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Safety



LAUNCH SAFETY PROGRAM POLICY

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This instruction implements Department of Defense Directive (DoDD) 3100.10, *Space Policy*, DoDD 3200.11, *Major Range and Test Facility Base (MRTFB)*, DoDD 3230.3, *DoD Support for Commercial Space Launch Activities*, Department of Defense Instruction (DoDI) 3100.12, *Space Support*, Air Force Policy Directive (AFPD) 91-1, *Nuclear Weapons and Systems Surety*, AFPD 91-2, *Safety Programs*, Air Force Instruction (AFI) 63-1201, *Assurance of Operational Safety, Suitability, and Effectiveness*, AFI 91-202_AFSPCSUP1, *The US Air Force Mishap Prevention Program*, and the *Memorandum of Agreement between the Department of the Air Force and the Federal Aviation Administration on Safety for Space Transportation and Range Activities* (Air Force/Federal Aviation Administration [AF/FAA] MOA). It defines and implements Launch Safety policy and responsibilities for Air Force Space Command (AFSPC). It identifies interfaces with other DoD, Federal Aviation Administration (FAA), and civil and commercial **Range Users**.

This instruction applies to all HQ AFSPC, subordinate, and supporting units. This instruction also applies to supporting Air Force Reserve Command and Air National Guard units when published in their respective 0-2 indexes. This instruction may be supplemented as required by subordinate units with the concurrence of HQ AFSPC/SE. Send correspondence pertaining to this instruction to HQ AFSPC/SEC, 150 Vandenberg St., Ste 1105, Peterson AFB CO 80914-4260. Maintain and dispose of records created as a result of prescribed processes in accordance with Air Force Records Disposition Schedule (RDS) which may be found on-line at <https://webrims.amc.af.mil/>.

This is the first publication of Air Force Space Command Instruction (AFSPCI) 91-701. The policies in this document substantially revise previous guidance; therefore, this new document shall be completely reviewed. This instruction pulls together requirements from many other documents that contain pieces of **Launch Safety program** direction.

1. AFSPC Launch Safety Program. AFSPC operates two Air Force-owned national **ranges** established under DoDD 3200.11, for all users having a valid need for launch and test **range** capabilities. Operation

of these MRTFB **ranges** carries with it specific responsibilities for public and Launch Safety, also known as Range Safety. This publication defines policy and requirements to meet these responsibilities.

1.1. **Purpose.** This publication establishes the AFSPC **Launch Safety program** for the Eastern and Western Launch and Test Ranges (ER and WR) operated by 45 and 30 Space Wings (45 SW and 30 SW), respectively. It implements DoD and Air Force Launch Safety policy and it defines the responsibilities and authority of agencies and **range** organizations that establish, implement, and enforce Launch Safety requirements. The goal of the **Launch Safety program** is to allow **Range Users** to conduct their missions with minimal interference while maintaining a mutual strong commitment to **public safety**.

1.1.1. This publication establishes Launch Safety policy and responsibilities to ensure that the public, **range**/third party launch area and launch complex personnel, and **range**/third party owned resources are provided an acceptable level of safety during all pre-launch, launch, post-launch, and other approved activities.

1.1.2. This publication identifies and implements AFSPC Launch Safety responsibilities and identifies the interfaces that were established to meet the requirements of the AF/FAA MOA.

1.1.3. This publication also identifies and implements responsibilities for activities relating to the Launch Safety aspects of the **Operational Safety, Suitability, and Effectiveness (OSS&E)** and the **Space Flight Worthiness (SFW)** Certification programs applicable to AFSPC procured systems.

1.1.4. Safety responsibilities of the 21 SW that affect or support the Launch Safety program are also addressed within this publication.

1.2. **Applicability.**

1.2.1. The policies, requirements, and responsibilities defined in this instruction shall be applicable to both AFSPC **ranges** and all **Range Users** conducting or supporting operations on these **ranges**. Specific policies, responsibilities, and authorities of AFSPC organizations for implementing Launch Safety requirements at the **ranges** will be described in a future Air Force Space Command Manual on Range Safety Requirements for AFSPC organizations. Specific policies, responsibilities, and authorities of AFSPC organizations for implementing Orbital and Ground Based Space **System Safety** requirements will be described in a future AFSPC instruction on Orbital and Ground Based Space System Safety Program Policy. Specific Range User policies, requirements, and approvals required for processing and launch at the **ranges** are defined in AFSPCMAN 91-710, **Range Safety User Requirements Manual**, and previous Launch Safety requirements documents such as Eastern and Western Range (EWR) 127-1, **Range Safety Requirements**. When used in this publication, the terms **range** or **ranges** refer to both AFSPC **ranges**.

1.2.2. **Range Users** include all entities who conduct pre-launch, launch, post-launch, or other approved activities that use AFSPC range facilities and test equipment.

1.3. **Responsibilities and Authorities.** The United States Air Force (USAF) as owner and operator of the ER and WR has regulatory responsibility for Range Safety. The FAA, as the licensing agency of commercial **launch operators (Range Users)**, shares this regulatory responsibility with the USAF for **FAA-licensed launches** from these **ranges**. The USAF and FAA hold all **Range Users** responsible for safe operations with respect to **public safety** and USAF or third party personnel and resources.

