a safety program consistent with operational requirements, which includes the prevention of objects (including targets) from violating established safety, security or range boundaries. When more than one activity is involved in supporting an event, the lead activity shall be responsible for the coordination of safety plans and for any safety issues arising during the event. For earth reentry of orbiting space vehicles, the safety responsibility rests with the activity controlling the recovery portion of the flight. Specific safety responsibilities include:

2.3.3.11.1. Establishment and enforcement of safety policies and procedures.

2.3.3.11.2. Coordination of safety plans and procedures with other agencies within the potentially affected areas and issuance of notices within the United States and to foreign governments on anticipated hazards from test activities.

2.3.3.11.3. Coordination of public affairs plans and assistance in disseminating appropriate information.

2.3.3.11.4. Establishment of allowable ground and flight safety conditions and appropriate action to ensure that test articles do not violate those conditions.

2.3.3.11.5. Prevention of objects (including targets and decoys) from violating established limits through impact or landing for vehicles with suborbital trajectories and through orbital injection or escape velocity for space vehicles.

2.3.3.11.6. Notification to the National Military Command Center if an accident or errant trajectory occurs that may have international implications.

2.3.3.11.7. Ensure safety is consistent with operational requirements, including preventing objects from violating established limits through impact for vehicles with suborbital trajectories, through orbital insertion or escape velocity for space vehicles and through final recovery for RVs.

2.3.3.12. Ensure public safety criteria are not exceeded through the end of Wing Safety responsibility. Wing Safety responsibility exists until the time of flight at which the launch/reentry/flyback vehicle/spacecraft achieves a sustainable orbit or reaches escape velocity for space vehicles or through final impact for vehicles with suborbital trajectories or until vehicle motion with respect to the ground stops for RVs, and can be shown to pose no statistically significant additional safety risk.

2.3.3.13. Ensure the FAA is invited to participate in tailoring meetings for launch vehicles used for FAA-licensed launches, IAW MOU between AFSPC and FAA for Resolving Requests for Relief from Common Launch Safety Requirements.

2.3.4. Space Wing Safety Office Relationship with Range Users. The SW Safety Offices (30 SW/SE and 45 SW/SE) are responsible for initiating, establishing and implementing Range User interface processes to ensure that the requirements of this publication are met and, if desired by the Range User, tailored to meet individual Range User safety program requirements. To meet these responsibilities, 30 SW/SE and 45 SW/SE shall assign a point of contact (POC) for each new Range User program to act as the Wing Safety single point of contact. The POC shall assist in identifying and establishing interfaces between the Range User and the applicable range support organizations required for the Range User safety program. The interface process is described in Chapter 4.

2.3.5. Commander, 30th Launch Group and 45th Launch Group. The Commander, 30th Launch Group (30 LCG) and 45th Launch Group (45 LCG), are responsible for the following:

2.3.5.1. Review and accept all prelaunch and launch operations procedures at CCAFS (45 LCG) and VAFB (30 LCG) for SMC acquired/managed programs, including hazardous and safety critical procedures that may affecting public safety or launch area safety, after ensuring the procedures have been approved by Wing Safety.

2.3.5.2. As a control authority, IAW the Launch Complex Safety Training and Certification Plan, review and approve prelaunch and launch operations procedures for USAF programs where any hazards associated with the procedure are limited to the launch complex.

2.3.5.3. As a control authority, IAW the Launch Complex Safety Training and Certification Plan, review and approve recovery and post-recovery operations procedures

for USAF programs where any hazards associated with the procedure are limited to the recovery site.

2.3.6. Commander, 30th Operations Group and 45th Operations Group. The Commanders, 30th Operations Group (30 OG) and 45th Operations Group (45 OG), are responsible for the following:

2.3.6.1. Provide and ensure all required instrumentation, computers, communications, command systems and display systems necessary for Wing Safety to carry out its functions perform to the prescribed level of reliability and meet specified design requirements.

2.3.6.2. Provide certified MFCOs and associated support personnel as required to implement the rules and requirements designed by Wing Safety for protecting the public during launch and reentry operations.

2.3.6.3. Identify and coordinate with Wing Safety on DoL range system failures and/or anomalies (non-compliances) that may affect the reliability of instrumentation critical to ensuring public safety.

2.3.6.4. Coordinate with the FAA to ensure the timely notification of any expected air traffic hazard associated with range activities, prior to launch and reentry and based on information provided by Wing Safety. During the launch and reentry and in the event of a mishap, the Commanders are responsible for immediately informing the FAA of the volume and duration of airspace where an aircraft hazard is predicted, after coordinating with Wing Safety. Similarly, the Commanders are responsible to coordinate with the US Coast Guard (USCG) to ensure timely notification of any associated ship traffic hazard and in the event of a mishap, to inform the USCG of the area and duration of navigable waters where a ship hazard is predicted with information provided by or coordinated with, Wing Safety. The term “ship” includes boats and watercraft of all sizes.

2.3.7. Commander, 30th Mission Support Group and 45th Mission Support Group. The commanders, 30th Mission Support Group (30 MSG) and 45th Mission Support Group (45 MSG), are responsible for the following:

2.3.7.1. Determine, coordinate and enforce fire safety, environmental management and explosive ordnance disposal requirements.

2.3.7.2. Provide certified Launch Emergency Operations Center (LEOC)(ER) or Launch Support Team (LST)(WR). The LEOC or LST Chief shall direct operations resulting from an accident with primary responsibility for directing lifesaving, protecting resources and preserving evidence The LEOC/LST Chief serves as on-scene commanders for all LEOC/LST activities impacting public and government safety. The LEOC/LST Chiefs report and respond to the Incident Commander as specified in the National Response and Emergency Management Plan.

2.3.7.3. The Fire Department, Environmental Engineering and Explosive Ordnance Disposal organizations within the MSG are responsible for establishing and implementing their programs in coordination with the offices of the Chiefs of Safety.

2.3.8. Commander, 30th Medical Group and 45th Medical Group. The Commanders of the 30th Medical Group (30 MDG) and 45th Medical Group (45 MDG) are responsible for

determining, coordinating and enforcing medical, biological and radiological health requirements. Radiation Safety Officers and Bioenvironmental Engineering are responsible for establishing and implementing their programs in coordination with the offices of the Chiefs of Safety.

2.4. Federal Aviation Administration Responsibilities. IAW 14 CFR Part 400 series, the FAA has responsibility for public safety of licensed or permitted launches and reentries. The Launch Safety requirements in this publication have been written with the intent of achieving commonality with the FAA requirements. SW/CC discretion to accept higher risk for the launch or reentry of government payloads does not apply to licensed or permitted launches without a Range User obtaining relief from the FAA (Memorandum of Agreement between the Department of the Air Force and Federal Aviation Administration on Safety for Space Transportation and Range Activities). FAA documents can be found on the FAA/AST website at **http://www.faa.gov/about/office_org/headquarters_offices/ast/**.

2.4.1. The FAA and the applicable Wing Safety Office shall jointly review and approve all 14 CFR Part 400 series non-compliance requests from Range Users/launch operators for FAA licensed or permitted launch operations. Neither agency may overrule the other's denial of a request for relief. The FAA shall document the findings/resolution of the joint review and provide copies to all participants. Wing Safety shall act as the primary interface with the launch operator (Range User) for requests for relief and for tailoring.

2.4.2. The FAA has the responsibility and authority to oversee the conduct of all licensed or permitted launches and reentries and may prohibit, suspend or end immediately a licensed or permitted launch before flight if, at any time, the FAA determines the launch and/or reentry is detrimental to public health and safety, the safety of property or any national security or foreign policy interest of the US.

2.5. Range User Responsibilities. Range Users are solely responsible for complying with the requirements identified in this publication. The following are direct responsibilities of the Range User:

2.5.1. Wing Safety Funding. Range Users and supporting agencies shall be responsible for full funding of activities associated with Wing Safety support.

2.5.1.1. Funding shall be provided early in and throughout the program IAW funding requirements of DoDD 3200.11.

2.5.1.2. Programs intending to perform launch or reentry/flyback operations at both the ER and WR shall fund both ranges.

2.5.1.3. At the ER, Range Users shall provide funding and Wing Safety shall provide cost estimates IAW 45 SWI 99-101, ***45 SW Mission Program Documents***.

2.5.2. System Safety Program. The Range User Program Manager (PM) shall be responsible for developing and maintaining a safety management program encompassing all applicable Launch Safety requirements, identifying a qualified key system safety person with authority for resolution of identified hazards and direct access to the PM, and establishing and funding a supporting system safety organization/function with direct interfaces and access to other functional elements of the program. The Range User shall provide a System Safety Program

Plan (SSPP), detailing the program described above, for review and approval IAW **Attachment 3**.

2.5.3. Design, Test and Inspection Requirements. Range Users shall be responsible for the design, inspection and testing of all hazardous and safety critical launch vehicle, RV (excluding ballistic missile RVs), payload and ground support equipment, systems, subsystems, facilities and materials to be used at the ranges IAW the requirements of this publication. Range User requests to eliminate or reduce testing shall be justified with clear and convincing evidence presented to Wing Safety for submission to the SW/CC or his designee for approval. Range User responsibilities include the following:

2.5.3.1. Provide safety systems, equipment, facilities and material IAW this publication; ensure that each launch system has a capability that allows Wing Safety to initiate a holdfire that prevents launch in the event of loss of Range Safety critical systems or violation of mandatory Launch Safety launch commit criteria (AFSPCMAN 91-710 Volume 6).

2.5.3.2. Develop and obtain Wing Safety review and approval of all required data and/or documents necessary for planned operations. The review and approval for these documents, identified in Chapter 5 and in AFSPCMAN 91-710 Volumes 2 through 6, shall be IAW the data submission lead times identified in this publication.

2.5.3.3. Submit data for mission rules, launch commit criteria, reentry commit criteria and flight control operations; obtain Wing Safety launch operations approval at the LRR; participate in safety critical tests and operations; submit telemetry measurement lists and tape, the Range User Countdown Checklist and any special requirements for launch and reentry.

2.5.3.4. Ensure the FAA regulations 14 CFR, Chapter III are met for licensed or permitted launches and reentries.

2.5.3.5. Perform design and mission changes based on risk analyses performed by Launch Safety to maintain acceptable risk to the general public for deorbiting launch vehicles, upper stages, spacecraft, flyback, and RVs.

2.5.3.6. Coordinate their safety programs with Wing Safety to ensure the activities of both organizations meet national policy goals and provide for public, launch complex, recovery site or recovery area safety and resource protection while minimizing impact on mission requirements.

2.5.3.7. Provide for crew safety in manned space launch systems and coordinating crew safety policy, procedures and activities with Wing Safety.

2.5.3.8. Verify compliance with this publication. The use of subcontractors does not relieve the Range User of this responsibility. The Range User shall provide adequate contractual direction and monitor subcontractor performance to verify compliance.

2.5.3.9. As applicable, when involved in joint projects, interface and integrate actions with other Range Users or associated contractors in their safety programs.

2.5.3.10. Prepare a Safety Assessment Report (SAR). The SAR shall summarize the results of all hazards analyses performed IAW the requirements of this publication, as tailored and identify the program's residual risk, if any.

2.5.4. Radioactive Material Launches. Range Users shall be responsible for the following radioactive material launch and reentry activities:

2.5.4.1. Notify Wing Safety and the Installation Radiation Safety Officer of any intended launch or reentry of radioactive materials during the concept phase of the program.

2.5.4.2. At the WR only, request and obtain launch and reentry approval for radioactive materials from the Wing Vice Commander through the Radiation Safety Committee (RADSAFCOM).

2.5.4.3. As applicable, ensure compliance with PD/NSC 25 as outlined in DoDD 3100.10, with implementation through AFI 91-110 and any Space Wing supplements and providing certification as detailed in AFSPCMAN 91-710 volumes 2 and 3.

2.5.5. Conduct of Operations. Range Users shall be responsible for the conduct of operations as outlined below and in AFSPCMAN 91-710 Volume 6 and its attachments:

2.5.5.1. Conduct operations in a safe manner.

2.5.5.2. Plan and conduct hazardous and safety critical operations IAW Wing Safety or, as applicable, Safety Control Authority (SCA) approved procedures and IAW the current edition of the applicable operations safety plan (OSP) for the launch complex, recovery site, facility or area in use and for ordnance and propellant operations and areas.

2.5.5.3. Observe, evaluate and enforce compliance with Wing Safety requirements by all personnel within launch complexes, assembly and checkout areas, propellant and ordnance storage areas, recovery areas, recovery sites and other areas as deemed appropriate by Wing Safety.

2.5.5.4. Maintain an accurate written or computerized log of events during the launch countdown and/or reentry/flyback for three years or three launches or three reentries, whichever is greater.

2.5.5.5. Provide formal correspondence to the Space Wing detailing, for each orbital launch vehicle component achieving an altitude of at least 150 km, the time in flight when the Range User or other acceptable organization proposes to accept responsibility for on-orbit COLA. For vehicles planning to perform reentry operations, the Range User shall identify to the Space Wing when they expect to relinquish on-orbit COLA responsibility to the organization/location approving deorbit operations.

2.5.6. Control Authority Responsibilities. Range Users have the option to perform "operational safety control authority" within the launch complex or let Wing Safety perform this function. As defined in this publication, the control authority for safety includes areas within a complete launch complex (or missile silo), recovery site and adjacent facilities used by the control authority for launch vehicle, RV and/or payload processing. If the Range User performs this function, Wing Safety shall audit the program on an unannounced and periodic basis. Wing Safety shall perform these duties if a Range User is not qualified to perform the control authority function. Wing Safety can assume these responsibilities for qualified control authorities, if requested. Pad Safety shall audit the program, perform duties and assume responsibilities, if requested. The "control authority" shall also be responsible for any recovery site safety training and certification requirements. When certified IAW the Launch Complex Safety Training and Certification Requirements, the "control authority"

shall be responsible for the following activities (limited to launch complex, recovery area or recovery site safety): (See **Attachment 8**, sec A8.2.3. for the Launch Complex Safety Training and Certification Requirements).

2.5.6.1. Review and approve all procedures relating to the performance of any hazardous operation and safety critical operation.

2.5.6.2. Review and approve Facility Emergency Operating Plans (FEOPs) and OSPs.

2.5.6.3. Ensure hazardous facilities are periodically inspected and safety critical and hazardous operations are monitored, as required.

2.5.6.4. Monitor hazardous and safety critical operations, as required.

2.5.6.5. Define the threat envelopes of all hazardous operations and establish safety clearance zones to protect launch complex/recovery area/recovery site personnel and resources."

2.5.6.6. Ensure that all personnel performing hazardous operations are provided adequate training to ensure proper conduct of their jobs and tasks.

2.5.6.7. Ensure that adequate personal protective equipment is provided to launch complex, recovery area, site personnel as defined by this publication and approved OSPs.

2.5.6.8. Ensure that all hazardous operations affecting launch complex safety and recovery area or recovery site safety are conducted using formal written procedures approved by the appropriate Safety Control Authority (SCA).

2.5.7. Occupational Safety and Health:

2.5.7.1. Per AFI 91-202, *The United States Air Force Mishap Prevention Program*, Range Users (contractors/licensed or permitted launch and reentry operators/foreign entities) are fully responsible for the safety and health of their employees IAW Occupational Safety and Health Administration (OSHA) regulations/standards and other federal and state safety and health regulations. Further, they have an inherent responsibility to protect any government employees and property when such are involved in contractor operations or on contractor-leased facilities. Wing Safety shall assume no liability for Range User or contractor compliance or noncompliance with OSHA requirements.

2.5.7.2. USAF civilian and military personnel Range Users are required to comply with all DoD and Air Force safety and health requirements. Other DoD and federal government agency Range Users shall comply with their applicable safety and health requirements.2.5.7.3. All Range Users shall develop and coordinate an Accident Notification Plan with Wing Safety (AFSPCMAN 91-710 Volume 6, **Chapter 4**).

2.5.8. Resource Safety. Range Users are responsible for resource safety of Range User owned or leased facilities, equipment and flight hardware.

Chapter 3

RANGE SAFETY POLICY

3.1. General.

3.1.1. It is AFSPC policy to ensure that the risk to the public, launch area, launch complex personnel and resources, and recovery area and recovery site personnel and resources is managed to an acceptable level. This policy shall be implemented by employing risk management in five categories of safety: Public, Launch Area, Launch Complex, Recovery Area, and Recovery Site Safety.

3.1.2. The Range User shall endeavor to manage risk to the lowest level, consistent with mission requirements, and in consonance with AFSPC range launch risk guidance. Individual hazardous activities may exceed guidance based on national need after implementation of available cost-effective mitigation.

3.1.3. It is the policy of the ranges to avoid the use of waivers. However, the SW/CC has the authority to tailor or waive any requirement in this publication for a specific mission based on national or mission needs. The ranges shall comply with risk criteria specified in Table 3.1. The standard acceptable risk criteria apply separately to the launch and reentry phases of flight IAW RCC 321 and AFI 91-217. Therefore, the standard acceptable risk criteria applies separately to the launch vehicle, upper stage reentry (for upper stages that achieve orbit), and payload reentry provided the requirements of AFSPCMAN 91-710 Volume 2 are satisfied. (T-3)

3.1.4. Imminent danger situations are subject to the following:

3.1.4.1. Any operation, condition or procedure that presents imminent danger shall be brought to the immediate attention of the supervisor or individual responsible for the immediate area.

3.1.4.2. Immediate action shall be taken by the supervisor or individual responsible for the immediate area to correct the situation, apply interim control measures, stop the operation, and evacuate all personnel. The system, equipment or facility shall be immediately placed in the safest condition possible until the situation is resolved.

3.1.4.3. All imminent danger situations shall be reported to Wing Safety not later than 1 hour from the time the situation is identified.

3.2. Public Safety.

3.2.1. Launch and Reentry Risk Criteria ab. Wing Safety shall ensure the risk to the public, including foreign countries personnel and resources), from range operations meets the criteria established in AFI 91-217 and this publication. Table 3.1 shows the risk management criteria for personnel to be used for determining acceptable risk for individual launches and reentries IAW the flight plan approval process and risk budgets defined in AFSPCMAN 91-710, Volume 2. Allowable individual public risk criterion is an expected casualty (Ec) of <1 x 10-6. The allowable collective risk to the General Public is an aggregated (all hazards, all people including personnel n ships) Ec of <100 x 10-6. General Public risk that exceeds an Ec of 100 x 10-6 requires SW/CC waiver approval. When the General Public mission risks

exceed an Ec of 1,000 x 10-6, the 14th AF/CC must be notified (see Table 3.1, note c). When the General Public mission risks exceed an Ec of 10,000 x 10-6, AFSPC/CC approval is required. Launch Essential Personnel mission risks greater than an aggregated Ec of 300 x 10-6 require SW/CC waiver approval. Based on national need and the approval of the SW/CC, non FAA licensed launches may be permitted using a predicted risk above 100 x 10-6. Range Users will comply with FAA acceptable risk criteria or AF criteria, whichever is more stringent, for FAA-licensed or permitted launches. Refer to AFI 91-217 for AF risk approval levels. RCC Standard 321 provides relevant background information on launch risk acceptability. The ranges and Range Users shall work together to determine mission risks based on data provided by the Range Users and Wing Safety models. See Attachment 5 for definitions of terms and further guidance. (T-3) and (T-2).

Table 3.1. Launch and Reentry Risk Criteria ab.

Category	Type	Acceptable Limit		SW/CC Waiver Required		AFSPC/CC Approval Required [c]	
		Individual	Collective [d]	Individual	Collective [d]	Individual	Collective [d]
General Public [e]	E_c [f]	$\leq 1 \times 10^{-6}$	$\leq 100 \times 10^{-6}$	$> 1 \times 10^{-6}$ to $\leq 100 \times 10^{-6}$ [g]	$> 100 \times 10^{-6}$ to $\leq 10{,}000 \times 10^{-6}$ [g]	$> 100 \times 10^{-6}$	$> 10{,}000 \times 10^{-6}$
General Public (FAA – Licensed Launch) [h]	E_c [f]	Refer to 14 CFR Part 400 series (FAA Regulations)					
Launch Essential Personnel [e]	E_c [f]	$\leq 10 \times 10^{-6}$	$\leq 300 \times 10^{-6}$	$> 10 \times 10^{-6}$ to $\leq 1{,}000 \times 10^{-6}$ [g]	$> 300 \times 10^{-6}$ to $\leq 30{,}000 \times 10^{-6}$ [g]	$> 1{,}000 \times 10^{-6}$	$> 30{,}000 \times 10^{-6}$
Aircraft-General Public	P_i [i]	----	$\leq 1 \times 10^{-6}$	----	----	----	----
Aircraft-Launch Essential	P_i [i]	----	$\leq 10 \times 10^{-6}$	----	----	----	----
Trains	Pi [i]	----	$\leq 1 \times 10^{-6}$	----	----	----	----

a. Risk is a measure that accounts for both the probability of occurrence and the consequence of hazards to a population. Risk criteria applies from lift-off to orbital insertion for orbital missions (all hazards including debris, distant focusing overpressure, toxic dispersion, etc.) and from lift-off to final impact for suborbital missions (AFI 91-217). Risk criteria apply separately to the launch and reentry phases of flight for orbital missions IAW RCC 321, AFI 91-217, National Space Policy, and AFSPCMAN 91-710, Volume 2

b. When risks from toxic hazards exist, ensure the allowable risk does not exceed other required standards (national, federal, and state guidelines as well as agreements with local government authorities) for toxic exposure limits for the general public

c. Prior to requesting AFSPC/CC approval, SW/CC approval and 14 AF/CC notification must have occurred

d. Collective risk is the aggregated risk to all individuals from all hazards (debris, toxics, distant focus overpressure, etc.)

e. Expectation of casualty for personnel on waterborne vessels are included in the calculation of collective risk to the General Public or Launch Essential Personnel

f. Expectation of casualty. A casualty is a serious injury or worse to a human being
g. Risks greater than "Acceptable Limit" but less than or equal to one order of magnitude above "Acceptable Limit" require SW/CC waiver and notification to 14 AF/CC
h. FAA-licensed launches shall meet both the FAA and AF risk criteria
i. Predicted probability of impact

3.2.1.1. Prelaunch, Launch and Reentry Operations:

3.2.1.1.1. Wing Safety shall review, approve and monitor (through Pad Safety) all prelaunch, launch and reentry operations conducted on AFSPC ranges and will impose safety holds when necessary. These actions are required to ensure that hazards do not expose the public, launch base, launch area, launch complex, recovery area or recovery site personnel and range assets to risks greater than those considered acceptable by public law, state requirements and agreements or military regulations. These documents include, but are not limited to, 42 USC, Chapter 116; 29 CFR Part 1910.119, Process Safety Management of Highly Hazardous Chemicals; 40 CFR Part 355; 40 CFR 68, Subpart G, Risk Management Plan; Executive Order 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements; and California Occupational Safety and Health Administration (CAL-OSHA).

3.2.1.2. Wing Safety shall oversee launch vehicle, RV, payload, mission flight control and Wing Safety launch support operations to ensure that risks to the public, launch area, launch complex, recovery area and recovery site do not exceed acceptable limits consistent with mission and national needs.

3.2.1.3. The Range User shall provide each launch and reentry system with a capability that allows Wing Safety to initiate a hold to prevent the launch or reentry in the event of the loss of Range Safety critical systems or the violation of mandatory Range Safety launch or reentry commit criteria (see AFSPCMAN 91-710 Volume 6).

3.2.1.3.1. Safety holds shall be initiated to prevent the start of a launch operation or to stop a launch operation that is committed if it violates public, launch area or launch complex safety or Launch Safety launch commit criteria.

3.2.1.3.2. Safety holds may be initiated by the MFCOs, Pad Safety Supervisor/Pad Safety Officer, Range Control Officers, Range Operations Commander (WR), Flight Safety Project Officer (FSPO) (WR), the Range User, FAA representative for licensed or permitted launches or any responsible supervisor in charge of a launch operation.

3.2.1.3.3. RVs that reenter from Earth orbit and will be landing/recovering at the ER or WR shall be operated such that only the vehicle operator is able to issue a command enabling reentry of the flight vehicle. Reentry flight shall not be initiated autonomously, under nominal circumstances, without prior enable. Reentry shall not be initiated until after an analysis of the vehicle health and safety and a Wing Safety "GO" is obtained.

3.2.1.4. Explosives siting is required by the DoD and by Federal Law for any organization that stores, handles, operates, and/or assembles ordnance/propellant/explosive items on a DoD installation. Quantity distance explosives siting shall be accomplished for all explosives facilities IAW AFMAN 91-201, Explosives Safety Standards. Range Users shall submit their explosive requirements a minimum of one year prior to breaking ground for new construction or initiating facility modifications that require a new explosive site plan. Explosive requirements shall be submitted a minimum of 6 months prior to beginning a new use at an existing facility.

3.2.2. Range Safety Critical Systems. Range Safety critical systems include all airborne and ground subsystems of the FSS. The FSS consists of airborne and ground FTSs, airborne and ground Range Tracking System (RTS) and the Telemetry Data Transmitting System (TDTS). The ground FSS also includes any hardware or software system, subsystem or elements thereof that could prevent the MFCO from stopping the launch of a vehicle, determining the performance of a nominal or non-nominal launch or reentry vehicle or commanding flight termination action or could cause unauthorized issuance of FTS commands. Range Safety criticality shall be determined during initial acquisition activities by the Wing Safety organization at the launch range (see AFSPCMAN 91-710 Volume 4 and RCC 319 for further details). An autonomous flight safety system (AFSS) is a range safety critical system that is self-contained onboard the vehicle. There are no real-time ground systems (tracking, commanding or other) that are part of an AFSS. Command and tracking capability is necessary only from liftoff to over-the-horizon loss of signal, as viewed from the launch head, provided public risk criteria are not exceeded.

3.2.2.1. All Range Safety critical systems shall be designed to ensure that no single point of failure will deny the capability to monitor and terminate or result in the inadvertent termination of a launch vehicle, RV or payload, as applicable. For software, this requirement may be satisfied by analysis and rigorous fault testing (IV&V) acceptable to Wing Safety.

3.2.2.2. Range Safety critical systems shall be designed to be dual fault tolerant against failure in hardware and software and still provide overall system redundancy.

3.2.2.3. The reliability requirements of the FSS are as follows:

3.2.2.3.1. The overall airborne and ground FTS reliability goal is 0.9981 at the 95 percent confidence level.

3.2.2.3.1.1. The airborne FTS reliability goal shall be a minimum of 0.999 at the 95 percent confidence level. This goal shall be met by combining the design approach and testing requirements of AFSPCMAN 91-710 Volume 4 and RCC 319.

3.2.2.3.1.2. The ground FTS shall have a reliability of 0.999 at the 95 percent confidence level for an 4-hour duration, as required.

3.2.2.3.2. The overall airborne and ground RTS reliability is a function of the following requirements:

3.2.2.3.2.1. The airborne RTS reliability shall be 0.995 at the 95 percent confidence level for transponder systems and 0.999 at the 95 percent confidence

level for global positioning systems. Reliability requirements for other tracking systems, such as inertial measurement units, shall comply with the tracking system reliability requirements in RCC 324. These requirements shall be met by combining the design approach and testing requirements of AFSPCMAN 91-710 Volume 4.

3.2.2.3.2.2. The ground RTS reliability shall be 0.999 at the 95 percent confidence level for the duration of wing safety responsibility.

3.2.2.3.3. The reliability requirement for the TDTS is the same as that for the airborne and ground RTS when the TDTS is used to provide tracking data. At a minimum, for vehicle health and FSS post-flight analysis, TDTS reliability shall be a minimum of 97% which includes ground and airborne systems.

3.2.2.4. Other systems determined to be Range Safety critical shall have a design reliability of 0.999 at the 95 percent confidence level.

3.2.2.5. The RTS shall include at least two adequate and independent instrumentation data sources. At least one of the instrumentation data sources shall be GPS MT as required by the Under Secretary of the Air Force memorandum (GPS Metric Tracking) dated Sep 20, 2006. This requirement applies to all launches (DoD, civil and commercial) from the Eastern and Western ranges. Waiver authority for this requirement is the AFSPC/CC (T-2). If an autonomous flight safety system is used, then a GPS tracking source is not mandated.

3.2.2.5.1. After T-0, based on Range Safety pre-launch analysis, two tracking sources are required for an adequate period of time before Minimum Time to Endanger to allow for MFCO actions to prevent violation of the destruct lines.

3.2.3. Control of Errant Vehicle Flight:

3.2.3.1. Wing Safety shall verify that all launch or reentry vehicles launched from or onto AFSPC ranges or RVs or flyback stages originating from or recovering onto AFSPC ranges have a wing-approved method of minimizing risks to the public, launch area, launch complex personnel and resources and recovery site personnel and resources. Normally, control systems on launch and reentry vehicles using the ranges shall consist of an airborne FSS that shall meet all the requirements of AFSPCMAN 91-710 Volumes 2 and 4 of this publication. A thrust termination system may be considered as an option for an FSS; however, quantification of risks shall be determined, and the requirements in AFSPCMAN 91-710 Volume 2 shall be met. The alternative thrust termination concept and design shall be approved by the SW/CC.

3.2.3.2. Wing Safety shall establish flight termination criteria and Wing Safety mission flight rules to ensure that operations do not exceed acceptable public safety limits.

3.2.3.3. Wing Safety shall establish and control hazardous launch areas, recovery areas and procedures to protect the public on land, on the sea and in the air for each launch and launch vehicle or RV using the ranges and to ensure the following criteria are met:

3.2.3.3.1. No intact launch vehicle, RV, scheduled debris, payload, or launch vehicle and payload subsystems (**exception**: AFGSC & MDA missions downrange) shall be allowed to intentionally impact on land except in the launch area or recovery area

inside the impact limit lines. **Note:** There may be missions that require no intact impact on land areas (for example, a nuclear payload launch) that may drive additional mitigation techniques or augmentation to ensure vehicle or stage destruct capability inside the impact limit lines.

3.2.3.3.2. Flight paths and trajectories shall be designed so that normal impact dispersion areas do not encompass land.

3.2.3.3.3. Safety margins shall be used to avoid overly restrictive flight termination (destruct) limits.

3.2.3.4. Wing Safety policy may allow errant launch vehicles and RVs to continue to fly to obtain maximum data until they would present an unacceptable risk to the public or until the launch vehicle or RV can no longer be controlled.

3.3. Launch Area Safety. The following requirements are in addition to those specifically identified for launch area safety in section 3.2. See **Attachment 5** and AFSPCMAN 91-710 Volume 7 for the definitions of terms related to risk.

3.3.1. The ranges shall ensure that all personnel and USAF or third party resources located on any AFSPC range, including CCAFS or VAFB or on any supporting site within the ER or WR, are provided an acceptable degree of protection from the hazards associated with range operations.

3.3.2. **Table 3.2.** shows nominal launch area and launch complex hazard consequence and probability categories correlated to different levels of acceptability for prelaunch hazards not associated with launch or Launch Safety launch commit criteria. Numbers provided in **Table 3.2** are guides only and are not necessarily hard limits.

Table 3.2. Acceptability Guidelines for Launch Recovery Sites Hazard Consequences and Probability Categories.

Hazard Severity		**Potential Consequences**				**Probability***				
Category		Personnel Illness/Injury	Equipment Loss ($)	Unit Downtime	Data Compromise	A	B	C	D	E
I	Catastrophic	Could result in one or more of the following: death, permanent total disability, irreversible significant environmental impact.	> 10,000,000	> 4 months	Data is never recoverable or primary program objectives are lost.					
II	Critical	Could result in one or more of the following: permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, reversible significant environmental impact.	1,000,000 to 10,000,000	2 weeks to 4 months	May cause repeat of test program.					
III	Marginal	Could result in one or more of the following: injury or occupational illness resulting in one or more lost work day(s), reversible moderate environmental impact.	100,000 to 1,000,000	1 Day to 2 Weeks	May cause repeat of test period.					
IV	Negligible	Could result in one or more of the following: injury or occupational illness not resulting in a lost	< 100,000	< 1 Day	May cause repeat of data point, or data may require minor manipulation					

		work day, minimal environmental impact.			or computer rerun.

Risk Priority: High-Unacceptable | Serious-Waiver required | Medium-ELS Required | Operation Permitted

* Probability refers to the probability that the potential consequence will occur in the life cycle of the system (test/activity/operation). Use the following list to determine the appropriate risk level.

Probability Description**		**Threshold Level*****	**Probability Value**	**Specific Individual Item**	**Fleet or Inventory******
A	Frequent	8×10^{-2}	3×10^{-1}	Likely to occur repeatedly	Continuously experienced
B	Probable	8×10^{-3}	3×10^{-2}	Likely to occur several times	Will occur frequently
C	Occasional	8×10^{-4}	3×10^{-3}	Likely to occur sometime	Will occur several times
D	Remote	8×10^{-5}	3×10^{-4}	Unlikely to occur, but possible	Unlikely, but can reasonably be expected to occur
E	Improbable	8×10^{-5}	1×10^{-6}	Very unlikely to occur, but still possible.	Unlikely to occur, but possible

** Definitions of descriptive words may need to be modified based on the quantity involved.

*** These are upper threshold for each frequent category (row)

**** The size of the fleet or inventory as well as the system life cycle shall be defined.

3.3.3. Launch-Essential Personnel. Allowable collective aggregated risk for launch-essential launch area personnel is 300 x 10-6. Allowable individual risk for launch-essential personnel is 10 x 10-6 (for FAA-licensed or permitted launches, see 14 CFR Part 400 series (FAA Regulations, range users shall comply with both AFSPC and FAA requirements).

3.3.3.1. Launch-essential personnel are those persons necessary to safely and successfully complete a specific/current hazardous operation or launch.

3.3.3.2. Launch-essential personnel include supporting personnel required to perform emergency actions according to authorized directives and persons in training to perform emergency actions.

3.3.3.3. Wing Safety and the Range User jointly determine the number of launch-essential personnel allowed in safety clearance zones and hazardous launch areas with the concurrence of the SW/CC.

3.3.4. For non-FAA-licensed or permitted launches, the SW/CC can allow for neighboring operations personnel (NOP) to be assessed at the same risk level as launch-essential personnel (300 x 10-6). For risk requirements for FAA-licensed or permitted launches, see 14 CFR Part 400 series (range users shall comply with both AFSPC and FAA requirements).

3.3.5. Wing Safety shall conduct risk studies and analyses to determine the risk levels, define acceptable risk levels and develop exposure criteria for launch area and launch complex safety.

3.3.6. Wing Safety shall establish design criteria and controls, procedures and processes to minimize personnel risks and ensure acceptable launch area and launch complex risk levels are not exceeded.

3.3.7. Wing Safety shall evaluate all launch vehicle, payload, ground support and facility systems used on the ranges to test, checkout, assemble, handle, support or launch space launch vehicles or payloads with regard to their hazard potential and ensure they are designed to minimize risks to personnel and fall within acceptable exposure levels for launch area and launch complex safety.

3.3.8. Wing Safety shall ensure that all hazardous operations affecting launch area and launch complex safety are identified and conducted using Wing Safety or SCA (if procedure hazards are limited to launch complex safety) approved formal written procedures. Through Pad Safety, Wing Safety shall ensure launch area and launch complex safety is provided IAW this publication and approved OSPs.

3.3.9. Wing Safety shall define the threat envelope of all hazardous operations affecting launch area and launch complex safety and establish safety clearance zones to protect personnel and resources. A minimum number of personnel shall be exposed to the minimum hazard level consistent with efficient task accomplishment.

3.3.10. Range Users shall ensure all personnel performing hazardous operations that may impact launch area or launch complex safety are provided adequate training to ensure proper conduct of their jobs and tasks by reviewing Range User training plans. Wing Safety may review the Range User training plans to ensure compliance.

3.3.11. Launch Area Resource Safety. Resource safety, formerly known as resource protection, is the protection of facilities, support equipment or other property from damage due to mishaps.

3.3.11.1. The SW/CC shall ensure range-owned resources are protected. Where government property or facilities are leased to launch system operators, the SW/CC shall ensure the government agency responsible for the resource identifies the requirements for resource safety in the appropriate lease agreements.

3.3.11.2. Procedures and policies that are applied for public and launch area safety shall be used to reduce risks to launch area USAF and third party physical resources to acceptable levels.

3.3.11.3. Siting, design and use of USAF and third party physical resources shall consider potential hazards and threat envelopes to ensure that damage exposure is limited to acceptable levels as defined by federal law and national consensus standards.

3.3.11.4. USAF squadron/detachment commanders shall be responsible for implementing resource safety requirements for all USAF flight hardware, ground support equipment and facilities within their assigned areas.

3.3.11.5. The US Navy, the National Aeronautics and Space Administration (NASA) and other government tenant organizations shall be responsible for all tenant-occupied facilities and tenant-owned equipment.

3.3.11.6. The SW/CC is responsible for the implementation of resource safety requirements for any area on the installation that is not assigned to a specific USAF squadron/detachment commander or other Range User.

3.3.11.7. Commercial Range Users (contractors or licensed launch operators) shall be responsible for commercially owned, leased or licensed physical resources, including facilities, equipment and flight hardware.

3.3.11.8. The SW/CC shall inform owners of non-range resources of risk that may be incurred from operations of others when risk exceed normal limits.

3.4. Launch Complex Safety. The following requirements are in addition to those identified for launch complex safety in sections 3.2 and 3.3.

3.4.1. As the control authority, the single contractor or licensed launch operator, full-time government tenant organization or USAF squadron/detachment commander can assume the responsibility for launch complex safety and shall exercise the function IAW the Launch Complex Safety Training and Certification requirements. Launch Complex Control Authority is the responsibility of the Chiefs of Safety unless assumed by the Range User IAW **Attachment 8** of this volume.

3.4.2. The Chiefs of Safety shall review and approve all hazardous procedures and any procedures that may pose or induce a hazardous condition.

3.4.3. If the Range User is operating under a government contract, the government agency owning the contract shall ensure the launch provider is adequately protecting government interests within the terms and conditions of the contract.

3.4.4. When hazards extend to range assets or the general public, the SW/CC has the ultimate responsibility to ensure proper safety through an appropriate level of oversight into Range User operations.

3.5. Recovery Area Safety. The following requirements are in addition to those specifically identified for reentry and recovery area safety (for reentry vehicles and flyback stages) in section 3.2. See **Attachment 5** and AFSPCMAN 91-710 Volume 7 for the definitions of terms related to risk.

3.5.1. **Table 3 2.** Also applies to reentry missions and describes recovery area and recovery site hazard consequences and probability categories correlated to different levels of acceptability for recovery hazards not associated with reentry or Wing Safety reentry commit criteria. Numbers provided in **Table 3.2** are guidance only and are not necessarily hard limits.

3.5.2. Recovery-Essential Personnel. Allowable collective risk for recovery-essential personnel in the recovery area is 300 x 10-6. Allowable individual risk for recovery-essential personnel in the recovery area is 10 x 10-6.

3.5.2.1. Recovery-essential personnel are those persons necessary to safely and successfully complete a specific/current hazardous operation or support recovery of a RV.

3.5.2.2. Recovery-essential personnel include supporting personnel required to perform emergency actions according to authorized directives and persons in training to perform emergency actions.

3.5.2.3. Wing Safety and the Range User jointly determine the number of recovery-essential personnel allowed in safety clearance zones and hazardous recovery areas with the concurrence of the SW/CC.

3.5.3. The SW/CC can allow for Neighboring Operations Personnel (NOP) to be assessed at the same risk level as launch and recovery essential personnel (300 x 10-6). For non-launch essential personnel refer to see 14 CFR Part 400 series (range users shall comply with both AFSPC and FAA requirements).

3.5.4. Wing Safety shall conduct risk studies and analyses to determine the risk levels, define acceptable risk levels and develop exposure criteria for recovery area and recovery site safety.

3.5.5. Wing Safety shall establish design criteria and controls, procedures and processes to minimize personnel risks and to ensure acceptable recovery area and recovery site risk levels are not exceeded.

3.5.6. Wing Safety shall evaluate all RV, payload, ground support and facility systems used on the range to test, checkout, assemble, handle, support or recover RVs or payloads with regard to their hazard potential and to ensure they are designed to minimize risks to personnel and fall within acceptable exposure levels for recovery area and recovery site safety.

3.5.7. Wing Safety shall ensure that all hazardous operations affecting recovery area and recovery site safety are identified and conducted using Wing Safety or Safety Control Authority (if procedure hazards are limited to recovery site safety) approved formal written procedures. Through Pad Safety, Wing Safety shall ensure recovery area and recovery site safety is provided IAW this publication and approved OSPs.

3.5.8. Wing Safety shall define the threat envelope of all hazardous operations affecting recovery area and recovery site safety and establish safety clearance zones to protect personnel and resources. A minimum number of personnel shall be exposed to the minimum hazard level consistent with efficient task accomplishment.

3.5.9. Range Users shall ensure all personnel performing hazardous operations that may impact recovery area or recovery site safety are provided adequate training to ensure proper conduct of their jobs and tasks by reviewing Range User training plans. Wing Safety may review the Range User training plans to ensure compliance.

3.5.10. Recovery Area Resource Safety. Resource safety, formerly known as resource protection, is the protection of facilities, support equipment or other property from damage due to mishaps.

3.5.10.1. The SW/CC shall ensure range-owned resources are protected. Where government property or facilities are leased to RV operators, the SW/CC shall ensure the government agency responsible for the resource identifies the requirements for resource safety in the appropriate lease agreements.

3.5.10.2. Procedures and policies that are applied for public and recovery area safety shall be used to reduce risks to the recovery area, USAF and third party physical resources to acceptable levels.

3.5.10.3. Siting, design and use of USAF and third party physical resources shall consider potential hazards and threat envelopes to ensure damage exposure is limited to acceptable levels as defined by federal law and national consensus standards.

3.5.10.4. USAF squadron/detachment commanders shall be responsible for implementing resource safety requirements for all USAF flight hardware, ground support equipment and facilities within their assigned areas.

3.5.10.5. The US Navy, NASA and other government tenant organizations shall be responsible for all tenant-occupied facilities and tenant-owned equipment.

3.5.10.6. The SW/CC shall be responsible for implementation of resource safety requirements for an area on the installation not assigned to a specific USAF squadron/detachment commander or other Range User.

3.5.10.7. Commercial Range Users (contractors or licensed reentry operators) shall be responsible for commercially owned, leased or licensed physical resources, including facilities, equipment and flight hardware.

3.6. Recovery Site Safety. The following requirements are in addition to those also specifically identified for recovery area safety in sections 3.2 and 3.5. The provisions of **Attachment 8**, sec A8.2.3, "Launch Complex Safety Training and Certification," may also apply to a recovery site provided the recovery site is separate from the recovery area. The recovery area remains under the control of the SW/CC. The recovery site must be a specifically defined geographic area or facility capable of being controlled by the Operator and not fouling or otherwise impeding the functionality of the recovery area.

3.6.1. As the control authority, the single contractor or licensed reentry operator, full-time government tenant organization or USAF unit has the responsibility for recovery site safety and shall exercise this responsibility IAW the Launch Complex Safety Training and Certification requirements. The control authority may delegate this responsibility to the Chief of Safety.

3.6.2. The Chief of Safety shall review and approve all hazardous procedures and any procedures that may pose or induce a hazardous condition.

3.6.3. If the Range User is operating under a government contract, the government agency owning the contract shall ensure the reentry/flyback stage operator is adequately protecting government interests within the terms and conditions of the contract.

3.6.4. When hazards extend to range assets or the general public, the SW/CC has the ultimate responsibility to ensure proper safety through an appropriate level of oversight into Range User operations.

Chapter 4

RANGE SAFETY PROCESSES

4.1. Wing Safety and Range User Interface Process. Due to the complexity of launch vehicle and reentry programs, early Wing Safety and Range User planning will lead to a cost effective safety program and reduce potential schedule impacts. The goal of the interface process is to provide final approvals for launch and reentry as early as possible. Range Users will first be introduced to Wing Safety through the SW/XP office or, as applicable, through the sponsoring Range User. The PM will assist in establishing interfaces with other SW offices for safety-related purposes. Range Users are strongly encouraged to solicit Wing Safety participation in the development of programmatic documentation such as requests for proposals, source selection processes, concept developments, preliminary/subsequent design reviews, statements of work and contract data requirements lists. It is not the intent of this publication or the interface process to stifle ingenuity, new technology, state-of-the-art development or unique solutions to safety problems. Instead, the interface process ensures that Wing Safety and Range Users understand the requirements of this publication and reach mutual agreement on compliance methods early in the program.

4.2. Wing Safety Concept-to-Launch Process. The overall Wing Safety process from "concept to launch" for new launch vehicles is shown in **Attachment 9**, Figure A9.1. This process can be tailored to apply to RVs, payloads, ground support equipment, critical facilities and/or hazardous and safety critical operations. The details of this process can be found in AFSPCMAN 91-710 Volumes 2 through 6.

4.3. Initial Wing Safety and Range User Technical Interchange Meeting.

4.3.1. During the concept phase of a program, Range Users shall contact Wing Safety to arrange an initial technical interchange meeting (TIM) through the 30/45 SW/XP office. The purpose of this meeting is to present program concepts regarding flight plans; launch complex selection; recovery site selection, launch vehicle, RV, payload and ground support equipment; the FSS; and facility design, operations and launch complex safety and recovery site safety responsibility to determine if there are any major safety concerns that could impact the program.

4.3.2. This TIM may occur at any time but shall be no later than the formal PI via the 30/45 SW/XP office. The cost of the initial interface meetings will not be charged to the Range User as long as the workload associated with this activity is insignificant in scope.

4.4. Tailoring Process.

4.4.1. If desired by the Range User, Wing Safety and the Range User shall jointly develop a tailored edition of this publication for their program. The purpose of tailoring the publication is to ensure that only applicable requirements are identified and to determine whether or not the requirement will be met as written or through an alternative means that will provide an ELS.

4.4.2. Requirements in this publication are subject to tailoring within limits, including detailed design, performance, operating and documentation requirements. Consideration is

given to applicability, design pedigree and complexity, state of the art technology, cost and risk. Details of the tailoring process can be found in **Attachment 2**.

4.4.3. Tailoring, if desired, should begin at the earliest opportunity and finish no later than 30 days after the critical design review. Tailored documents may be changed after initial approval if necessary, but must go through the approval process again to accept changes.

4.4.4. The FAA shall be included in the tailoring process for FAA licensed or permitted programs at AFSPC ranges per the memorandum of agreement between HQ AFSPC and the FAA/AST on Resolving Requests for Relief from Common Launch Safety Requirements. Although the tailoring may reference waivers, waivers shall be approved through a separate waiver process. ELS determinations are normally documented as part of the tailoring process.

4.5. Other Wing Safety and Range User TIMs and Reviews. Wing Safety and Range Users shall jointly agree to arrange for the following TIMs and reviews as necessary:

4.5.1. Flight Safety TIMs [Preliminary Flight Data Package (PFDP) and/or Final Flight Data Package (FFDP), AFSPCMAN 91-710 Volume 2].

4.5.2. Combined or independent safety reviews in association with the Concept Design Review (cDR), Preliminary Design Review (PDR), Critical Design Review (CDR), Pre-Ship Review (PSR) for the launch vehicle, RV, payload and associated ground support equipment design [Missile System Prelaunch Safety Package (MSPSP), AFSPCMAN 91-710 Volume 3], airborne FSS and associated ground support equipment design [Flight Termination System Report (FTSR), AFSPCMAN 91-710 Volume 4], critical facility design [Facility Safety Data Package (FSDP), AFSPCMAN 91-710 Volume 5] and Ground Operations Plans (GOPs), AFSPCMAN 91-710 Volume 6. For programs that do not use the above reviews, the Range User shall develop, in coordination with Wing Safety, a review process that meets the intent of these requirements. This alternate process shall be included in the program's System Safety Program Plan.

4.5.2.1. cDRs or program equivalent activities shall provide design and operations detail to at least the system level.

4.5.2.2. PDRs or program equivalent activities shall provide design and operations detail to at least the subsystem and box level.

4.5.2.3. CDRs or program equivalent activities shall provide design and operating detail to the component and piece part level.

4.5.2.4. PSRs or program equivalent activities shall provide sufficient detail to ensure hazards are controlled to the maximum extent possible and to ensure Wing Safety required documentation (e.g., MSPSP, Hazard Tracking System, FSDP, OSP, as a minimum) is ready for closure and Wing Safety concurrence prior to the shipment of hardware to the range.

4.5.3. Hazardous and safety critical procedures TIMs (AFSPCMAN 91-710 Volume 6) and other TIMs, reviews, and meetings, as necessary.

4.6. Equivalent Level of Safety Determinations and Waivers.

4.6.1. General. Range Users shall identify the need for any potential ELS determinations and/or waivers regarding requirements in this publication to Wing Safety for resolution. Waivers which could increase mishap risk related to AF System Program/Project Office (SPO) acquired (or sustained) Systems/Services must be coordinated with the System Program Office (SPO) Director or designee for concurrence prior to exposure of the system to the risk. Potential ELS determinations or waivers shall be identified and presented to the Wing Safety approval authority at the earliest possible time, preferably no later than the cDR. Details and requirements for submitting non-compliance requests can be found in **Attachment 4**, "Submitting AFSPCMAN 91-710 Noncompliance Requests."

4.6.2. ELS Determination. The term ELS means an approximately equal level of safety. An ELS may involve a change to the level of expected risk that is not statistically or mathematically significant as determined by qualitative or quantitative risk analysis. ELS determination made by AFSPC ranges have been referred to in the past as meets intent certifications. ELS determinations are normally incorporated during the tailoring process. A "life of the program" ELS should be addressed through updates to the program's tailored IAW **Attachment 4**.

4.6.3. Waivers

4.6.3.1. The term *waiver* refers to a decision that allows a Range User to continue with a launch or reentry, including the launch or reentry process, even though the Range User does not satisfy a specific safety requirement and is not able to demonstrate an ELS. A waiver applies where a failure to satisfy a safety requirement involves a statistically or mathematically significant increase in expected risk as determined through quantitative and/or qualitative risk analysis and the activity may or may not exceed the public risk criteria. It is AFSPC policy to minimize the use of waivers.

4.6.3.2. Waivers to the requirements shall be granted only in extremely unique or compelling circumstances and only when the mission objectives of the Range User cannot otherwise be achieved. Wing Safety and the Range User shall jointly endeavor to ensure that all requirements of this publication are met as early in the design and operation process as possible to limit the number of required waivers to an absolute minimum.

4.6.3.3. Waivers shall always have the effectivity designated. All waivers are intended to have limited effectivities. "Life of the program" or lifetime waivers are highly discouraged and must be thoroughly justified. Range users shall provide a definitive "get-well" plan for all waiver requests.

4.6.3.4. The FAA shall be included in the waiver process for FAA licensed or permitted programs at AFSPC ranges per the memorandum of agreement between HQ AFSPC and FAA/AST on Resolving Requests for Relief from Common Launch Safety Requirements. For non-FAA licensed launches, the AF shall notify the FAA and obtain FAA coordination regarding waivers involving 'common' launch vehicles or 'common' launch vehicle components.

4.6.3.5. The SW/CC shall approve or disapprove all waivers affecting public safety. (T-3)

4.6.3.6. The Chiefs of Safety or their designated representatives shall approve or disapprove all waivers other than those affecting public safety.

4.6.4. Submittal. The Range User shall submit all waiver requests to the Wing Safety office for review and approval. ELS determinations shall normally be documented as part of the tailoring process. All approved waivers and ELS determinations shall be included in the appropriate safety data package as an appendix.

4.6.5. Every applicable waiver shall be reviewed for validity prior to each launch, reentry, and launch or reentry cycle. The Range User shall present a synopsis of each applicable waiver with the rationale concerning its viability for review and approval by Wing Safety.

4.7. Changes to Approved Generic Systems.

4.7.1. Once baseline or generic launch or reentry systems, including launch or reentry vehicles, payloads, ground support equipment, FSSs and critical facilities have been approved, only those systems and subsystems that change shall be submitted to Wing Safety for review and approval. The approval process remains the same as described in this publication and is subject to the requirements in section 1.2.3. **Attachment 7** provides a tailored process for the approval of generic payloads.

4.7.2. Documentation shall be marked or labeled as “Mission Unique,” “Upgrade,” “Change” or “Other” to the previously approved system and shall be prepared in such a manner to allow easy reference to previously approved submittals.

Chapter 5

SAFETY AUTHORIZATIONS, APPROVALS AND DOCUMENTATION

5.1. General. Range Users are solely responsible for obtaining the identified mandatory authorizations and approvals necessary for operating on or launching from the ranges. Also, Range Users are responsible for providing the documentation necessary to show compliance or the rationale for obtaining ELS determinations or waivers to the requirements identified in this publication (See also section 4.6).

5.2. Safety Authorizations.

5.2.1. Programs launching from or reentering onto AFSPC ranges shall obtain authorizations from the appropriate authority.

5.2.2. Programs operating from an AFSPC range shall use an FSS that is jointly approved for flight at all AFSPC ranges. This includes government and FAA-licensed or permitted programs. Departures from this policy shall be approved by all AFSPC ranges. Departures from this policy shall not be approved unless Range Users sign a letter acknowledging that they will be solely responsible for any additional costs resulting from a decision to operate at another AFSPC range.

5.2.3. Programs launching from or reentering onto AFSPC ranges shall obtain authorizations for common requirements from the appropriate SW authorities.

5.2.3.1. Unique requirements shall require authorizations from the appropriate SW authority.

5.2.3.2. In general, if a program is approved at either of the current AFSPC ranges (ER or WR), it will be approved at the other range. However, for approval to occur, a streamlined review of the following items shall take place: all Wing Safety required documentation, AFSPCMAN 91-710 tailoring non-compliances and agreements made between the Range User and the originating Wing Safety Office. The Range User shall also address applicable ER or WR unique requirements that are not subject to the original approval. Updates to existing Wing Safety documentation, particularly the SAR, GOP and hazardous or safety critical procedures shall normally be required due to the change in the operating location.

5.3. Safety Approvals.

5.3.1. SW Commander. The following safety approvals shall be authorized only by the SW/CC or their designated representatives:

5.3.1.1. Tailored sections of AFSPCMAN 91-710 affecting public safety. (30 SW/SE: Flight termination criteria for all launch vehicles)

5.3.1.2. Launch Safety launch commit criteria for all launch vehicles.

5.3.1.3. Range Safety reentry commit criteria for all RVs that will recover to the Range.

5.3.1.4. The launch of launch vehicles containing explosive warheads.

5.3.1.5. The reentry of reentry vehicles containing explosive warheads.

5.3.1.6. The launch of nuclear payloads. In addition, nuclear payloads which meet criteria specified in AFI 91-110 require Presidential approval IAW Presidential Directive/NSC-25.

5.3.1.7. Waivers affecting public safety. (T-3)

5.3.1.8. Alternative thrust termination concepts and design.

5.3.1.9. Launch Complex Safety Training and Certification Plan (AFSPCMAN 91-710 Vol. 1, **Attachment 8**).

5.3.1.10. Recovery Site Safety Training and Certification Plan (AFSPCMAN 91-710 Vol. 1, **Attachment 8**).

5.3.1.11. Wing Safety Launch/Reentry Operations Approval Letter (AFSPCMAN 91-710 Vol. 1 and 6).

5.3.1.11.1. WR. A Wing Safety Launch Operations Approval Letter granting approval to launch from or onto the WR, signed by the Chief of Wing Safety, shall be provided to the Range User no later than the scheduled LRR conducted before a planned launch operation. A Reentry Operations Approval Letter, signed by the SW/CC, shall be provided to the Range User no later than Reentry Readiness Review (RRR) for reentry operations. Receipt of this letter depends on the Range User having obtained the previously required approvals described in this volume.

5.3.1.11.2. ER. Launch/Reentry Operations Approval Letters are not normally issued by the ER. Wing Safety's "GO" for launch at the LRR/RRR constitutes approval to launch/reentry operations and is contingent upon the Range User having obtained the required approvals identified in this volume. However, a Range Safety Launch/Reentry Operations Approval Letter can be provided, if requested.

5.3.1.11.3. Lack of launch/reentry operations approval may result in the launch being withdrawn from the Range schedule.

5.3.1.12. Launch Safety Mission Rules, including termination criteria for expendable launch or reentry vehicles.

5.3.2. Chiefs of Safety. The following safety approvals shall be authorized by the Chiefs of Safety or a designated representative:

5.3.2.1. Tailored versions of AFSPCMAN 91-710 (AFSPCMAN 91-710 Vol. 1, **Attachment 2**).

5.3.2.2. All ELSs

5.3.2.3. All waivers that do not affect public safety.

5.3.2.4. SSPP (AFSPCMAN 91-710 Vol. 1, **Attachment 3**).

5.3.2.5. Launch vehicle, RV and payload flight plans, PFDP and FFDP (AFSPCMAN 91-710 Vol. 2).

5.3.2.6. Aircraft and Ship Intended Support Plans (ISPs) (AFSPCMAN 91-710 Vol. 2).

5.3.2.7. Directed Energy Plans (DEPs) (AFSPCMAN 91-710 Vol. 2).

5.3.2.8. MSPSP (AFSPCMAN 91-710 Vol. 3).

5.3.2.9. Airborne FTSR (AFSPCMAN 91-710 Vol. 4).

5.3.2.10. FSDP (AFSPCMAN 91-710 Vol. 5).

5.3.2.11. Hazardous and Safety Critical Procedures (AFSPCMAN 91-710 Vol. 1 and AFSPCMAN 91-710 Vol. 6).

5.3.2.12. Final Wing Safety Approval for Launch/Reentry (AFSPCMAN 91-710 Vol. 1 and 6).

5.3.2.12.1. Holdfire checks, FSS checks and other safety critical checks shall be performed satisfactorily; environmental conditions shall be met; and all Launch Safety launch or reentry commit criteria shall be "green" before final approval to launch or reenter (see AFSPCMAN 91-710 Vol. 6).

5.3.2.12.2. Given that holdfire checks, FSS checks, other safety critical checks and environmental conditions are satisfactory and all Launch/Range Safety launch/reentry commit criteria are "GREEN," Wing Safety shall provide a final approval to launch/reenter as follows: At the ER, the Chief of Safety reports "GO" status to the LDA during the final "CLEAR TO LAUNCH" poll. At the WR, the MFCO issues a "GREEN TO GO" electronically and a verbal call "Safety is sending a GREEN."

5.3.2.13. Wing Safety instrumentation, tracking, data and display requirements for all launch or reentry vehicles.

5.3.2.14. Safety Assessment Report (SAR).

5.3.2.15. RSORs.

5.4. Other Required Approvals.

5.4.1. Explosives Site Plans. Explosives site plans require the signature of a member of the Department of Defense Explosives Safety Board (DDESB).

5.4.2. Use of Radioactive Sources for Space Operations. The use of radioactive sources for space operations requires approval IAW procedures in AFSPCMAN 91-710 Vol. 3.

5.4.3. For commercial launches from an AFSPC range, or from a neighboring location that presents a risk to AFSPC people, facilities, or resources, AFSPC will require hazard analysis that provides an assessment of risk from the launch/reentry activity. The SW safety office will review this hazard analysis for consideration against established risk criteria to determine if the activity presents acceptable risk to resources. If risk exceeds criteria, the SW/CC can mitigate, accept, or reject the activity based on unacceptable impact to National Security interests. If the SW/CC rejects the risk and halts the activity, AFSPC/CC shall be notified through 14 AF/CC." (T-1)

5.5. Documentation and Data Requirements. Volumes 2 through 6 of this publication have "Documentation Requirements" or "Data Requirements" sections that describe the information that shall be submitted and the processes that shall be used to obtain the necessary approvals to operate at AFSPC ranges. In addition, attachments in all volumes provide detailed document content requirements that shall be met. All other documentation noted in the specific volumes shall also be approved as indicated in the respective AFSPCMAN 91-710 volumes. While developing the required documentation, Range Users are encouraged to work closely with Wing Safety to facilitate the approval process. The Eastern and Western Range 127-1, Range Safety

Requirements, *Range User Handbook*, provides additional helpful information regarding documentation requirements. The Range User is responsible for providing the following documents (not all inclusive):

5.5.1. Tailored version of AFSPCMAN 91-710, if desired (AFSPCMAN 91-710 Vol. 1, **Attachment 2**).

5.5.2. Tailored version of an SSPP (AFSPCMAN 91-710 Vol. 1, **Attachment 3**).

5.5.3. Launch Complex Safety Training and Certification Plan, if desired (AFSPCMAN 91-710 Vol. 1, **Attachment 8**).

5.5.4. Flight Plans, PFDPs, FFDPs, ISPs and DEPs (AFSPCMAN 91-710 Vol. 2).

5.5.5. MSPSP, associated test plans and reports (AFSPCMAN 91-710 Vol. 3).

5.5.6. Airborne FTSR (AFSPCMAN 91-710 Vol. 4,).

5.5.7. FSDP for all critical facilities and launch complexes and recovery sites, including applicable test plans, test reports, demolition plans and explosive quantity distance site plans (AFSPCMAN 91-710 Vol. 5).

5.5.8. GOPs, hazardous and safety critical procedures, recycle procedures, FEOPs, Emergency Evacuation Plans (EEPs) and, as applicable, Emergency Response Plan (ERP) for graphite/epoxy composite over-wrapped and Kevlar-wrapped pressure vessels (AFSPCMAN 91-710 Vol. 6).

5.5.9. Data for mission rules, launch commit criteria, reentry commit criteria and flight control operations, telemetry measurement lists and electronic media, the Range User Countdown Checklist and any special requirements.

5.5.10. ELS or waiver request justification (AFSPCMAN 91-710 Vol.1, **Attachment 4**).

5.5.11. Safety Assessment Report (SAR).

Chapter 6

INVESTIGATING AND REPORTING MISHAPS AND INCIDENTS

6.1. Mishaps and Incidents Involving Air Force Personnel and Resources. Following any vehicle or FSS failure, a Wing Safety return to flight certification shall be required. Vehicle-related failure resolution shall address risk model reliability and ensure corrective action was initiated. For an FSS in-flight failure, root cause and corrective action shall be completed and approved by Range Safety. The appropriate AF organization shall investigate and report all mishaps and incidents involving USAF personnel and resources IAW AFI 91-204, *Safety Investigations and Reports*; AFMAN 91-221, *Weapons Safety Investigations and Reports;* AFMAN 91-222, *Space Safety Investigations and Reports;* and AFMAN 91-224, *Ground Safety Investigations and Reports*.

6.2. Non-Air Force Personnel and Resources.

6.2.1. The AFSPC ranges shall not report or investigate non-Air Force mishaps under AFI 91-204 auspices. However, Wing Safety shall assist and participate in non-Air Force mishap investigations that affect or could affect public safety, launch area safety, recovery area safety or Air Force resources and may assist in non-Air Force mishap investigations that affect or could affect launch complex safety, recovery site safety or non-Air Force third party resources.

6.2.2. Wing Safety shall be provided with the investigation results of any mishaps or incidents occurring on the ranges that were destined for one of the ranges, or at any off-range recovery areas for missions that originated on the range.

6.2.3. Regardless of the Range User, the SW/CC may conduct formal investigations into any mishap and incident that affects or could affect public safety, launch area safety, recovery area safety, launch complex safety or recovery site safety. However, the scope of such an investigation into contractor mishaps is limited to the protection of the public, other Range Users and Air Force personnel and resources.

6.2.4. Investigation of FAA-licensed and/or permitted activities shall be IAW with applicable FAA, NTSB and AF regulations and MOUs regarding space launch accidents.

6.2.5. Investigation of other U.S. government agency launches (non-DoD, non-FAA-licensed) will be conducted under the regulations of that agency, unless one of the conditions cited in paragraph 6.2.3 occurs (e.g. Range Safety System failure suspected or confirmed.)

6.3. Reporting Space Launch System Anomalies. Any anomaly with potential safety implications occurring with a launch or reentry vehicle or system during prelaunch processing (including range safety system ground systems), launch, flight, deorbit/deorbit preparations, reentry or post-launch processing or post-recovery processing shall be promptly reported to Wing Safety for review. Range Users shall notify the Wing Safety office of all anomaly reviews/meetings prior to the review/meeting and shall provide copies of the briefings, reports, meeting minutes and actions identified and taken to address the anomalies.

Chapter 7

CHANGES TO THIS PUBLICATION

7.1. This publication shall be reviewed and updated every four years; however, it may be updated more frequently, if required. Each volume of AFSPCMAN 91-710 is considered a separate publication and can be updated individually.

7.2. Permanent changes shall be performed IAW the requirements in Attachment 6.

7.3. Changes requiring immediate attention, such as previously unknown risk, safety compromise, or implementation of new technology, shall be made as necessary and distributed as Guidance Memorandums IAW AFI 33-360.

7.4. All changes to this publication shall be coordinated among the AFSPC ranges before being submitted to HQ AFSPC/SEK for incorporation. Wing Safety shall inform all their Range Users when changes are issued to any volume of AFSPCMAN 91-710.

Chapter 8

RANGE USER INFORMATION SOURCES

8.1. Organization of AFSPCMAN 91-710 Volumes.

8.1.1. Main Chapters. The main chapters of this publication include common requirements for all vehicle classes. Attachments include additional requirements to supplement the main chapters.

8.1.2. Open Text. The open text contains the actual mandatory performance-based requirements. The only tailoring expected for these requirements would be the deletion of non-applicable requirements. For example, solid rocket motor performance requirements would be deleted for launch systems that do not use solid rocket motors.

8.1.3. Bordered Paragraphs:

8.1.3.1. Bordered paragraphs are non-mandatory and are used to identify some of the potential detailed technical solutions that meet the performance requirements. **Figure 8.1**. is an example of a bordered paragraph. In addition, the bordered paragraphs contain lessons learned from previous applications of the performance requirement, where a certain design may have been found successful or have been tried and failed to meet the requirement. These technical solutions are provided for the following reasons:

8.1.3.1.1. To aid the tailoring process between Wing Safety and Range Users in evaluating a potential system against all the performance requirements.

8.1.3.1.2. To aid Wing Safety and Range Users in implementing lessons learned.

8.1.3.1.3. To provide benchmarks that demonstrate what Wing Safety considers an acceptable technical solution/implementation of the performance requirement and to help convey the level of safety the performance requirement is intended to achieve.

Figure 8.1. Bordered paragraph example.

Some Range Users employ software packages (e.g., Dynamic Object Oriented Requirements System (DOORS)) to track and verify completion of their tailored safety requirements.

8.1.3.2. The technical solutions in the bordered paragraphs may be adopted into the tailored version of the requirements for a specific program when the Range User intends to use that solution to meet the performance requirement. At this point, they become mandatory requirements to obtain Wing Safety approval. This process is done to:

8.1.3.2.1. Provide an appropriate level of detail necessary for contractual efforts and to promote efficiency in the design process.

8.1.3.2.2. Avoid contractual misunderstandings that experience has shown often occur if an appropriate level of detail is not agreed to. The level of detail in the bordered paragraphs is necessary to avoid costly out-of-scope contractual changes

and to prevent inadvertently overlooking a critical technical requirement. A requirement must be included for each applicable bordered paragraph that accepts, replaces or tailors the existing wording. A requirement must reside in the bordered paragraph that provides an equivalent level of detail. The bordered paragraphs are not to be tailored as "information only" -- see A1.1.5.4.

8.1.3.3. The Range User always has the option to propose alternatives to the bordered paragraph solutions. Range User proposed alternative solutions shall achieve an equivalent level of safety and be approved by Wing Safety. After meeting these two requirements, the Range User proposed solutions become part of the tailored AFSPCMAN 91-710 for that specific program.

8.1.3.4. Wing Safety has final decision authority in determining whether Range User proposed detailed technical solutions meet AFSPCMAN 91-710 performance requirements.

8.2. AFSPCMAN 91-710 Access. The official version of each volume of AFSPCMAN 91-710 (as well as other AFSPC 91-7XX series publications) is located on the Air Force publications web site (**http:/www.e-Publishing.af.mil/**). Once on the web site, click on the following items in order: Major Commands, Air Force Space Command and 91 Safety, then select the volume desired.

CLARK H. RISNER, Colonel, USAF
Director of Safety

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

See AFSPCMAN 91-710 Vol 7

Prescribed Forms

See AFSPCMAN 91-710 Vol 7

Adopted Forms

See AFSPCMAN 91-710 Vol 7

Abbreviation and Acronyms

See -AFSPCMAN 91-710 Vol 7

Terms

See—AFSPCMAN 91-710 Vol 7

Attachment 2

AFSPCMAN 91-710 TAILORING PROCESS

A2.1. Introduction.

A2.1.1. Purpose. Tailoring refers to the process used at AFSPC ranges beginning at PI where AFSPC (Wing Safety) organizations and a Range User review each safety requirement in AFSPCMAN 91-710 and jointly document whether or not the requirement is applicable to the Range User; and if applicable, whether or not the Range User will meet the requirement as written or achieve an ELS via a Wing Safety acceptable alternative. If developed, the tailored edition shall be placed on the Range User's contract or applied through a Commercial Space Operations Support Agreement. A tailored version of the publication is denoted as AFSPCMAN 91-710 Tailored [T]. Programs that launch from only one of the AFSPC ranges shall be tailored by the appropriate space wing safety office. A combined 30/45 SW/SE team shall tailor programs that intend to launch from or return (including fly-back boosters) onto more than one of the AFSPC ranges. The FAA shall be invited to participate in the tailoring process for all programs utilizing common launch vehicles at AFSPC ranges. AFSPC (30/45 SW/SE) and the FAA will coordinate on the review of any request for an ELS for a common launch safety requirement that is part of the tailoring IAW the MOU between AFSPC and FAA/AST for Resolving Requests for Relief from Common Launch Safety Requirements. Programs launching from or reentering onto AFSPC ranges (that require an FSS) shall have an FSS that is jointly approved for flight at all ranges for all launching and reentering vehicles (government or FAA-licensed). Departures from this policy shall be approved by all affected ranges.

A2.1.2. Content. This attachment describes the rationale for tailoring, the tailoring process and the requirements for documenting tailored editions of the publication.

A2.1.3. Applicability. The tailoring process is applicable to all programs (boosters, solid rocket motors, upper stages, payloads, RVs, associated ground support equipment and facilities). The tailoring process is optional for new programs and existing programs where Wing Safety and the Range User agree this process would be effective.

A2.1.4. Formation of a High Performance Work Team. A high performance work team (HPWT) shall be formed to perform tailoring during TIMs. HPWT membership shall include the Range User, Wing Safety and FAA (if applicable) personnel who have specific tailoring authority.

A2.1.5. Tailoring Rationale. Tailoring shall be accomplished based on the rationale described below. Alternative means of identifying deletions, changes, additions and Range User information are allowable provided that they are distinguishable from the original text and each other and are mutually agreed to by the Range User and Wing Safety.

A2.1.5.1. Deletion of a Requirement:

A2.1.5.1.1. When a requirement is not applicable to a Range User program, the requirement shall be deleted.

A2.1.5.1.2. The original paragraph number and headings shall remain, but the non-applicable text shall be removed and replaced with the abbreviation *N/A*.

A2.1.5.2. Change to a Requirement:

A2.1.5.2.1. ELS determinations for tailoring may be provided and approved by the HPWT through the change process; however, the HPWT cannot provide or approve waivers.

A2.1.5.2.2. A particular system requirement may be tailored as long as the intent of the requirement is met and the ELS is maintained.

A2.1.5.2.3. The change shall be written in the place of the original requirement.

A2.1.5.2.4. The existing numbering system shall remain the same to the maximum extent possible.

A2.1.5.2.5. Additional paragraphs may be added; however, using the remaining unaffected paragraph numbers is not allowed.

A2.1.5.2.6. All changes shall be highlighted in bold. Deletions of text, including partial deletions, shall be shown with the original text marked with strikethrough. Insertions of text, including partial insertions, shall be shown with the new text marked with underline.

A2.1.5.3. Addition to a Requirement:

A2.1.5.3.1. An addition to a requirement is allowed when there are no existing requirements addressing a new technology, when unforeseen hazards are discovered, when federal or industry standards change and for similar reasons.

A2.1.5.3.2. An addition shall be added with new paragraph numbers in the section for which it is appropriate or in a new section if no other section applies.

A2.1.5.3.3. All additions shall be highlighted in bold. Insertions/additions of text, including partial insertions, shall be shown with the new text marked with underline.

A2.1.5.4. Range User Information Only:

A2.1.5.4.1. Requirements having only an indirect effect on the Range User but which are still required of the program as a whole shall remain in the tailored publication as information only. Examples of such requirements include Pad Safety responsibilities, other range contractor responsibilities and Range User facilities manager responsibilities.

A2.1.5.4.2. All “Range User Information Only” requirements shall be highlighted with an asterisk before the affected paragraph.

A2.1.5.5. Waivers. Waivers are not rationale for the deletion of requirements. The requirements shall remain in the AFSPCMAN 91-710[T] and the waiver process shall be used for the disposition of the requirement.

A2.1.5.6. Risk-Cost Benefit Analysis

A2.1.5.6.1. Technical issues regarding such items as applicable requirements, policy, criteria or data may be evaluated on a risk-cost benefit basis to determine if the risk is acceptable to waive the requirements.

A2.1.5.6.2. A risk-cost benefit analysis, based on the criteria defined in Tables 3.1 and 3.2 shall be submitted to Wing Safety.

A2.1.5.6.3. Based on risk-cost benefit analysis data, Wing Safety and the Range User shall reach agreement on the disposition of the requirement in question.

A2.1.5.6.4. If the application of an AFSPCMAN 91-710 requirement results in significant reduction in risk at a significant cost benefit, it may be determined by Wing Safety to be sufficient to impose the requirement; however, if the benefit is insignificant and/or the cost is high, the requirement may be waived or determined to provide an ELS, all with consideration for public safety.

A2.1.6. Scheduling Technical Interchange Meetings

A2.1.6.1. TIMs are required for Range Users to present their systems to Wing Safety and to TIM participants in the active tailoring of the publication.

A2.1.6.2. TIMs shall be scheduled as early in the program as possible when program definition is sufficient to make the meetings worthwhile and structured so that technical tailoring is completed before contractual tailoring is started.

A2.1.6.3. AFSPCMAN 91-710[T] TIM data shall be provided to Wing Safety at least 30 days before scheduled TIMs.

A2.2. Tailoring Process.

A2.2.1. Typically, all programs operating at the AFSPC ranges request a tailored version of AFSPCMAN 91-710 for their program. Therefore, all range users should request a Range introduction meeting at the earliest opportunity following the Range User's request for program support through the SW/XP.

A2.2.1.1. During the Range introduction meeting, the Range User provides their "program concept" to Wing Safety and Wing Safety provides the Range User with AFSPCMAN 91-710 requirements, a guidebook containing the rationale for the safety requirements, lessons learned from similar programs, the range history, known differences between the AFSPC ranges, etc.

A2.2.1.2. Based on the information provided by Wing Safety, the Range User shall develop a draft tailored version of AFSPCMAN 91-710 (AFSPCMAN 91-710[T]) and submit it to Wing Safety. AFSPCMAN 91-710 [T] Tailoring Requests can be used to document proposed AFSPCMAN 91-710 [T] deletions, changes and additions to aid in the draft AFSPCMAN 91-710[T] development. The forms for submitting Tailoring Requests are available from the Wing Safety offices. Range Users shall submit Tailoring Requests in writing using any format containing the same information as the Tailoring Request form, if mutually agreed to by the Range User and Wing Safety. Working group meetings (including technical interchanges) to ask questions, resolve issues, work non-compliance concerns, provide analyses, test data, solution justifications, etc. between the Range User and Wing Safety during the development of the draft AFSPCMAN 91-710[T] will save time and resources for both the Range User and Wing Safety. Range Users shall submit their draft AFSPCMAN 91-710 [T] to Wing Safety 30 days prior to the PDR or equivalent program safety review activity if the program does not hold a PDR.

A2.2.1.2.1. Completing Tailoring Requests

A2.2.1.2.1.1. The original AFSPCMAN 91-710 paragraph number, original (or summarized, if sufficiently detailed) text, tailored paragraph number, proposed text and the rationale for the change shall be included.

A2.2.1.2.1.2. Deletions of requirements that are non-applicable and need no formal explanation may all be listed on one or more Tailoring Request forms.

A2.2.1.2.1.3. Tailoring Requests dealing with similar or related requirements and rationale may all be combined on the same Tailoring Request form.

A2.2.1.2.2. Disposition of Tailoring Requests

A2.2.1.2.2.1. If necessary, Wing Safety shall comment on the proposed change and dispose of it as “approved,” “approved with comments” or “disapproved”.

A2.2.1.2.2.2. When agreement is reached and a Tailoring Request is approved, Wing Safety and Range User representatives shall sign and date the form.

A2.2.1.3. Wing Safety will review the draft AFSPCMAN 91-710[T] and provide comments and changes to the Range User. After the Range User and Wing Safety resolve all issues, Wing Safety will approve the program-specific AFSPCMAN 91-710[T].

A2.2.2. Publication of AFSPCMAN 91-710 [T]:

A2.2.2.1. Final Publication:

A2.2.2.1.1. Range Users should initiate the development of AFSPCMAN 91-710[T] as soon as possible to minimize impacts to program schedules. Range Users should initiate tailoring discussions with Wing Safety in time to submit a draft of their AFSPCMAN 91-710[T] NLT 30 days prior to the PDR. The final AFSPCMAN 91-710[T] should be submitted to Wing Safety no later than 30 days after CDR. Tailoring is a continuous process even after the AFSPCMAN 91-710[T] is published. Thus, tailored documents should be considered living documents that may be modified throughout the life of the program.

A2.2.2.1.2. In some cases, it may be necessary to complete the AFSPCMAN 91-710 [T] as part of the contracting process or at some other point before the PDR. In these cases, Wing Safety will work with the Range User to establish and meet a completion date for AFSPCMAN 91-710 [T] publication.

A2.2.2.2. The tailored edition shall look like AFSPCMAN91-710 with the following **exceptions:**

A2.2.2.2.1. The document title/heading shall read, "AFSPCMAN91-710VX TAILORED FOR Program Name". This title shall be centered at the top of each page.

A2.2.2.2.2. The date of the applicable contract/CSOSA/agreement/etc. shall be listed under the title and centered at the top of each page.

A2.2.2.2.3. The date of the tailored edition shall be on the cover page of the document.

A2.2.2.2.4. If requested by the Range User, the term "PROPRIETARY" shall be placed at the top and bottom of each page, centered directly over the title/heading.

A2.2.2.2.5. The following items from the front page (title page) of AFSPCMAN91-710 shall be removed:

A2.2.2.2.5.1. “Docid" information (i.e. AFSPCMAN91-710VX)

A2.2.2.2.5.2. “BY ORDER OF THE COMMANDER AIR FORCE SPACE COMMAND"

A2.2.2.2.5.3. Air Force Space Command Shield

A2.2.2.2.5.4. OPR and certifier information

A2.2.2.2.5.5. Number of pages and distribution information

A2.2.2.2.6. The remaining heading information shall be left justified

A2.2.2.2.7. Change **"AIR FORCE SPACE COMMAND MANUAL 91-710 VOLUME X"** to **"Extracted from AIR FORCE SPACE COMMAND MANUAL 91-710 VOLUME DATED DD/MMM/YYYY"**.

A2.2.2.2.8. Change **"COMPLIANCE WITH THIS PUBLICATION IS MANDATORY"** to **"COMPLIANCE WITH THIS TAILORED EXTRACT OF AFSPCMAN91-710 IS MANDATORY".**

A2.2.2.2.9. In the introduction, the section identified as "***NOTES:***" shall read as follows: ***"NOTES:*** **1**. Special publication formatting features are described in section 9.1 of Volume 1. AFSPCMAN 91-710 Volume 7 contains a glossary of references, acronyms, abbreviations and terms for use with all AFSPCMAN 91-710 volumes. ***NOTES:*** **2**. Bordered paragraphs are non-mandatory and are used to identify some of the potential detailed technical solutions that meet the performance requirements of this document as well as applicable lessons learned."

A2.2.2.2.10. All deleted information shall be removed from the tailored edition.

A2.2.2.2.11. All added information shall be inserted in the tailored edition as a separate paragraph immediately following the most applicable paragraph in AFSPCMAN91-710. The added paragraph shall not be numbered. The add-in paragraphs shall be clearly labeled as, "(Program Name - Added)".

A2.2.2.2.12. The signature block that appears on the last page of the official version of AFSPCMAN91-710, prior to the attachments, shall be removed from the tailored version.

A2.2.2.3. Effectivity of AFSPCMAN 91-710 [T]:

A2.2.2.3.1. Each AFSPCMAN 91-710 [T] shall contain a preface paragraph detailing its effectivity.

A2.2.2.3.2. At a minimum, the types of vehicles, the time period and the number of vehicles to which the AFSPCMAN 91-710 [T] applies shall be addressed.

A2.2.2.4. Assumptions:

A2.2.2.4.1. Each AFSPCMAN 91-710 [T] shall contain a preface paragraph detailing the critical assumptions that were made in writing the tailored edition.

A2.2.2.4.2. The nature of the assumptions shall be such that a change may invalidate the AFSPCMAN 91-710 [T] or require a change or update. An example of such a critical assumption is that the design of any hazardous system does not change from that presented before publication of the AFSPCMAN 91-710 [T].

A2.2.2.4.3. The assumption(s) described in the Tailoring Request form shall include sufficient detail to categorize the scope of the tailored requirement to the specific systems or subsystems affected by the proposed change. If two or more systems/subsystems are affected by the tailored paragraph, then the assumption(s) shall state which of those systems/subsystems is intended to be included in the scope of the tailoring. If there is a difference in the tailoring for the two or more systems/subsystems, then the tailored paragraph shall be repeated with appropriate tailoring unique to each individual system/subsystem.

A2.2.2.5. Management Summaries:

A2.2.2.5.1. Management summaries shall be prepared to specifically identify AFSPCMAN 91-710 [T] deletions, changes and additions. Management summaries shall be used to assist management in their review of editions of AFSPCMAN 91-710 [T].

A2.2.2.5.2. The management summary shall consist of all signed AFSPCMAN 91-710 [T] Tailoring Requests and a list of all HPWT members.

A2.2.2.5.3. A copy of the management summary and the final AFSPCMAN 91-710 [T] ready for signature shall be provided to the SW/CC or their designated representatives for signature.

A2.2.3. Approvals:

A2.2.3.1. Each significant addition, change or deletion shall be signed off by the Wing Safety Program Manager and the appropriate Range User representative on the Tailoring Request form.

A2.2.3.2. Tailored AFSPCMAN 91-710 volumes affecting public safety (normally Volumes 1, 2 and 4) shall be approved and signed on the front page of the AFSPCMAN 91-710 [T] by the Chief of Safety or a designated representative and the Range User authorized representative.

A2.2.3.3. Tailored AFSPCMAN 91-710 volumes not affecting public safety (normally Volumes 3, 5 and 6) shall be approved and signed by the appropriate Wing Safety section chief or a designated representative and the appropriate Range User representative.

A2.2.3.4. Tailored sections of AFSPCMAN 91-710 affecting public safety shall be approved by the SW/CC or their designated representatives. Public safety ELSs in the AFSPCMAN 91-710[T] shall be approved by the Chief of Safety or may elevated by SW/CC.

A2.2.4. Revisions to AFSPCMAN 91-710 [T]:

A2.2.4.1. Any revision to this publication shall be evaluated against each program AFSPCMAN 91-710 [T] to determine applicability.

A2.2.4.2. Any revisions to AFSPCMAN 91-710 [T] shall be made IAW the AFSPCMAN 91-710 change process (see **Attachment 6**).

Attachment 3

SYSTEM SAFETY PROGRAM REQUIREMENTS

A3.1. Introduction.

A3.1.1. Purpose. This attachment establishes the minimum requirements for a Range User's System Safety Program for launch safety purposes. Such a program is consistent with MIL-STD-882, *Department of Defense Standard Practice for System Safety*, for DoD programs and the requirements of AFI 91-202 for Air Force programs. The program includes the corresponding requirements for a Range User SSPP and identifies hazard analysis and risk assessment requirements.

A3.1.2. Tailoring. Tailoring of this attachment and the requisite SSPP is highly recommended. The tailoring process is defined in **Attachment 2**. When conflicting requirements or deficiencies are identified in launch safety program requirements or with other program requirements, the Range User shall submit notification, with proposed solutions or alternatives and supporting rationale, to Wing Safety for resolution.

A3.1.3. Special Provisions. The Wing Safety Office recognizes that many programs may already have a system safety program due to contract or internal company directives. In these cases, many of the following tasks may already be covered and need only be provided to the ranges in the form of the larger system safety program. This attachment is not intended to cause duplicate work. Additionally, the analyses and other requirements specified in AFSPCMAN 91-710 Volume 2, Flight Analyses and AFSPCMAN 91-710 Volume 4, Airborne Flight Safety Systems are adequate for Wing Safety purposes and no additional system safety analyses in these areas are required from the Range User by the ranges. However, the Range User system safety management and organization in the SSPP shall note that these analyses and other applicable requirements are performed by the AFSPC ranges.

A3.1.4. Demonstration of an Acceptable Level of Mishap Risk. Range Users shall demonstrate an acceptable level of mishap risk to Wing Safety through the completion of the system safety hazard analyses and risk assessments described in this attachment.

A3.2. System Safety Program Tasks. To achieve the system safety objectives and obtain Wing Safety approval, the following tasks shall be completed by the Range User in the approximate order that they are listed and in conjunction with the milestones that are identified.

A3.2.1. Task 1: Establish a Range User Safety Program. By the time of the Range User's PI, the Range User shall have established a Safety Program that meets the tailored requirements of this publication which includes the following:

A3.2.1.1. Establishing a safety management system. A Range User program manager shall be responsible for the following:

A3.2.1.1.1. Establishing, controlling, incorporating, directing and implementing the system safety program policies.

A3.2.1.1.2. Ensuring that mishap risk is identified and eliminated or controlled within established program risk acceptability parameters. Decisions regarding resolution of identified hazards shall be based on assessment of the risk involved. To

aid the achievement of the objectives of system safety, hazards shall be characterized as to hazard severity categories and hazard probability levels, when possible. Since the priority for system safety is eliminating hazards by design, a risk assessment procedure, considering only hazard severity, will generally suffice during the early design phase to minimize risk. When hazards are not eliminated during the early design phase, a risk assessment procedure based upon the hazard probability, hazard severity, as well as risk impact, shall be used to establish priorities for corrective action and resolution of identified hazards.

A3.2.1.1.3. Establishing internal reporting systems and procedures for investigation and disposition of system related mishaps and safety incidents, including potentially hazardous conditions not yet involved in a mishap or incident and reporting such matters to Wing Safety.

A3.2.1.1.4. Reviewing and approving the safety analyses, reports and documentation required by this publication and submitted to Wing Safety to establish knowledge and acceptance of residual risks to the public and launch area personnel and resources.

A3.2.1.2. Establishing a key system safety position for each program. The individual in this position shall be directly responsible to the Range User program manager for safety matters. At a minimum, Range User key safety personnel shall be responsible for the following:

A3.2.1.2.1. Reviewing and approving all safety analyses, reports and documentation required by this publication and submitted to Wing Safety for approval.

A3.2.1.2.2. Reviewing and approving all hazardous and safety critical test plans and procedures conducted at the AFSPC ranges and verifying that all safety requirements are incorporated.

A3.2.1.3. Developing a planned approach for safety task accomplishment, providing qualified people to accomplish the tasks, establishing the authority for implementing the safety tasks through all levels of management and allocating appropriate resources, both manning and funding, to ensure the safety tasks are completed.

A3.2.1.4. Establishing a system safety organization or function and lines of communication within the program organization and with associated organizations (government and contractor).

A3.2.1.5. Establishing interfaces between system safety and other functional elements of the program, as well as between other safety disciplines such as nuclear, range, explosive, chemical and biological.

A3.2.1.6. Designating the organizational unit responsible for executing each safety task.

A3.2.1.7. Establishing the authority for resolution of identified hazards.

A3.2.1.8. Establishing a single closed-loop hazard tracking system by development of a method or procedure to document and track hazards and their controls and providing an audit trail of hazard mitigation.

A3.2.1.8.1. Maintaining and making available to Wing Safety upon request a centralized file, computer database or document called a Hazard Log. At a minimum, the Hazard Log shall contain the following information:

A3.2.1.8.1.1. Title and description of each hazard, including an associated hazard including hazard cause and associated risk index.

A3.2.1.8.1.2. Status of each hazard and the status of the associated controls for each hazard.

A3.2.1.8.1.3. Traceability of resolution on each Hazard Log item from the time the hazard was identified to the time the risk associated with the hazard was reduced to a level acceptable to Wing Safety.

A3.2.1.8.1.4. Identification of residual risk.

A3.2.1.8.1.5. Action persons and organizational element.

A3.2.1.8.1.6. The recommended design features, procedure controls, Caution & Warning and training to reduce the hazard to a level of risk acceptable to Wing Safety.

A3.2.1.8.1.7. The signature of Wing Safety accepting the risk effecting closure of the Hazard Log item.

A3.2.1.9. Establishing the order of precedence for satisfying system safety requirements and resolving identified hazards as follows:

A3.2.1.9.1. Designing for Minimum Risk. From program inception, a program should design their system to eliminate hazards. If an identified hazard cannot be eliminated, reduce the associated risk to an acceptable level, as defined by Wing Safety, through design selection.

A3.2.1.9.2. Incorporating Safety Devices. If identified hazards cannot be eliminated or their associated risk adequately reduced through design selection, that risk shall be reduced to a level acceptable to Wing Safety through the use of fixed, automatic or other protective safety design features or devices. Provisions shall be made for periodic functional checks of safety devices when applicable.

A3.2.1.9.3. Providing Warning Devices. When neither design nor safety devices can effectively eliminate identified hazards or adequately reduce associated risk, devices shall be used to detect the condition and to produce an adequate warning signal to alert personnel of the hazard. Warning signals and their application shall be designed to minimize the probability of incorrect personnel reaction to the signals and shall be standardized within like types of systems.

A3.2.1.9.4. Developing Procedures and Training. Where it is impractical to eliminate hazards through design selection or adequately reduce the associated risk with safety and warning devices, procedures and training shall be used. However, without a specific waiver from Wing Safety, no warning, caution or other form of written advisory shall be used as the only risk reduction method for Category I or II hazards (**Table 3.2**.). Procedures may include the use of personal protective equipment. Precautionary notations shall be standardized as specified by Wing

Safety. Range User personnel performing safety critical tasks and activities (as defined in AFSPCMAN 91-710, Volume 7) require certification of personnel proficiency.

A3.2.1.10. Defining system safety program milestones and relating these to major program milestones, program element responsibility and required inputs and outputs. When major program milestones are not used, an equivalent process that meets the intent of this document shall be developed by the Range User in coordination with Wing Safety. The final resulting process shall be included in the program's SSPP.

A3.2.1.11. Establishing System Safety Program reviews and audits.

A3.2.1.11.1. Conducting, documenting and making the following documentation available to Wing Safety upon request:

A3.2.1.11.1.1. The Range User launch safety program plan and supporting risk assessment data.

A3.2.1.11.1.2. Associate contractor SSPP and supporting risk assessment data.

A3.2.1.11.1.3. Support contractor SSPP and supporting risk assessment data.

A3.2.1.11.1.4. Subcontractor SSPP and supporting risk assessment data.

A3.2.1.11.2. Providing support for the following:

A3.2.1.11.2.1. Safety reviews and audits performed by representatives of Wing Safety.

A3.2.1.11.2.2. Presentations to government certifying activities such as phase safety reviews, munitions safety boards, nuclear safety boards or flight safety review boards to the extent specified by this publication. These may also include special reviews such as flight and article readiness reviews or pre-construction briefings.

A3.2.1.11.2.3. Safety reviews shall be held in association with the program SSR, PDR, CDR and PSR. When the design review process is not used, the Range User shall develop, in coordination with Wing Safety, a review process that meets the intent of the AFSPCMAN 91-710 identified safety reviews. This review process shall be included in the program's SSPP. As a minimum, all safety reviews shall address the following:

A3.2.1.11.2.3.1. Program systems and operations overview.

A3.2.1.11.2.3.2. Presentation of Wing Safety required documentation and hazard analyses.

A3.2.1.11.2.3.3. AFSPCMAN 91-710 non-compliances.

A3.2.1.11.2.3.4. Open safety issues.

A3.2.1.12. Establishing an incident alert and notification, investigation and reporting process, to include notification of Wing Safety.

A3.2.1.13. Establishing a process to evaluate engineering change proposals (ECPs), specification change notices (SCNs), software problem reports (SPRs), program or

software trouble reports (PTRs, STRs) for their safety impact on the system and notify Wing Safety if the level of risk of the system changes.

A3.2.1.14. Establish a method that verifies the program's final system configuration meets all the requirements in the program's tailored version of AFSPCMAN 91-710.

A3.2.2. Task 2: Develop a SSPP. The Range User shall develop and implement a Wing Safety approved SSPP to prevent mishaps once the system enters an AF Range and ending at SCA transfer or previously approved by other documentation. The SSPP shall describe, in detail, tasks and activities of system safety management and system safety engineering required to identify, evaluate and eliminate or control hazards, to reduce the associated risk to a level acceptable to Wing Safety. The approved plan provides a formal basis of understanding between the Range User and Wing Safety on how the Safety Program will be conducted to meet the requirements of AFSPCMAN 91-710. The approved plan shall account for all required tasks and responsibilities on an item-by-item basis. The Range User shall submit a draft SSPP to Wing Safety for review and approval within 45 days of the PI and a final at least 45 days before any program cDR. The SSPP shall include the following information:

A3.2.2.1. System Safety Organization. The System Safety Organization section shall describe the following:

A3.2.2.1.1. The location of the system safety and flight safety analysis organizations or functions within the overall program organization, using charts to show the organizational and functional relationships and lines of communication.

A3.2.2.1.2. The organizational relationship between other program functional elements having responsibility for tasks with launch safety impacts and the system safety management and engineering organization.

A3.2.2.1.3. Review and approval authority of applicable tasks by key system safety personnel.

A3.2.2.1.4. The responsibility and authority of key system safety personnel, other Range User organizational elements involved in the launch/reentry/flyback safety effort, contractors and system safety groups.

A3.2.2.1.5. A description of the methods by which safety personnel may raise issues of concern directly to the program manager or the program manager's supervisor within the corporate organization.

A3.2.2.1.6. Identification of the organizational unit responsible for executing each task.

A3.2.2.1.7. Identification of the authority in regard to resolution of all identified hazards.

A3.2.2.1.8. The staffing of the system safety organization for the duration of the program to include personnel loading and a summary of the qualifications of key system safety personnel assigned to the effort, including those personnel identified with approval authority for Range User prepared Wing Safety documentation.

A3.2.2.1.9. The process by which Range User management decisions will be made, including such decisions as timely notification of unacceptable risks, necessary action, incidents or malfunctions or request for non-compliances to safety requirements or program waivers.

A3.2.2.1.10. Details of how resolution and action relative to system safety will be accomplished at the program management level possessing resolution authority.

A3.2.2.2. System Safety Program Milestones. The SSPP shall:

A3.2.2.2.1. Define system safety program milestones and relate these to the major program milestones, program element responsibility and required inputs and outputs.

A3.2.2.2.2. Provide and maintain a program schedule of safety tasks, including start and completion dates, reports and reviews.

A3.2.2.2.3. Identify subsystem, component or software safety activities as well as integrated system level activities such as design analyses, tests and demonstrations applicable to the system safety program but specified in other engineering studies and development efforts to preclude duplication.

A3.2.2.2.4. Combined or independent safety reviews in association with the following programs: Concept Design Review (cDR), Preliminary Design Review (PDR), Critical Design Review (CDR), Pre-Ship Review (PSR) for the launch vehicle, RV, payload and associated ground support equipment design [Missile System Prelaunch Safety Package (MSPSP), AFSPCMAN 91-710 Volume 3], airborne FSS and associated ground support equipment design [Flight Termination System Report (FTSR), AFSPCMAN 91-710 Volume 4], critical facility design [Facility Safety Data Package (FSDP), AFSPCMAN 91-710 Volume 5] and Ground Operations Plans (GOPs), AFSPCMAN 91-710 Volume 6. For programs that do not use the above reviews, the Range User shall develop, in coordination with Wing Safety, a review process that meets the intent of these requirements. This alternate process shall be included in the program's System Safety Program Plan.

A3.2.2.2.4.1. cDRs or program equivalent activities shall provide design and operations detail to at least the system level.

A3.2.2.2.4.2. PDRs or program equivalent activities shall provide design and operations detail to at least the subsystem and box level.

A3.2.2.2.4.3. CDRs or program equivalent activities shall provide design and operating detail to the component and piece part level.

A3.2.2.2.4.4. PSRs or program equivalent activities shall provide sufficient detail to ensure hazards are controlled to the maximum extent possible and to ensure Wing Safety required documentation (e.g., MSPSP, Hazard Tracking System, FSDP, OSP, as a minimum) is ready for closure and Wing Safety concurrence prior to the shipment of hardware to the range.

A3.2.2.3. System Safety Data. The SSPP shall:

A3.2.2.3.1. Identify the method(s) by which deliverables will be delivered to Wing Safety. If delivery is through a web site or company portal, the Range User shall

provide Wing Safety the ability to access these sites. Identify deliverable data by title, number and means of delivery such as hard copy or electronic submission.

A3.2.2.3.2. Identify non-deliverable system safety data and describe the procedures for accessibility by Wing Safety and retention of data of historical value. The SSPP shall identify how data will be stored and retained when delivery of the data to Wing Safety is on an "upon request" basis.

A3.2.2.4. System Safety Interfaces. The SSPP shall identify, in detail:

A3.2.2.4.1. The interface between system safety and all other applicable safety disciplines such as nuclear safety, launch safety, explosive and ordnance safety, chemical and biological safety, laser safety and any others.

A3.2.2.4.2. The interface between system safety, design and/or systems engineering, and all other support disciplines such as maintainability, quality control, reliability, software development, human factors engineering, medical support (health hazard assessments) and any others.

A3.2.2.4.3. The interface between system safety and all system integration and test disciplines.

A3.2.3. Task 3: Perform and Document a Preliminary Hazard Analysis. The Range User shall perform and document a Preliminary Hazard Analysis (PHA) to identify safety critical areas, to provide an initial assessment of hazards and to identify requisite hazard controls and follow-on actions. The results of the PHA shall be submitted to Wing Safety at least 45 days prior to the cDR or equivalent program design activity. The results of the PHA shall be used as a guide for tailoring AFSPCMAN 91-710 for the program. Based on the best available data, including mishap data from similar systems and other lessons learned, hazards associated with the proposed design or function shall be evaluated for hazard severity, hazard probability and operational constraints. Safety studies identifying provisions and alternatives needed to eliminate hazards or reduce their associated risk to a level acceptable to Wing Safety shall be included. At a minimum, the PHA shall consider the following for identification and evaluation of hazards:

A3.2.3.1. Hazardous components such as fuels, propellants, lasers, explosives, toxic substances, hazardous construction materials, pressure systems and other energy sources.

A3.2.3.2. Safety related interface considerations among various elements of the system such as material compatibility, electromagnetic interference, inadvertent activation, fire and explosive initiation and propagation and hardware and software controls. This shall include consideration of the potential contribution by software, including software developed by other contractors and sources, to subsystem and system mishaps.

A3.2.3.3. Safety design criteria to control safety-critical software commands and responses such as inadvertent command, failure to command, untimely command or responses, inappropriate magnitude or designated undesired events shall be identified and appropriate action taken to incorporate them in the software and related hardware specifications.

A3.2.3.4. Environmental constraints including the operating environments such as drop, shock, vibration, extreme temperatures, humidity, noise, thermal range, rate of heating,

space-based radiation, corona effects, acoustics, exposure to toxic substances, health hazards, fire, electrostatic discharge, lightning, electromagnetic environmental effects, ionizing and non-ionizing radiation including laser radiation.

A3.2.3.5. Operating, test, maintenance, built-in-tests, diagnostics and emergency procedures (human factors engineering, human error analysis of operator functions, tasks and requirements; effect of factors such as equipment layout, lighting requirements, potential exposures to toxic materials, effects of noise or radiation on human performance; explosive ordnance render safe and emergency disposal procedures; life support requirements and their safety implications in manned systems, crash safety, egress, rescue, survival and salvage).

A3.2.3.6. Those test unique hazards that will be a direct result of the test and evaluation of the article or vehicle.

A3.2.3.7. Facilities, real property installed equipment, support equipment such as provisions for storage, assembly, checkout, proof testing of hazardous systems and assemblies that may involve toxic, flammable, explosive, corrosive or cryogenic materials and wastes; radiation or noise emitters; electrical power sources.

A3.2.3.8. Training and certification pertaining to hazardous and safety critical operations and maintenance of hazardous and safety critical systems.

A3.2.3.9. Safety related equipment, safeguards and possible alternate approaches such as interlocks; system redundancy; fail-safe design considerations using hardware or software controls; subsystem protection; fire detection and suppression systems; personal protective equipment; heating, ventilation, and air-conditioning; and noise or radiation barriers.

A3.2.3.10. Malfunctions to the system, subsystems or software. Each malfunction shall be specified, the cause and resulting sequence of events determined, the degree of hazard determined and appropriate specification and/or design changes developed.

A3.2.4. Task 4: Perform and Document Subsystem, System, Facility and Operating and Support Hazard Analyses:

A3.2.4.1. Subsystem Hazard Analysis. The Range User shall perform and document a subsystem hazard analysis (SSHA) to identify all components and equipment that could result in a hazard or whose design does not satisfy Wing Safety requirements. The purpose of the SSHA is to verify subsystem compliance with safety requirements contained in subsystem specifications and other applicable documents; identify previously unidentified hazards associated with the design of subsystems including component failure modes, critical human error inputs and hazards resulting from functional relationships between components and equipment comprising each subsystem; and recommend actions necessary to eliminate identified hazards or control their associated risk to acceptable levels. The SSHA shall include government furnished equipment, non-developmental items and software. Areas to consider are performance, performance degradation, functional failures, timing errors, design errors, defects or inadvertent functioning. The human shall be considered a component within a subsystem, receiving both inputs and initiating outputs, during the conduct of this analysis. The SSHA may indicate the need for revised tailoring of some requirements of

this publication depending on the level of risk identified or the discovery of any previously unidentified hazards. The analysis shall include a determination of the following:

A3.2.4.1.1. The modes of failure including reasonable human errors as well as single point and common mode failures and the effects on safety when failures occur in subsystem components.

A3.2.4.1.2. The potential contribution of hardware and software, including that which is developed by other contractors and sources, events, faults and occurrences such as improper timing on the safety of the subsystem.

A3.2.4.1.3. That the safety design criteria in the hardware, software and facilities specifications have been satisfied.

A3.2.4.1.4. That the method of implementation of hardware, software and facilities design requirements and corrective actions has not impaired or decreased the safety of the subsystem nor has it introduced any new hazards or risks.

A3.2.4.1.5. The implementation of safety design requirements from top level specifications to detailed design specifications for the subsystem. The implementation of safety design requirements developed as part of the PHA shall be analyzed to ensure that it satisfies the intent of the requirements.

A3.2.4.1.6. Test plan and procedure recommendations to integrate safety testing into the hardware and software test programs.

A3.2.4.1.7. That system level hazards attributed to the subsystem are analyzed and that adequate control of the potential hazard is implemented in the design.

A3.2.4.1.8. SSHA Analysis Techniques. If no specific analysis techniques are directed or if the Range User recommends that a different technique other than that specified by Wing Safety should be used, the Range User shall obtain approval of techniques to be used before performing the analysis.

A3.2.4.1.9. SSHA Software:

A3.2.4.1.9.1. Software used to control safety critical computer system functions shall be developed IAW AFSPCMAN 91-710 Volume 3.

A3.2.4.1.9.2. Range Users shall identify all safety critical computer system functions IAW AFSPCMAN 91-710 Volume 3, and develop a SSHA for each.

A3.2.4.1.9.3. Software shall be put under formal configuration control of a Software Configuration Control Board (SCCB) IAW AFSPCMAN 91-710 Volume 3, as soon as a baseline is established. This will ensure that hardware/software changes do not conflict with or introduce potential safety hazards due to hardware/software incompatibilities.

A3.2.4.1.9.4. Problems identified that require the reaction of the software developer shall be reported to Wing Safety in time to support the ongoing phase of the software development process.

A3.2.4.1.10. Updating the SSHA. The Range User shall update the SSHA as a result of any system design changes, including software design changes that affect system safety.

A3.2.4.1.11. SSHA Submittal. The Range User shall submit their plan for developing their SSHA at the PDR or equivalent program activity. The Range User shall submit a draft of their SSHA 45 days prior to the CDR or equivalent program activity. The Range User shall provide the final SSHA with their final MSPSP (See AFSPCMAN 91-710 Volume 3).

A3.2.4.2. System Hazard Analysis. The Range User shall perform and document a system hazard analysis (SHA) to identify hazards and assess the risk of the total system design, including software, and specifically of the subsystem interfaces. The purpose of the SHA is to verify system compliance with safety requirements contained in system specifications and other applicable documents; identify previously unidentified hazards associated with the subsystem interfaces and system functional faults; assess the risk associated with the total system design, including software, and specifically of the subsystem interfaces; and recommend actions necessary to eliminate identified hazards and/or control their associated risk to acceptable levels. The SHA may indicate the need for revised tailoring of some requirements of this publication depending on the level of risk identified or the discovery of any previously unidentified hazards. This analysis shall include a review of subsystem interrelationships to determine the following:

A3.2.4.2.1. Compliance with specified safety design criteria.

A3.2.4.2.2. Possible independent, dependent and simultaneous hazardous events including system failures; failures of safety devices; common cause failures and events; and system interactions that could create a hazard or result in an increase in mishap risk.

A3.2.4.2.3. Degradation in the safety of a subsystem or the total system from normal operation of another subsystem.

A3.2.4.2.4. Design changes that affect subsystems.

A3.2.4.2.5. Effects of reasonable human errors.

A3.2.4.2.6. Potential contribution of hardware and software, including that which is developed by other Range Users and other sources or commercial off-the-shelf hardware or software, events, faults and occurrences such as improper timing on the safety of the system.

A3.2.4.2.7. That the safety design criteria in the hardware, software and facilities specifications have been satisfied.

A3.2.4.2.8. That the method of implementation of the hardware, software and facilities design requirements and corrective actions has not impaired or degraded the safety of the system nor has introduced any new hazards.

A3.2.4.2.9. SHA Analysis Techniques. If no specific analysis techniques are directed or if the Range User recommends that a different technique than that specified by Wing Safety should be used, the Range User shall obtain approval of

techniques to be used before performing the analysis. The SHA may be combined with and/or performed using similar techniques to those used for the SSHA.

A3.2.4.2.10. SHA Software:

A3.2.4.2.10.1. Software used to control safety critical computer system functions shall be developed IAW AFSPCMAN 91-710 Volume 3.

A3.2.4.2.10.2. Range Users shall identify all safety critical computer system functions IAW AFSPCMAN 91-710 Volume 3 and develop an SHA for each.

A3.2.4.2.10.3. Software shall be put under formal configuration control of a Software Configuration Control Board (SCCB) IAW AFSPCMAN 91-710 Volume 3 as soon as a baseline is established. This will ensure that hardware/software changes do not conflict with or introduce potential safety hazards due to hardware/software incompatibilities.

A3.2.4.2.10.4. Problems identified that require the reaction of the software developer shall be reported to Wing Safety in time to support the ongoing phase of the software development process.

A3.2.4.2.11. Updating the SHA. The Range User shall update the SHA as a result of any system design changes, including software design changes that affect system safety.

A3.2.4.2.12. SHA Submittal. The Range User shall submit their plan for developing the SHA at the PDR or equivalent program activity if a PDR is not held. A draft SHA shall be submitted 45 days prior to the CDR or equivalent program activity if a CDR is not held. The final SHA shall be provided with the final MSPSP (see AFSPCMAN 91-710, Volume 3).

A3.2.4.3. Operating and Support Hazard Analyses. The Range User shall perform and document an operating and support hazard analysis (O&SHA) to examine procedurally controlled activities. The purpose of the O&SHA is to evaluate activities for hazards or risks introduced into the system by operational and support procedures and to evaluate adequacy of operational and support procedures used to eliminate, control or abate identified hazards or risks. The O&SHA identifies and evaluates hazards resulting from the implementation of operations or tasks performed by persons, considering the following criteria: the planned system configuration and/or state at each phase of activity; the facility interfaces; the planned environments or the ranges thereof; the supporting tools or other equipment, including software controlled automatic test equipment, specified for use; operational and/or task sequence, concurrent task effects and limitations; biotechnological factors, regulatory or contractually specified personnel safety and health requirements; and the potential for unplanned events including hazards introduced by human errors. The human shall be considered an element of the total system, receiving both inputs and initiating outputs during the conduct of this analysis. The O&SHA shall identify the safety requirements or alternatives needed to eliminate or control identified hazards or to reduce the associated risk to a level that is acceptable under either regulatory or Wing Safety specified criteria. The O&SHA may indicate the need for revised tailoring of some requirements of this publication depending on the level

of risk identified or the discovery of any previously unidentified hazards. The analysis shall identify the following:

A3.2.4.3.1. Activities that occur under hazardous conditions, their time periods and the actions required to minimize risk during these activities and time periods

A3.2.4.3.2. Changes needed in functional or design requirements for system hardware and software, facilities, tooling or support and test equipment to eliminate or control hazards or reduce associated risks

A3.2.4.3.3. Requirements for safety devices and equipment, including personnel safety and life support equipment.

A3.2.4.3.4. Warnings, cautions and special emergency procedures such as egress, rescue, escape, render safe, explosive ordnance disposal and back out, including those necessitated by failure of a computer software-controlled operation to produce the expected and required safe result or indication.

A3.2.4.3.5. Requirements for packaging, handling, storage, transportation, maintenance and disposal of hazardous materials.

A3.2.4.3.6. Requirements for safety training and personnel certification.

A3.2.4.3.7. Effects of non-developmental hardware and software across the interface with other system components or subsystems.

A3.2.4.3.8. Potentially hazardous system states under operator control.

A3.2.4.3.9. Assessment of Procedures. The O&SHA shall document system safety assessment of procedures involved in system production, deployment, installation, assembly, test, operation, maintenance, servicing, transportation, storage, modification, demilitarization and disposal. Human factors shall be analyzed during the development of all O&SHAs.

A3.2.4.3.10. O&SHA Analysis Techniques. If no specific analysis techniques are directed or if the Range User recommends that a different technique other than that specified by Wing Safety should be used, the Range User shall obtain approval of techniques to be used before performing the analysis.

A3.2.4.3.11. Updating the O&SHA. The Range User shall update the O&SHA as a result of any system design or operational changes.

A3.2.4.3.12. O&SHA Submittal. The Range User shall submit their plan for developing their O&SHA submittal at the PDR or equivalent program activity if a PDR will not be held. A draft O&SHA shall be submitted 45 days prior to the CDR or equivalent program activity if a CDR will not be held. The final O&SHA shall be provided to Wing Safety with the final GOP (see AFSPCMAN 91-710 Volume 6).

A3.2.4.4. Facility Safety Analyses. The PHA, SSHA, SHA and O&SHA shall address hazards associated with the facilities used to support the Range User program. The facility portions of these analyses shall be provided with the Facility Safety Data Package specified in AFSPCMAN 91-710 Volume 5.

A3.2.5. Task 5: Perform and Document a Safety Assessment Report (SAR). The Range User shall perform and document a SAR. The purpose of this task is to perform and document a comprehensive evaluation of the mishap risk being assumed before test or operation of the Range User's system. The SAR shall be developed using data from the hazard analyses required in Task 4 (A2.2.4) and data packages required in AFSPCMAN 91-710 Volumes 1 through 6 and shall summarize the following information:

A3.2.5.1. The safety criteria and methodology used to classify and rank hazards, plus any assumptions on which the criteria or methodologies were based or derived including the definition of acceptable risk as specified by Wing Safety (Tables 3.1. and 3.2.).

A3.2.5.2. The results of analyses performed to identify hazards inherent in the system, including those hazards that still have a residual risk and the actions that have been taken to reduce the associated risk to a level specified as acceptable by Wing Safety (Tables 3.1. and 3.2.).

A3.2.5.3. The results of the safety program efforts, including a list of all significant hazards along with specific safety recommendations or precautions required to ensure safety of personnel, property or the environment. The list shall be categorized as to whether or not the risks may be expected under normal or abnormal operating conditions.

A3.2.5.4. Conclusion with the Range User program safety manager and the Range User program manager signed statement that all identified hazards have been eliminated or their associated risks controlled to levels specified in Tables 3.1 and 3.2, and that the system is ready to test or operate or proceed to the next acquisition phase.

A3.2.5.5. Recommendations applicable to hazards at the interface of Range User systems with other systems, as required.

A3.2.5.6. A formal request for Wing Safety approval to conduct operations at the ranges.

A3.2.5.7. SAR Submittal. The Range User shall submit their plan for developing their SAR at the PDR or equivalent program activity if a PDR is not held. The Range User shall submit their final SAR at the Pre-Ship Review (PSR) or equivalent program activity if no PSR is held.

A3.2.5.8. SAR Approval. The SAR shall be approved by Wing Safety prior to the start of operations on the range.

Attachment 4

SUBMITTING AFSPCMAN 91-710 NONCOMPLIANCE REQUESTS

A4.1. Introduction.

A4.1.1. Purpose. ELSs and waivers are used when Range Users cannot meet the requirements of this publication.

A4.1.2. Content. This attachment describes the noncompliance categories and the process for submitting ELSs and waivers.

A4.1.3. Applicability**:**

A4.1.3.1. The noncompliance process is applicable to all programs including boosters, solid rocket motors, upper stages, payloads, RVs, ground support equipment, facilities and others that operate at AFSPC ranges or elsewhere if governed under Wing Safety unless grandfathered IAW the criteria stated below.

A4.1.3.2. The noncompliance process is also applicable to all programs regardless of which version of Range Safety requirements documents (such as AFETR 127-1, ESMCR 127-1, ERR 127-1, WSMCR 127-1, WRR 127-1, EWR 127-1, AFSPCMAN 91-710) is under contract.

A4.1.3.3. The flight plan approval process does not fall within the intent of this attachment except when it involves launch vehicle, RV and/or payload hardware.

A4.1.4. Grandfathering Criteria. Previously approved systems with or without granted ELSs and waivers will be grandfathered and maintain approval and need not be resubmitted unless it is determined by the Chief of Safety and/or the Range User that one of the situations described below exists. Wing Safety shall coordinate all grandfathering determinations with the affected Range User.

A4.1.4.1. Existing programs make major modifications that affect the launch vehicle's or RV's operation or safety characteristics or include the use of currently approved components, systems or subsystems in a new application (through tailoring if desired). **Exception:** Previously approved existing components, systems or subsystems that do not increase the risks, do not degrade safety or can survive new environments equivalent to or lower than the originally approved qualification levels shall be honored and do not have to meet new requirements as long as data and analyses show that the criteria have been met.

A4.1.4.2. The Range User has determined that it is economically and technically feasible to incorporate new requirements into the system.

A4.1.4.3. The system has been or will be modified to the extent that it is considered a new program or that existing safety approvals no longer apply. Risk and hazard analyses developed jointly by Wing Safety and the Range User shall be used to determine applicability of the safety approvals.

A4.1.4.4. A previously unforeseen or newly discovered safety hazard exists that is deemed by either Wing Safety or the Range User to be significant enough to warrant the change. This category includes systems that were previously approved, but when

obtaining the approval, the non-compliances to the original requirement were not identified.

A4.1.4.5. A system or procedure is modified and a new requirement reveals that a significant risk exists.

A4.1.4.6. Accident, incident investigations and reports may render specific compliance mandatory within this publication.

A4.1.5. Noncompliance Categories.

A4.1.5.1. Public Safety. Public safety noncompliance deals with safety requirements involving risks to the public, including foreign countries, their personnel and/or their resources.

A4.1.5.2. Launch Area Safety. Launch area safety non-compliances deal with safety requirements involving risks that are limited to personnel and/or resources on AFSPC ranges, including CCAFS and VAFB and may be extended to KSC. Launch area safety involves multiple licensed users, government tenants or USAF squadrons.

A4.1.5.3. Launch Complex Safety. Launch complex safety non-compliances deal with safety requirements involving risk that is limited to the personnel and/or resources under the control of a single licensed user, full time government tenant organization or USAF squadron/detachment (control authority). Launch complex safety is limited to risks confined to a physical space for which the single control authority is responsible.

A4.1.5.4. Recovery Area Safety. Recovery area safety non-compliance deals with safety requirements involving risks that are limited to personnel and/or resources on AFSPC ranges, including CCAFS and VAFB, and may be extended to KSC. Recovery area safety involves multiple licensed users, government tenants and/or USAF units.

A4.1.5.5. Recovery Site Safety. Recovery site safety non-compliance deals with safety requirements involving risks that are limited to the personnel and/or resources under the control of a single licensed user, full time government tenant organization or USAF units (control authority). Recovery site safety is limited to risks confined to a physical space for which the single control authority is responsible.

A4.1.6. Effectivity of Non-compliances:

A4.1.6.1. Lifetime:

A4.1.6.1.1. All waivers are intended to have limited effectivities. Lifetime waivers shall be limited to those situations where it is virtually impossible to meet the requirement or meet the intent of the requirement.

A4.1.6.1.2. Lifetime ELSs are allowed provided equivalent safety is maintained. A life of the program ELS should be addressed through updates to the tailored AFSPCMAN 91-710.

A4.1.6.2. Time Limited:

A4.1.6.2.1. Time limited waivers are set for a limited period of time or a limited number of launches. The time constraint is normally determined as a function of cost,

schedule and the minimum time needed to satisfactorily modify or replace the noncompliant system or to modify the noncompliant operation.

A4.1.6.2.2. ELSs may be time limited depending on the method by which equivalent safety is accomplished. If excessive procedural controls, personnel, material or costs are required to maintain equivalent safety, the ELS should be time limited.

A4.1.7. Conditions for Issuance of ELSs and Waivers:

A4.1.7.1. Hazard Mitigation. All reasonable steps shall be taken to meet the intent of the publication requirements and mitigate associated hazards to acceptable levels, including design and operational methods.

A4.1.7.2. Get Well Plans. Range Users who have ELSs and waivers that are not granted for the life of a program shall provide a plan to meet the requirements in question by the time the approved effectivity expires. Range Users who have ELSs and waivers that are granted for the life of the program shall provide Wing Safety a definition of "program life" intended for the scope of the ELSs and waivers.

A4.1.8. Risk-Cost Benefit Analysis:

A4.1.8.1. Technical disagreements regarding such items as applicable requirements, policy, criteria or data may be evaluated on a risk-cost benefit basis to determine if the risk is acceptable to issue an ELS determination or waive the requirement.

A4.1.8.2. Risk-cost benefit analyses based on the criteria defined in **Table 3.2** shall be submitted to Wing Safety.

A4.1.8.3. Based on data from the risk-cost benefit analysis, Wing Safety and the Range User shall reach agreement on the disposition of the requirements involving the launch area, launch complex personnel, recovery area, recovery area personnel, and AF resources. However, Wing Safety shall be the sole authority for the determination and disposition of requirements that affect public safety.

A4.1.8.4. If the application of an AFSPCMAN 91-710 requirement results in a significant reduction of risk at a significant cost benefit, it may be judged by Wing Safety to be sufficient to impose the requirement; however, if the benefit is insignificant and/or the cost is high, the requirement may be waived or determined to be an ELS, after considering the effect on public safety.

A4.2. Submitting Non-compliances.

A4.2.1. Format. Range Users shall submit non-compliances in writing using the format provided in the MOA Between AFSPC and FAA for Resolving Requests for Relief from Common Launch Safety Requirements. This format and the associated instructions are available by request from Wing Safety. Note that this form was developed for use by all range users, not just range users associated with FAA licensing.

A4.2.2. Process:

A4.2.2.1. Requests for ELSs and waivers shall be submitted to the office of the Chief of Safety as early as they are known to be necessary.

A4.2.2.2. Public safety ELSs and waivers such as flight plan approval, FSS design and toxic propellant storage normally require extensive risk analyses that can take one to two years to perform; therefore, these ELSs and waivers shall be initiated during the planning phase and be closed out by Wing Safety (ELSs) or the Space Wing Commander (waivers) approval or design change before manufacture of the booster, spacecraft, FSS or other system in question.

A4.2.2.3. Launch area safety, launch complex safety, recovery area and recovery site safety ELSs and waivers normally require two weeks to two months to process depending on the nature of the noncompliance and the requested effectivity.

A4.2.2.4. The Space Wing shall coordinate all noncompliance requests with affected agencies, as appropriate. A coordinated review and resolution of requests for relief from common AF-FAA launch safety requirements shall be per procedures developed between the AFSPC and the FAA. The Space Wing shall also coordinate all noncompliance requests with the affected Range User.

A4.2.3. Approvals:

A4.2.3.1. Programs launching from and reentering onto only one AFSPC range require only the appropriate 30 SW/SE or 45 SW/SE approvals.

A4.2.3.2. Programs launching from one range and reentering onto another range require approvals from both the launching range for the launch and orbital phases of flight and from the reentry range for the reentry phase of flight prior to the initiation of operations/test. If the risk associated with the mission cannot be separated by phases according to the guidelines and requirements defined in AFSPCMAN 91-710 Volume 2 governing separate risk budgets, then launch range approval will be conditional on the reentry range's approval. If a launch occurs from an AFSPC range and the associated reentry occurs on another range/location, the launching range shall ensure all approvals required by the reentry range/location are obtained prior to the initiation of operations.

A4.2.3.3. Waivers dealing with public safety shall be approved by the SW/CC. (T-3)

A4.2.3.4. Waivers other than public safety shall be approved by the Chief of Safety or his/her designated representatives.

A4.2.3.5. ELSs shall be approved by the appropriate 45 SW/SE or 30 SW/SE or their designated representatives.

Attachment 5

ACCEPTABLE RISK CRITERIA

A5.1. Introduction. The risk criteria defined in this attachment apply to all programs and missions operating at AFSPC ranges. FAA-licensed/permitted launches shall comply with both FAA risk requirements in 14 CFR Part 400 series (Commercial Space Transportation) and AFSPC risk requirements. The standard acceptable risk criteria apply separately to the launch and reentry phases of flight (including RLVs) provided the guidelines of RCC 321 (if used) and requirements of AFSPCMAN 91-710 Volume 2 (Section 2) are met. Therefore, the standard acceptable risk criteria applies separately to the launch vehicle, upper stage reentry (for upper stages that achieve orbit), and payload reentry provided RCC 321 and AFSPCMAN 91-710 Volume 2 requirements are satisfied. The risk posed by a flyback vehicle component/flyback booster is part of the launch risk budget provided the flyback vehicle component/flyback booster does not achieve orbit.

A5.2. Definition of Terms and Guidance Information.

A5.2.1. Casualty:

A5.2.1.1. Definition. A casualty is a serious injury or worse, including death, to a human.

A5.2.1.2. Guidance Information. Casualty modeling is a critical part of any risk analysis performed before flight to establish launch or reentry commit criteria that protect against casualties. The AIS is an anatomical scoring system first introduced in 1969. AIS provides a reasonably accurate way of ranking the severity of an injury. A scaling committee of the Association for the Advancement of Automotive Medicine monitors the AIS. In the AIS system, injuries are ranked on a scale of 1 to 6, with 1 being a minor injury; 2, moderate; 3, serious; 4, severe; 5, critical; and 6, a non-survivable injury. Abbreviated Injury Scale (AIS) Level 3 and greater is appropriate for describing a medical condition sufficiently to allow modeling of casualties for purposes of determining whether a launch or reentry satisfies the risk criteria for launch-essential personnel, recovery essential personnel and the public.

A5.2.2. Risk:

A5.2.2.1. Definition. Risk is a measure that accounts for both the probability of occurrence and the consequence of a hazard to a population or installation. Unless otherwise noted, risk is measured in expectation of casualties and expressed as individual risk or collective risk.

A5.2.2.2. Individual Risk:

A5.2.2.2.1. Definition. Individual risk is the risk that any single person will suffer a consequence. Unless otherwise noted, individual risk is expressed as the probability that any individual will become a casualty from a given hazard (Pc) at a specific location and event.

A5.2.2.2.2. Guidance Information. If each person in a group is subject to the same individual risk, then the collective risk may be computed as the individual risk multiplied by the number of people in the group.

A5.2.2.3. Collective Risk:

A5.2.2.3.1. Definition. Collective risk is the total risk to all individuals exposed to any and all hazards during a specific period of time or event such as a specific phase of flight, launch area, downrange (overflight), and recovery area or reentry overflight. The collective risk includes aggregated and accumulated risk. Unless otherwise noted, collective risk is the mean expectation of casualty predicted (Ec) to result from all hazards associated with an operation.

A5.2.2.3.2. Guidance Information. For launch and reentry, the collective risk per hazard may be determined for each of the different phases of flight, such as the launch area, recovery area, downrange/overflight, reentry overflight, or accumulated through all phases of the vehicle's flight.

A5.2.2.4. Accumulated Risk:

A5.2.2.4.1. Definition. Accumulated risk is the combined collective risk to all individuals exposed to a particular hazard through all phases of an operation.

A5.2.2.4.2. Guidance Information. For the flight of an orbital launch vehicle, risk is accumulated from liftoff through orbital insertion. For the flight of a suborbital launch vehicle, risk is accumulated from liftoff through the impact of all pieces of the launch vehicle, including the payload.

A5.2.2.5. Aggregated Risk:

A5.2.2.5.1. Definition. Aggregated risk is the accumulated risk due to all hazards associated with a flight.

A5.2.2.5.2. Guidance Information. For a specified launch, aggregated risk includes, but is not limited to, the risk due to debris impact, toxic release and distant focusing of blast overpressure.

A5.2.3. Populations at Risk:

A5.2.3.1. Launch-Essential Personnel

A5.2.3.1.1. Definition. Launch-essential personnel are those persons necessary to safely and successfully complete a specific hazardous operation or launch (see AFSPCMAN 91-710 Volume 7 for the complete definition).

A5.2.3.1.2. Guidance Information. Launch-essential personnel include supporting personnel required to perform emergency actions according to authorized directives and persons in training. Wing Safety and the Range User jointly determine the number of launch-essential personnel allowed within safety clearance zones or hazardous launch areas, with concurrence of the SW/CC.

A5.2.3.2. Recovery-Essential Personnel

A5.2.3.2.1. Definition. Recovery-essential personnel are those persons necessary to safely and successfully complete a specific hazardous operation, recovery of a RV, or flyback vehicle component (see AFSPCMAN 91-710 Volume 7 for the complete definition).

A5.2.3.2.2. Guidance Information. Recovery-essential personnel include supporting personnel required to perform emergency actions according to authorized directives and persons in training. Wing Safety and the Range User jointly determine the number of recovery-essential personnel allowed within safety clearance zones or hazardous recovery areas, with concurrence of the SW/CC.

A5.2.3.3. Public

A5.2.3.3.1. Definition. Public refers to all persons not in the launch-essential or recovery-essential categories. There are two sub-categories of public: neighboring operations personnel and the general public.

A5.2.3.3.2. Neighboring Operations Personnel (NOP)

A5.2.3.3.2.1. Definition. Neighboring operations personnel are individuals, not associated with the specific operation or launch or recovery currently being conducted, required to perform safety, security or critical tasks at the launch base or recovery site and who are notified of a neighboring hazardous operation and are either trained in mitigation techniques or accompanied by a properly trained escort.

A5.2.3.3.2.2. Guidance Information. For a commercially licensed launch, the FAA, as well as the range, shall approve the number and location of all neighboring operations personnel. NOP may include individuals performing launch processing tasks for another launch, recovery tasks for another RV, or flyback vehicle component, but do not include individuals in training for any job or individuals performing routine activities such as administrative, maintenance, support, janitorial. NOP may be allowed within safety clearance zones and hazardous launch or recovery areas and would not be evacuated with the general public. NOP shall be included in the same risk category as launch-essential personnel. Wing Safety and the Range User jointly determine the number and location of NOP, with the concurrence of the SW/CC. For a commercially licensed launch, the FAA as well as the range must approve the numbers and locations of NOP.

A5.2.3.3.3. General Public

A5.2.3.3.3.1. Definition. The general public consists of all individuals that are not in the launch-essential personnel, recovery-essential or NOP categories and includes the people onboard ships and aircraft.

A5.2.3.3.3.2. Guidance Information. For a specific launch or reentry, the general public includes all visitors, media and other non-essential personnel at the launch base or recovery site, as well as persons located outside the boundaries of the launch or recovery sites.

A5.2.4. Modeling:

A5.2.4.1. Probabilistic Modeling

A5.2.4.1.1. Definition. Probabilistic modeling is a process of employing statistical principles and the laws of probability to quantify the variability and the uncertainty in a physical quantity. The results of probabilistic modeling typically express the ratio

of the outcomes that would produce a given event to the total number of possible outcomes.

A5.2.4.1.2. Guidance Information. Two common forms of probabilistic modeling are pure statistical modeling and probabilistic modeling with reference to a deterministic model. Statistical modeling refers to the process of using statistical analysis of data to characterize an outcome. Probabilistic modeling with reference to a deterministic model begins with an appropriate deterministic model describing the underlying physical process. Probabilistic models (probability distributions of input parameters and characterization of model uncertainty) are superimposed on the deterministic model to develop a characterization of the likelihood of different outcomes from the process being studied. Probabilistic modeling is used for many purposes including: (1) characterizing performance envelopes of a booster, (2) characterizing the ability of a tracker to detect and track a booster, (3) characterizing the region hazarded by a particular peril; for example, impact probability contours; and (4) computing the risk from a hazardous operation; for example, casualty expectation from a mission.

A5.2.4.2. Deterministic Modeling

A5.2.4.2.1. Definition. A deterministic model is a mathematical model used to evaluate the extent of a hazard. Deterministic models are the mathematical basis used to establish boundaries that define where a specific hazard exists.

A5.2.4.2.2. Guidance Information. Deterministic models are commonly employed for the following purposes: (1) to establish a reference model about which to build a probabilistic model; (2) when a Wing Safety analyst believes that variability and uncertainty are not important in the context of the analysis; and (3) as the basis for conservative screening of models to assess whether one or more hazardous conditions poses a sufficient threat to warrant operational restrictions or more complete analyses.

A5.3. Description of Risk Criteria.

A5.3.1. As shown in Table A5.1, comparing normally accepted public, day-to-day accident risk exposure to normal launch (expendable and reusable), payload launch, and recovery operating risk exposure indicates that, under any circumstances, the annual collective risk for launch and reentry operations is small.

A5.3.2. Individual hazardous activities may exceed guidance levels based on national need or mission requirements. ELSs or waiver requests are required.

A5.3.3. All programs and missions are subject to GO/NO-GO decisions based on risk acceptance. The overall risk levels resulting from debris, toxic, and blast overpressure shall be accumulated and aggregated. Risk guidance levels in sections 3.2 and 3.3 are derived from the criteria shown in Table A5.1.

Table A5.1. Normally Accepted Public Collective Accident Risks.

US Hazardous Events	**Average Individual Casualty Riskper Year**	**Collective Casualty Risk per Year for Population in ER and WR Launch Area** [a]	**Equivalent Launch Collective Casualty Riskper Year**	**Launch Guidance Limits: Collective Risks per Launch**
All Accidents	7.2×10^{-2} [b]	1.8×10^{4}		
Motor Vehicle Accidents	8.0×10^{-3} [b]	2.0×10^{3}		
Air Travel Accidents	6.4×10^{-4} [c]	1.6×10^{2}		
Natural Hazards [d]	2.6×10^{-4} [e]	6.5×10^{1}		
Hypothetical Nuclear Plant Accident	4.0×10^{-6} [e]	1.0		
Aviation Overflight Accidents		1.8×10^{-2} [f]		
Max Risk Acceptable [g] for Accident in National Need Launch			1×10^{-2}	300×10^{-6} [h]
Max Risk Acceptable[g] for Accidents in Launches Unless High Management Review			1×10^{-3}	100×10^{-6} [i]

Notes:

[a] Total population of 2.5×10^{5} assumed exposed to ER or WR launch area accidents

[b] From total numbers of casualties (at least one-day disability) in *Accident Facts*, 1994, a publication of the National Safety Council, divided by US population of 2.5×10^{8}

[c] From number of fatalities in *Accident Facts*, 1994, multiplied by 200, approximately the average number of casualties (at least one-day disability) experienced in the US for each

accident fatality experienced

[d] Lightning, tornadoes, hurricane (earthquake negligible)

[e] From *Reactor Safety Study*, WASH-1400/NUREG-75/014, 1975

[f] From Philipson, Lloyd L., *Refined Estimate of the Risk from Aviation Accidents to the Population in the CCAS Area of Concern*, ACTA Inc., Report No. 94-297/46-01, September 1994 (estimates derived for the ER; assumed to be applicable to the WR as well)

[g] If the risk is > 100 x 10^{-6} but < 300 x 10^{-6}, a SW/CC waiver is required. If the risk is >300 x 10^{-6} but < 3,000 x 10^{-6}, in addition to the SW/CC waiver, the 14 AF/CC shall be notified of the risk. If the risk is > 3,000 x 10^{-6}, in addition to the SW/CC waiver and notifying the 14 AF/CC, approval shall be obtained from the AFSPC/CC

[h] At most one such launch per year assumed for calculation purposes only. In practice, there is no such limit

[i] Per RCC 321: A casualty is a serious injury or worse, including death to a human

A5.3.4. The following risk acceptability criteria are provided as guidance for the SW/CC and as planning information for Range Users.

A5.3.5. The aggregated risk to all members of the general, public, including personnel on identified ships, shall be Ec $\leq$ 100 x 10^{-6}. The risk to personnel on other ships and aircraft beyond the Range's surveillance area shall be mitigated through the development of hazard zones and implementation of area clearance measures. FAA-licensed/permitted launches shall meet FAA and AFSPC risk criteria. The standard acceptable risk criteria apply separately to the launch and reentry phases of flight IAW RCC 321.

A5.3.6. The acceptable risk criteria in this manual are for the aggregated risk from all hazards associated with an operation. The range may require a lower launch risk criteria for toxic release to ensure that acceptable exposure concentrations for the general public are not exceeded. For example, the ER has placed a cap of 30 x 10^{-6} expected casualties for the general public for a toxic release based on a Monte Carlo analysis of toxic risk for each launch vehicle, considering varying weather profiles, and presenting an assessment of the toxic concentration levels to which the general public is exposed. The ER determined that the toxic concentration levels will not exceed the appropriate level of concern for the general public if the collective risk is limited to 30 x 10^{-6} or less with mitigations that include reverse 911 that facilitate shelter-in-place and evacuations. Since the results are dependent on many factors, such as the location, size, and other characteristics of the surrounding population centers, a similar analysis may not yield the same result at other ranges. Therefore each range should determine the applicable allowable toxic exposure limits that are acceptable to the Range Commander, federal, state, and local governments.

A5.3.7. Acceptable risk to an individual member of the general public is $\leq$ 1 x 10^{-6} expected casualties.

A5.3.8. Acceptable risk to an individual launch-essential person is $\leq$ 10 x 10^{-6} expected casualties.

A5.3.9. Ship Protection:

A5.3.9.1. General Public Ship Criteria. The term "ship" includes boats and watercraft of all sizes. A contour shall be developed based on the probability of impact of debris capable of causing a casualty exceeding 1×10^{-5} for general public ships of various sizes. If the probability of impact contour does not define a finite area, then the hazard area shall be based on the three-sigma dispersion area that provides 99 percent confidence of containment of the planned debris impacts. Risk to personnel on identified ships shall be calculated and summed with the general public aggregated risk for all other hazards from liftoff through orbital insertion.

A5.3.9.2. Launch Essential Ship Criteria. A contour shall be developed based on the probability of impact of debris capable of causing a casualty exceeding 10×10^{-5} for launch essential ships of various sizes. If the probability of impact contour does not define a finite area, then the hazard area shall be based on the three-sigma dispersion area that provides about 99 percent confidence of containment of the planned debris impacts. Risk to personnel on identified ships shall be calculated and summed with the launch essential aggregated risk for all other hazards from lift off until orbital insertion.

A5.3.10. Aircraft Protection.

A5.3.10.1. General Public Aircraft Criteria. General public aircraft will be restricted from hazard volumes of airspace where the probability of debris capable of causing one or more casualties for a representative aircraft exceeds 1×10^{-6}.

A5.3.10.2. Launch Essential Aircraft Criteria. Launch essential aircraft will be restricted from hazard volumes of airspace where the probability of debris capable of causing one or more casualties for an aircraft exceeds 10×10^{-6}.

A5.4. Risk Assessment Approach and Policy.

A5.4.1. The overall risk assessment approach at AFSPC ranges is to accumulate the risks (both in the launch area and down range/overflight) due to the various hazards (debris, blast and toxics) and then aggregate the risks for all hazards. The standard acceptable risk criteria apply separately to the launch and reentry phases of flight IAW RCC 321 and AFSPCMAN 91-710, Volume 2. Refer to the definitions of terms for an explanation of accumulated and aggregated risks. Each hazard risk is treated separately and then aggregated to assess the overall risk to each population category.

A5.4.2. Aggregated Hazard Risks when Ec is $>100 \times 10^{-6}$ through $10{,}000 \times 10^{-6}$. This level of risk may require the Range User to take additional measures to protect personnel and resources. Examples include fix/correct/improve existing non-compliances, improve risk analyses to reduce the level of uncertainty, require a day-of-launch risk analysis, establish disaster aversion criteria. SW/CCs, based on their assessment of national need, may approve launches/grant a waiver when Ec $>100 \times 10^{-6}$ through $10{,}000 \times 10^{-6}$. However, the SW/CC shall notify the 14 AF/CC before allowing launches that exceed an Ec of 1000×10^{-6}. FAA-licensed/permitted launches must comply with FAA (14 CFR Part 400 series, Commercial Space Transportation) and AFSPC risk criteria.

A5.4.3. Aggregated Hazard Risks when Ec $>10{,}000 \times 10^{-6}$. This level of risk may require the Range User to take additional measures to protect personnel and resources. Examples include fix/correct/improve existing non-compliances, improve risk analyses to reduce the level of uncertainty, require a day-of-launch risk analysis, establish disaster aversion criteria.

AFSPC/CC must approve any launch when the Ec exceeds 10,000 x10^{-6}. FAA-licensed/permitted launches must comply with FAA (14 CFR Part 400 series, Commercial Space Transportation) and AFSPC for FAA risk criteria requirements.

A5.4.4. Acceptable Aggregated Risk Level Criteria for All Hazards:

A5.4.4.1. Aggregate Risk to the General Public. Aggregate risk refers to the risk to the general public from all hazards. The risk criteria apply separately to the launch and reentry phases of flight IAW RCC 321. The acceptable risk criteria for the launch or reentry shall be Ec $\leq$ 100 x 10^{-6}.

A5.4.4.2. Aggregate Risk to Essential Personnel. Acceptable aggregate risk to launch-essential and NOP from all hazards is Ec $\leq$ 300 x 10^{-6}. The risk criteria apply separately to the launch and reentry phases of flight IAW RCC 321.

A5.4.5. Accumulated Risk Criteria. Accumulated risk is the combined collective risk to all individuals exposed to a particular hazard through all phases of an operation/flight. For the flight of an orbital launch vehicle, risk is accumulated from liftoff through orbital insertion. For the flight of a suborbital launch vehicle, risk is accumulated from liftoff through the impact of all pieces of the launch vehicle, including any payload. The various levels of hazard risks are described below.

A5.4.5.1. Accumulated Hazard Risks. Acceptable accumulated hazard risks (risk to all individuals from a single hazard) is Ec < 30 x 10^{-6}. This level of risk is acceptable if supported by established standardized risk analyses approved by Wing Safety. Established standardized risk analysis refers to analysis that meets the requirements outlined in this publication. A standardized risk analysis allows for a side-by-side comparison of programs.

A5.4.5.2. Accumulated Hazard Risks (risk to all individuals from a single hazard) that exceed Ec > 30 x 10^{-6}. This level of risk may require the Range User to take additional measures to protect personnel and resources. Examples include fix/correct/improve existing non-compliances, improve risk analyses to reduce the level of uncertainty, require a day-of-launch risk analysis, establish disaster aversion criteria. Wing Safety is the approval authority for accumulated hazard risks when Ec is > 30 x 10^{-6} through 100 x 10^{-6}. Although the acceptable limit for all accumulated hazard risks is 100 x 10^{-6} with Wing Safety approval, an individual hazard could potentially be close to that value if all other hazards are only marginal contributors to the aggregate risk. **Exception**: An exception to this would be the toxic risk contribution that is limited or capped (e.g., 30 x 10^{-6} at the ER).

A5.5. Risk Analysis.

A5.5.1. AIS level 3 shall be used to quantify casualties in risk analysis models.

A5.5.2. Risk analysis can be conducted using a two-tiered approach. The tiering approach allows Range Users to initially employ relatively simple metrics to establish a casualty from each hazard (debris, blast overpressure and toxics). If the range determines that the result of the first tier (relatively simplistic and moderately conservative) risk analysis demonstrates adequate safety, no further analysis is required. However, if the tier 1 analysis is determined by Wing Safety to be too risky, Wing Safety shall perform a tier 2 (sophisticated) risk

analysis. The tier 1 thresholds reflect 1 percent probability of exposure of personnel to values exceeding deterministic threshold values for each of the hazards.

A5.5.2.1. Hazard Parameters

A5.5.2.1.1. Debris

A5.5.2.1.1.1. Two screens shall be used for a tier 1 debris risk analysis. The first screen is 11 foot-pounds for a casualty due to blunt trauma for the general public (in the open) due to a typical launch vehicle debris impact for both the launch area and downrange/overflight. The second screen shall account for a casualty due to a penetrating injury for the general public (in the open) due to a typical launch vehicle debris impact for both the launch area and down range/overflight. The second screen shall be based on a penetration injury threshold level of 8 foot-pounds per inch squared that will be defined by Wing Safety during tailoring discussions.

A5.5.2.1.2. Blast Overpressure

A5.5.2.1.2.1. Two criteria shall be used for a tier 1 blast overpressure risk analysis. The first criterion is 1 psi for a casualty due to a blast load following a launch vehicle accident for both the launch area and down range/overflight. The second criterion is fragment throw distance for ships and boats. Range Users shall calculate a fragment throw distance for ships and boats using 1.0 psi for ships and 1/2 psi for boats.

Attachment 6

MAKING CHANGES TO AFSPCMAN 91-710

A6.1. Introduction.

A6.1.1. Purpose. Changing the publication provides a means for keeping the publication current as new technology and processes develop while allowing for internal and external technical reviews.

A6.1.2. Content. This attachment describes the process for submitting changes to this publication. These changes shall be global in nature and are not intended to address technical changes that are related to specific and unique program issues. For specific and unique program issues changes refer to **Attachment 2**.

A6.1.3. Applicability. The publication change process is applicable to all Range Users and range organizations that are responsible for establishing and enforcing Range User requirements.

A6.2. Change Process. Changes to AFSPCMAN 91-710 shall be submitted using the wing provided Change Request Form. Only one change is allowed per Change Request Form and that change is required to stand alone regarding specific subject matter and paragraph number. A sample of this form may be found in the Eastern and Western Range 127-1, Range Safety Requirements, ***Range User Handbook***. While the Change Request Form is preferred, alternative formats may be accepted so long as all the following required information is included. In such cases, Wing Safety will normally initiate a single form as a cover sheet for the received change request. Changes made by "revision-in-text" mode are strongly discouraged.

A6.2.1. Completing Change Requests. Change Requests shall include the following information:

A6.2.1.1. Date of request.

A6.2.1.2. Name of originator.

A6.2.1.3. Name of company or agency.

A6.2.1.4. Address of company or agency.

A6.2.1.5. E-mail address, telephone number and fax number, as applicable.

A6.2.1.6. The numeric designation of the affected paragraph.

A6.2.1.7. The text for the suggested change.

A6.2.1.8. The rationale for the suggested change.

A6.2.2. Submitting Changes to AFSPCMAN 91-710. Organizations desiring to submit proposed changes to AFSPCMAN 91-710 (any volume) shall complete a Change Request Form (CRF), available from the Wing Safety offices. Submit a single Change Request Form for each proposed change to either the 45 SW/SE Office of the Chief of Safety, Systems Engineering Support (1201 Edward H. White Street, Patrick Air Force base, Florida 32925-3238) or the 30 SW/SEAL, Launch Vehicle Safety (806 13th Street, Suite 3, Vandenberg Air Force Base, California 93437-5230). CRFs may also be submitted electronically via the

following Wing Safety e-mail address: **ewr1271@patrick.af.mil.** The 30 SW/SEAL shall forward copies of all CRFs to the 45 SW/SE.

A6.2.3. Disposition of Change Requests.

A6.2.3.1. The 45 SW/SE is designated as the lead range for administratively processing changes to all volumes of AFSPCMAN 91-710. CRFs shall be submitted IAW section A5.2.2 above. The 45 SW/SE shall assign each CRF with a unique identifiable tracking number. After receipt, the 45 SW/SE, in conjunction with 30 SW/SE, shall develop a joint 30/45 SW/SE recommended disposition, record this disposition on the CRF and forward the CRF to HQ AFSPC/SEK. If the 30 SW/SE and 45 SW/SE cannot reach agreement on a joint recommended disposition, the 45 SW/SE shall forward the CRF containing the recommended dispositions of both the 30 SW/SE and 45 SW/SE to HQ AFSPC/SEK for resolution. After consulting with both wings, HQ AFSPC/SEK shall issue the final CRF disposition.

A6.2.3.2. The disposition of Change Requests falls into the following three categories:

A6.2.3.2.1. Approved. The reviewer approves the proposed changed as suggested by the submitter.

A6.2.3.2.2. Approved with Comments. The reviewer submits proposed revised wording of the proposed change as well as rationale for the revision.

A6.2.3.2.3. Disapproved. Rationale for not accepting the proposed change will be provided.

Attachment 7

GENERIC PAYLOAD POLICY AND APPROVAL REQUIREMENTS

A7.1. Generic Payloads. Many payload systems are generic, meaning they are built on identical bus structures, they launch on a standard launch vehicle and use standard range processing prelaunch and launch procedures. If requested by a Range User and upon completion of the initial payload bus/launch vehicle processing/launch cycle, a Wing Safety approved baseline shall be established identifying the program as a generic payload program. These generic payload systems result in few changes to the baseline system and the payload/launch vehicle or payload/RV ground processing safety data remains basically the same from one mission to the next. The interactive process between Wing Safety, payload (bus) manufacturers and launch vehicle companies or government agencies (Range Users) described in this attachment has been developed to reduce the cost and time required for the approval process while satisfying the required Launch Safety requirements.

A7.1.1. Policy. To take advantage of previously approved generic payload/launch systems and their associated ground processing safety data, the policies described below shall be followed; however, they may be modified to meet individual program requirements:

A7.1.1.1. Wing Safety and the Range User shall conduct initial planning meetings to establish a generic payload/launch system approval process.

A7.1.1.2. Once a baseline payload/launch system has been approved, Wing Safety efforts will focus on specific changes for each new program or mission. Existing and ongoing previously approved components, systems and subsystems need not be resubmitted as part of data packages for review and approval.

A7.1.1.3. Wing Safety and the Range User shall conduct a safety assessment of each new program or mission to define changes and/or additions that create new uncontrolled hazards or that increase risks significantly.

A7.1.1.3.1. Based on the joint safety assessment, the parties shall agree on the minimum required changes and/or documentation to be submitted to Wing Safety for review and approval.

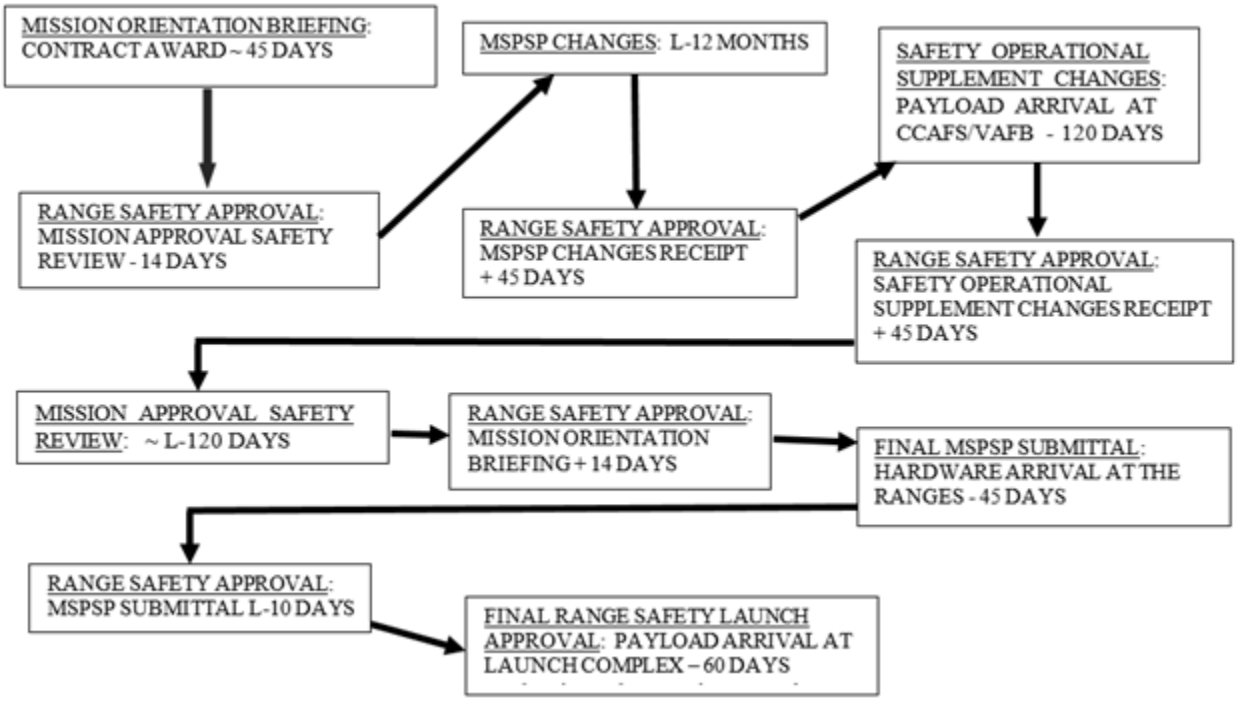
A7.1.1.3.2. Data submittal and Wing Safety response times shall be established based on the joint safety assessment and modified only upon agreement of all parties.

A7.1.1.4. The goal of the generic payload approval process is to achieve final Wing Safety approval at least 60 calendar days before payload arrival on the launch complex.

A7.2. Approval Process for Existing Payload Buses. For existing payload buses with approved baseline MSPSPs, Accident Risk Assessment Reports (ARARs), SARs, GOPs and hazardous and safety critical procedures, the goal is to grant baseline approvals for generic buses during the first mission, after a request for generic status by a Range User and upon implementation of this approach. Subsequent flights would use the joint assessment process to review and approve changes to the generic bus and/or payload additions for specific missions. Key to the approach is the safety assessment that is used to determine whether changes or additions have created any new uncontrolled hazards or increased the risks significantly. The assessment results will be used to determine changes (if any), data required and review and

approval requirements. The approval process for existing payload buses is shown in Figure A7.1 and described below:

Figure A7.1. Approval Process for Existing Payload Buses.



A7.2.1. Launch Services and Mission Orientation Briefing:

A7.2.1.1. A launch services and mission orientation safety briefing shall be presented to Wing Safety approximately 45 days after contract award for the mission. The briefing shall cover the following topics:

A7.2.1.1.1. Changes to the launch vehicle or RV.

A7.2.1.1.2. Changes to the payload bus.

A7.2.1.1.3. Planned payload additions for the mission.

A7.2.1.1.4. Changes to hazardous systems and operations (the focus of this review).

A7.2.1.2. Wing Safety concurrence for both the mission concept and schedule for the remaining Wing Safety milestones shall be provided during the mission orientation safety briefing or within 14 calendar days after the briefing.

A7.2.2. Data Review and Approval:

A7.2.2.1. Mission Unique Missile System Prelaunch Safety Package:

A7.2.2.1.1. An MSPSP, ARAR or SAR shall be delivered approximately 12 months before launch and contain the data requirements identified during the mission orientation safety briefing on the changes to the launch vehicle and payload unique for the mission and identified in the initial operation's concept review.

A7.2.2.1.2. Wing Safety shall provide responses within 45 calendar days after receipt of the data package.

A7.2.2.2. GOP and Hazardous and Safety Critical Procedures:

A7.2.2.2.1. A GOP supplement describing changes to approved operations and/or new or modified safety critical or hazardous procedures shall be delivered to Wing Safety approximately 120 days before payload arrival on the range. This supplement is required only if changes have been made to operations and procedures that affect hazardous levels or risks.

A7.2.2.2.2. Wing Safety shall provide responses within 45 calendar days after receipt of the data.

A7.2.3. Mission Approval Safety Review

A7.2.3.1. A mission approval safety review shall be conducted at approximately L-120 days to obtain Wing Safety approval for launch vehicle and payload processing, transport of the payload to the launch pad, payload mate to the launch vehicle and launch pad payload processing. For RVs and payloads returning from space, this chapter also applies and, if required, appropriate approval shall be obtained.

A7.2.3.2. Unless there are significant issues, Wing Safety shall provide mission safety approval 14 calendar days after the safety review.

A7.2.4. Final Launch Approval. Final approval to proceed with launch vehicle and payload processing up to beginning the final countdown shall be provided by Wing Safety at least 60 days before payload arrival at the launch complex. Flight plan approval for a mission that involves public safety may not be granted until just before the LRR depending on the complexity of the public safety issue encountered. For example, typically, at the ER, easterly launch azimuths can be approved at least 120 days before launch; on the other hand, high inclination launches may require extensive risk analyses that can delay final flight plan approval until just before the LRR.

A7.3. Approval Process for New Payload Buses. For new payload buses, the Range User shall submit a request for generic status at PI. The Range User shall then comply with the tailored requirements of this publication for the program. Wing Safety shall evaluate the initial mission processing and associated data and grant baseline approval as a generic bus. Subsequent flights would follow the requirements set out in A6.2 for existing payloads.

A7.4. Incidental Launch Safety Issues. Incidental Launch Safety issues such as component failures, test failures and the discovery of unforeseen hazards occurring after baseline approvals shall be worked in real time as part of the final approval process for individual launch requirements. ELS or waiver requests are required.

Attachment 8

LAUNCH COMPLEX OPERATIONS SAFETY PROGRAM

A8.1. Introduction.

A8.1.1. Purpose. This attachment provides 30 SW/SE and/or 45 SW/SE operational safety training and certification requirements for launch complex safety. These requirements shall be used by Range Users who wish to assume control authority for launch complex safety. These requirements may be jointly tailored by the Range User and Wing Safety to meet special or unique program requirements IAW **Attachment 2**. Minimum standards, roles and responsibilities for a launch complex safety program are defined in this attachment. The provisions of this attachment may also apply to a recovery site, provided the recovery site is separate from the recovery area. The recovery area remains under control of the SW/CC. The recovery site must be a specifically defined geographic area or facility capable of being controlled by the Operator and not fouling or otherwise impeding the functionality of the recovery area.

A8.1.2. Applicability. The requirements in this attachment apply to all full-time government tenant organizations, single FAA-licensed users or USAF squadron/detachments that assume launch complex SCA and responsibility for hazardous procedures identified by Wing Safety as *launch complex safety* operations. Responsibilities and authorities are defined in AFSPCMAN 91-710 volumes 1 and 6.

A8.2. Launch Complex Operations Safety Program General Requirements:

A8.2.1. The Range User shall establish and maintain a launch complex operations safety program to support efficient and effective achievement of overall operations safety objectives. The safety training and certification program shall be referred to as the Launch Complex Operations Safety Program.

A8.2.2. The Range User shall implement the requirements defined in this attachment using a Range User-prepared Operations Safety Training and Certification Plan.

A8.2.3. Launch Complex Safety Training and Certification Requirements:

A8.2.3.1. The control authority shall implement a Launch Complex Safety Training and Certification Plan IAW the Launch Complex Safety Training and Certification Requirements available from the Wing Safety Offices.

A8.2.3.2. The Launch Complex Safety Training and Certification Plan process includes the following steps:

A8.2.3.2.1. Wing Safety and the control authority jointly tailor the subject document.

A8.2.3.2.2. The control authority submits a plan to comply with the subject document.

A8.2.3.2.3. The Chief of Safety reviews and serves as approval authority for the plan.

A8.2.3.2.4. The complex control authority safety plan shall include qualification and certification documentation of personnel performing the safety function for review and approval by the Chief of Safety.

A8.2.3.2.5. Wing Safety shall audit launch complex safety procedures and processes as necessary.

A8.2.4. Safety Management System. The Range User shall establish and maintain a safety management system to implement provisions of this attachment. The launch complex SCA shall be responsible for the following:

A8.2.4.1. Establishing, controlling, incorporating, directing and implementing the launch complex operations safety program.

A8.2.4.2. Establishing internal reporting systems and procedures for investigation and disposition of launch complex safety operations mishaps and incidents, including potentially hazardous conditions not yet involved in a mishap or incident and reporting such matters to Wing Safety; preparing and maintaining an Accident Reporting Plan.

A8.2.4.3. Reviewing and approving launch complex safety hazardous procedures.

A8.2.5. Launch Complex Operations Safety Personnel Responsibilities and Qualifications:

A8.2.5.1. Safety Manager:

A8.2.5.1.1. Safety Manager Responsibilities. The Range User shall establish and maintain a launch complex operations safety manager directly responsible to the launch complex SCA. At a minimum, the Range User safety manager shall be responsible for the following:

A8.2.5.1.1.1. Approving all launch complex safety operations analyses, reports and documentation.

A8.2.5.1.1.2. Approving all launch complex safety hazardous procedures and verifying they comply with federal (OSHA/Environmental Protection Agency [EPA]) operation requirements and the requirements of AFSPCMAN 91-710, particularly those defined in volumes 1, 3, 5 and 6.

A8.2.5.1.2. Safety Manager Qualifications. The launch complex safety operations safety manager shall have a minimum of 10 years of applicable managerial or supervisory experience including at least 7 years of experience in 3 of the 4 functional areas listed below. A Bachelor of Science in Engineering and a Certified Safety Professional (CSP) or Professional Engineer (PE) are also required.

A8.2.5.1.2.1. Large missile, space vehicle, rocket, torpedo, prelaunch, launch, post-launch operations and/or recovery operations.

A8.2.5.1.2.2. System safety hazard analysis and/or design or research and development testing of ordnance, explosives, other types of munitions, pyrotechnics, cryogenic, toxic/hypergolic propellants, high pressure gases, radioactive materials or other hazardous systems/components.

A8.2.5.1.2.3. Nuclear safety and/or ionizing/non-ionizing radiation safety hazard analysis and/or design or research and development testing.

A8.2.5.1.2.4. Preparation and/or review and approval of hazardous operating procedures for space vehicle, missile and/or weapons systems.

A8.2.5.2. Safety Personnel:

A8.2.5.2.1. Safety Personnel Responsibilities. Safety personnel shall be directly responsible to the launch complex safety operations safety manager. At a minimum, Range User launch complex safety personnel shall be responsible for the following:

A8.2.5.2.1.1. Preparing and/or reviewing launch complex safety operations analyses, reports and documentation.

A8.2.5.2.1.2. Performing a detailed safety engineering review of launch complex safety hazardous procedures to ensure compliance with federal (OSHA/EPA), state or local operation requirements and the requirements in AFSPCMAN 91-710, particularly those defined in volumes 1, 3, 5 and 6.

A8.2.5.2.1.3. Performing safety, surveillance and monitoring of all launch complex safety hazardous operations.

A8.2.5.2.2. Safety Personnel Qualifications. Launch complex safety personnel shall meet rigid qualification standards and shall be fully experienced, trained and certified to perform launch complex safety duties.

A8.2.5.2.2.1. All safety personnel shall have at least four years of applicable experience in at least three of the four functional areas identified in A8.2.5.1.2.

A8.2.5.2.2.2. Personnel who prepare or provide detailed safety engineer review of launch complex safety analyses, reports, documentation and hazardous procedures shall have a Bachelor of Science degree in Engineering and a CSP or PE.

A8.2.5.2.2.3. The launch complex safety work force shall be composed of and have the following levels of experience. An engineering degree may be used to satisfy three years of the required experience or an equivalent combination of education, experience and training may be deemed acceptable by the 30 SW/SE or 45 SW/SE.

A8.2.5.2.2.3.1. At least 30 percent shall have more than eight years of applicable experience in at least three of the four functional areas identified in A8.2.5.1.2.

A8.2.5.2.2.3.2. An additional 50 percent shall have at least six years applicable experience in at least three of the four functional areas identified in A8.2.5.1.2.

A8.2.5.2.2.3.3. An additional 10 percent shall have at least four years applicable experience in at least three of the four functional areas identified in A8.2.5.1.2.

A8.2.5.2.2.3.4. The remaining 10 percent may be trainees.

A8.2.6. Launch Complex Operations Safety Personnel Training Requirements. The launch complex safety operations safety manager and safety personnel shall have initial and/or refresher training in the following areas every three years:

A8.2.6.1. Recognition of launch complex safety hazards including:

A8.2.6.1.1. Overhead and mobile crane and hoists.

A8.2.6.1.2. Slings.

A8.2.6.1.3. Handling structures.

A8.2.6.1.4. Personnel work platforms.

A8.2.6.1.5. Acoustic hazards.

A8.2.6.1.6. Non-ionizing radiation.

A8.2.6.1.7. Laser systems.

A8.2.6.1.8. Ionizing radiation sources.

A8.2.6.1.9. Hazardous materials.

A8.2.6.1.10. Airborne and ground pressure systems.

A8.2.6.1.11. Airborne and ground cryogenic systems.

A8.2.6.1.12. Airborne and ground hypergolic systems.

A8.2.6.1.13. Airborne and ground ordnance systems.

A8.2.6.1.14. Solid propellants.

A8.2.6.1.15. Airborne and ground electrical and electronic equipment.

A8.2.6.1.16. Motor vehicles.

A8.2.6.1.17. Forklifts.

A8.2.6.1.18. Computer controlled systems such as cranes and robots.

A8.2.6.1.19. Facilities.

A8.2.6.2. Failure modes for launch complex systems including cause and effect.

A8.2.6.3. Preventive and control measures for launch complex safety hazards.

A8.2.6.4. Safety devices for launch complex systems.

A8.2.6.5. Protective equipment.

A8.2.6.6. Monitoring and warning devices for launch complexes.

A8.2.6.7. Operations hazards analysis techniques.

A8.2.6.8. Human engineering principles.

A8.2.6.9. Emergency procedures.

A8.2.6.10. Hazardous procedures approval and ELS process.

A8.2.6.11. Preparation and handling of hazardous materials.

A8.2.6.12. Federal (OSHA/EPA), state, local and Air Force (AFSPCMAN 91-710, particularly those in volumes 1, 3, 5 and 6) hazardous operations requirements.

A8.2.6.13. Accident investigations.

A8.2.6.14. Non-destructive examination techniques.

A8.2.6.15. Single failure point analysis

A8.2.7. Compliance. Compliance with all launch complex safety operations requirements of federal (OSHA/EPA), state and/or local regulations and AFSPCMAN 91-710 (particularly those defined in volumes 1, 3, 5 and 6) is mandatory. When the Range User launch complex safety operations safety program plan is approved by Wing Safety, it provides a basis of understanding between the Range User and Wing Safety as to how the launch complex operations safety program will be accomplished.

A8.2.8. Conflicting Requirements. When conflicting requirements or deficiencies are identified in launch complex operations safety program requirements or with other program requirements, the Range User shall submit notification with proposed solutions or alternatives and supporting rationale to Wing Safety for resolution.

A8.3. Foundation of Launch Complex Operations Safety Program. The requirements for the foundation of a launch complex operations safety program are as follows:

A8.3.1. Establishing and executing a launch complex operations safety program which meets the tailored requirements of this attachment.

A8.3.2. Developing and maintaining a planned approach for safety task accomplishment, providing qualified people to accomplish the tasks, establishing the authority for implementing the safety tasks through all levels of management and allocating appropriate resources, both manning and funding, to ensure the safety tasks are completed.

A8.3.3. Establishing and maintaining a launch complex operations safety organization with designated functional responsibilities, interfaces and lines of communication within and throughout the program organization and with associated organizations (government and contractor).

A8.3.4. Designating the organizational unit responsible for executing each safety task.

A8.3.5. Establishing the authority for resolution of identified launch complex operational hazards.

A8.3.6. Defining launch complex operational safety program milestones and relating these to major program milestones, program element responsibility and required inputs and outputs.

A8.3.7. Establishing an incident alert and notification, investigation and reporting process, to include notification of Wing Safety.

A8.3.8. Establishing and executing a launch complex safety operations safety program that complies with the following:

A8.3.8.1. Launch complex safety operation requirements in AFSPCMAN 91-710, particularly those defined in volumes 1, 3, 5 and 6.

A8.3.8.2. As applicable, Title 29 CFR, OSHA. Range Users (contractors/licensed launch operators/foreign entities) are fully responsible for the safety and health of their employees IAW OSHA regulations.

A8.3.8.3. As applicable, AFI 91-202 and AFI 91-203. Air Force organizations and personnel are required to comply with AFI 91-202, AFI 91-203, and all DoD safety and health requirements. Other DoD and federal government agency personnel shall comply with their applicable safety and health requirements.

A8.4. Launch Complex Operations Safety Program Plan:

A8.4.1. The Range User shall develop a launch complex operations safety program plan (LCOSPP) that describes the tasks and activities of launch complex safety operations safety management and safety personnel required to identify, evaluate, eliminate and control launch complex operations hazards. It shall identify the launch complex SCA and define the responsibilities and authorities of each of the program organizations functional positions with safety program responsibilities, including the safety manager.

A8.4.2. The approved plan shall account for all AFSPCMAN 91-710 (particularly those in volumes 1, 3, 5 and 6) and federal, state and local regulations pertaining to launch complex safety operations on an item-by-item basis.

A8.4.3. The Range User shall submit a draft LCOSPP to Wing Safety for review and approval within 90 days of the date the Range User wishes to assume control authority for launch complex safety operations.

A8.4.4. The LCOSPP shall include the following sections:

A8.4.4.1. Launch Complex Operations Safety Organization**.** The Organization section shall describe the following:

A8.4.4.1.1. The launch complex operations safety organization and any other program functional organization with safety program responsibilities, using charts to show the organizational and functional relationships and lines of communication.

A8.4.4.1.2. The organizational relationship between other functional elements having responsibility for tasks with launch complex safety operations impacts and the launch complex operations safety organization.

A8.4.4.1.3. Preparation and/or review and approval authority of applicable tasks by launch complex operations safety.

A8.4.4.1.4. The responsibility and authority of launch complex operations safety personnel, other Range User organizational elements involved in the launch complex safety effort, support contractors and system safety groups.

A8.4.4.1.5. A description of the methods by which safety personnel or other program personnel may raise issues of concern directly to the control authority, program manager or the program manager's supervisor within the organization.

A8.4.4.1.6. Identification of the organizational unit responsible for performing each task.

A8.4.4.1.7. Identification of the authority responsible for resolving launch complex safety operations hazards.

A8.4.4.1.8. The staffing of the launch complex operations safety organization for the duration of the program including personnel loading and a summary of the

qualifications of safety personnel assigned to the effort, including those who possess coordination and approval authority.

A8.4.4.1.9. The process by which Range User management decisions are made, including such decisions as timely notification of unacceptable risks, necessary action, incidents or malfunctions, and waivers to operations safety requirements.

A8.4.4.1.10. Details of how resolution and action relative to launch complex operations safety will be accomplished at the program management level possessing resolution authority. Attachment 2 contains additional guidance.

A8.4.4.2. Launch Complex Operations Safety Program Plan Milestones. The LCOSPP shall:

A8.4.4.2.1. Provide a program schedule of safety tasks, including start and completion dates, reports and reviews. This should be an attachment that can be updated as program schedules change.

A8.4.4.2.2. Identify subsystem, component and software safety activities as well as integrated system level activities such as design analyses, tests and demonstrations applicable to the launch complex operations safety program but specified elsewhere to avoid duplication. Attachment 2 contains additional guidance.

A8.4.4.3. LCOSPP Data. The LCOSPP shall provide the following data:

A8.4.4.3.1. A list of all analyses, reports and documentation used by safety personnel to review and approve hazardous launch complex safety procedures and execute the safety program.

A8.4.4.3.2. A list of all hazardous procedures categorized as launch complex safety procedures by Wing Safety.

A8.4.4.3.3. The procedures for accessibility of the data by Wing Safety and for retention of the data for historical and legal requirements.

A8.4.4.4. Interfaces. The LCOSPP shall identify the following interfaces in detail:

A8.4.4.4.1. The interface between launch complex operations safety and all other applicable safety disciplines such as nuclear safety, Launch Safety, explosive and ordnance safety, chemical and biological safety and laser safety.

A8.4.4.4.2. The interface between launch complex operations safety, program management, systems engineering, systems safety engineering and all other support disciplines such as maintainability, quality control, reliability, software development, human factors engineering and medical support (health hazards assessments).

A8.4.4.4.3. The interface between launch complex operations safety and all system integration and test disciplines; Attachment 2 contains additional guidance.

A8.4.4.5. Internal Reviews and Audits. The LCOSPP shall describe the procedures for accomplishing the following:

A8.4.4.5.1. Annual review of the launch complex operations safety program to verify compliance, relevancy, adequacy and ensure documentation is current.

A8.4.4.5.2. Launch complex safety management and operational reviews (self-audits) to identify program deficiencies and ensure safety program effectiveness.

A8.5. Launch Complex Operations Safety Hazards Analysis. The Range User shall perform and document the following safety hazard analyses IAW the requirements specified in **Attachment 3**:

A8.5.1. A Launch Complex Safety O&SHA IAW the requirements in **Attachment 3**.

A8.5.2. Safety analyses of Engineering Change Proposals (ECPs), Specification Change Notices (SCNs), Software Problem Reports (SPRs), Program or Software Trouble Reports (PTRs, STRs) and requests for AFSPCMAN 91-710 (Volume 6) waiver to determine the launch complex safety impact on the system IAW the requirements in **Attachment 3**.

A8.5.3. A safety compliance assessment to identify and verify compliance with Air Force, federal, state, local and industry codes to ensure that the hazardous systems are being operated properly IAW the requirements of **Attachment 3.**

A8.6. Wing Safety Audits:

A8.6.1. Launch complex safety audits shall be conducted by Wing Safety on a periodic basis.

A8.6.2. The audit shall measure the status of each safety task, interrelationship between safety and other program disciplines, identification and implementation of safety requirements/criteria and documented evidence that reflects planned versus actual safety accomplishment. Each audit shall evaluate program milestones, safety program milestones and incompatibilities that require remedial corrective action.

A8.6.3. The Range User shall initiate corrective actions where deficiencies and incompatibilities are revealed by the audits.

A8.6.4. Components, equipment, conditions, designs or procedures that provide unusual safety problems shall be audited.

A8.6.5. Audits shall include verification or corrective action on problems revealed by previous audits.

A8.6.6. The Range User shall support these Wing Safety audits by providing access to documentation that substantiates compliance with federal, state, local and AFSPCMAN 91-710 (particularly Volume 6) launch complex operations safety requirements.

A8.7. 30 SW/45 SW Safety Program Approval. The Range User launch complex operations safety program shall be approved by the 30 SW/CC or 45 SW/CC, as appropriate, once the following tasks have been accomplished:

A8.7.1. The Range User shall submit a letter to the SW/CC stating that they wish to exercise control authority over launch complex safety operations.

A8.7.2. The Range User shall identify those launch complex safety operations/procedures they wish to have control authority for and provide this list to Wing Safety.

A8.7.3. Wing Safety shall identify those operations/procedures that can be classified as launch complex safety operations.

A8.7.4. The Range User and Wing Safety will jointly tailor this attachment and AFSPCMAN 91-710 volumes 1 and 6.

A8.7.5. The Range User shall prepare the launch complex operations safety program plan and submit it to Wing Safety for review and approval.

A8.7.6. The Range User shall prepare operating hazards analyses (as required) and submit them to Wing Safety for review and approval.

A8.7.7. The Range User control authority for launch complex safety shall submit a certification of compliance and substantiating data to Wing Safety for review and approval.

A8.8. Safety Program Decertification:

A8.8.1. As appropriate, the Range User launch complex operations safety program can be decertified by the 30 SW/CC or 45 SW/CC for the following reasons:

A8.8.1.1. The safety program, as implemented, does not comply with the range-approved launch complex operations safety program requirements.

A8.8.1.2. Internal audits or Wing Safety audits of the safety program indicate serious deficiencies that are not being corrected in a time frame acceptable to Wing Safety.

A8.8.1.3. Numerous anomalies and/or accidents caused by operational deficiencies in the safety program.

A8.8.2. 30 SW/CC & 45 W/CC actions following safety program decertification may include:

A8.8.2.1. Wing Safety and its Pad Safety group (contractor for the 45 SW/government for the 30 SW) shall assume control of launch complex safety operations.

A8.8.2.2. Launch complex safety operations shall be terminated until the safety program is approved by 30 SW/CC or 45 SW/CC, as appropriate.

Attachment 9

LAUNCH SAFETY CONCEPT-TO-LAUNCH PROCESS KEY DESCRIPTIONS

A9.1. Wing Safety Milestones. Represents distinct activities or groupings of activities in the Launch Safety approval process.

A9.2. AFSPCMAN 91-710 Milestone Volume Office of Primary Responsibility (OPR). Refers to the primary AFSPCMAN 91-710 volume in which the Launch Safety Milestone is addressed and identifies the Wing Safety Office with primary responsibility for the Launch Safety Milestone.

A9.3. Required TIM or Activity. Refers to the TIMs or activities required to achieve the Launch Safety Milestone.

A9.4. Primary Document. Refers to the primary documents or data the Range User must submit to Wing Safety for review and approval to achieve the Launch Safety Milestone.

A9.5. Approval Required Prior To. Refers to the activity that cannot be accomplished without accomplishment of the Launch Safety Milestone.

A9.6. Typical Timeframes. Refers to typical timeframes in which the Launch Safety Milestone must be initiated for new, major launch vehicle programs. These timeframes vary depending on the complexity of the program. For smaller vehicles and payloads, the timeframes can be compressed to a year or less. Timeframe requirements for Wing Safety and the Range Users throughout the publication are baselines for all programs; however, they may be altered during the tailoring process.

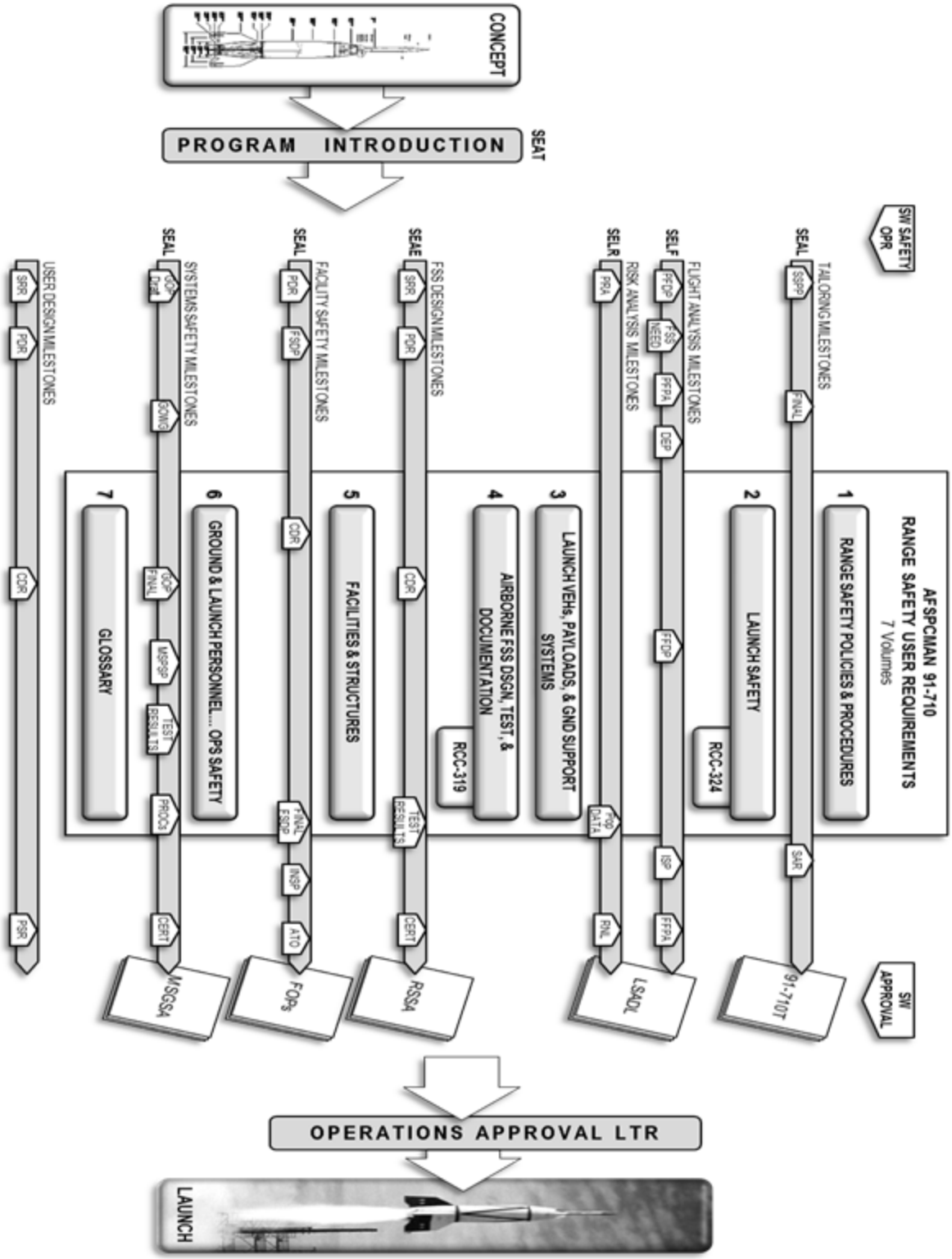



Figure A9.1. Launch Safety Concept to Launch Process.