1.3.1. **HQ Air Force Space Command Responsibilities.** AFSPC operates and has overall responsibility for **public safety** at the **ranges**. HQ AFSPC is responsible for establishing and enforcing a Launch Safety program and its associated policies and requirements.

1.3.1.1. HQ AFSPC Directorate of Safety (HQ AFSPC/SE) Responsibilities. HQ AFSPC/SE has authority and responsibility for the oversight of the AFSPC Launch Safety program.

1.3.1.1.1. HQ AFSPC/SE shall establish, evaluate, approve, and publish, in accordance with AFSPCI 91-700, *Range Safety Publication Series* (AFSPC 91-7XX document series) policy and guidance for carrying out these responsibilities.

1.3.1.1.2. HQ AFSPC/SE shall evaluate all “tailored” versions of AFSPCMAN 91-710 requirements, including equivalent level of safety (ELS) (formerly known as meets intent certifications) determinations and waivers, for significant trends and updates to Range Safety requirements.

1.3.1.1.3. HQ AFSPC/SE shall establish and allocate **launch mishap** reporting requirements and guidance for AFSPC organizations as responsibilities transition during launch to on orbit (or planned impact) through end of launch vehicle or spacecraft life.

1.3.1.1.4. HQ AFSPC Space Safety (SEC), as the USAF Co-Chair of the Common Standards Working Group (CSWG), shall provide the direct interface between AFSPC and the FAA for establishing **common Launch Safety requirements** as identified in the AF/FAA MOA.

1.3.1.1.4.1. HQ AFSPC/SEC shall support and Co-Chair with the FAA Office of the Associate Administrator for Commercial Space Transportation (AST) the CSWG in accordance with the *Charter for the Common Standards Working Group of the United States Air Force and Federal Aviation Administration Associate Administrator for Commercial Space Transportation*.

1.3.1.1.4.2. HQ AFSPC/SEC shall support and Co-Chair with the FAA/AST the Relief Review Panel in accordance with the *Memorandum of Understanding between Air Force Space Command and Federal Aviation Administration Office of the Associate Administrator for Commercial Space Transportation for Resolving Requests for Relief from Common Launch Safety Requirements* (AF/FAA MOU for Resolving Requests for Relief). The Relief Review Panel shall review the Wing Safety disposition of relief requests and approved tailored common Launch Safety requirements documents at least annually. The review panel shall recommend changes to the **common Launch Safety requirements** to the CSWG.

1.3.1.1.4.3. HQ AFSPC/SEC and the 30 and 45 SW/SEs shall inform the FAA/AST of planned or impending changes, including additions or deletions, to Launch Safety related organizations, programs, processes, ground systems, and/or end-items.

1.3.1.1.5. HQ AFSPC/SEC shall support the **Range Users** Coordination Board and the Commercial Space Industry Leaders conferences. HQ AFSPC/SE shall inform these two groups of impending changes to Range User safety requirements.

1.3.1.1.6. HQ AFSPC/SEC shall participate with and support the Range Commanders Council’s (RCC) appropriate groups/subgroups.

1.3.2. **Space and Missile Systems Center Responsibilities.** The Space and Missile Systems Center (SMC), through its System Program Offices (SPO) and Detachments (DET), acquires and sustains Air Force space and missile systems for AFSPC or through AFSPC for other DoD/inter-agency partners. SMC Single Managers (SM) have lifecycle **Operational Safety, Suitability, and Effectiveness** (OSS&E) responsibility in accordance with AFI 63-1201, as implemented by SMC Instruction 63-1201 (SMCI 63-1201), *Assurance of Operational Safety, Suitability, and Effectiveness for Space and Missile Systems*, for all launch services, systems, and end-items in the SMC-procured space and missile product line, including systems, and end-items located at the **ranges**. SMC has SFW Certification responsibility, implemented in accordance with SMCI 63-1202, *Space Flight Worthiness*, for all **SMC-procured launch services and systems**.

1.3.2.1. The SMC Commander (SMC/CC) shall provide SFW Certification for **SMC-procured launch services and systems** to the applicable SW/CC before each Launch Readiness Review.

1.3.2.2. The SMC Satellite and Launch Control Systems Program Office (SMC/RN) is responsible for acquisition, modernization, and sustainment of all **range** ground systems and end-items required by the **ranges** to conduct their Launch Safety programs. SMC/RN is responsible for obtaining coordination/concurrence of requirements, for systems or end-items, with the applicable SW/SE, 14AF/SE, SMC/SE, and HQ AFSPC/SE organizations. SMC/RN shall include the SW/SEs in scheduled program reviews, including System Requirement Reviews (SRRs), System Design Reviews (SDRs), Preliminary Design Reviews (PDRs) and Critical Design Reviews (CDRs) and associated Technical Interchange Meetings.

1.3.2.3. SMC SPO/SM/DETs, as **Range Users**, are responsible for and shall implement a **System Safety program** that includes all Space Safety (Launch and Orbital) requirements, for each **SMC-procured launch service, system, or end-item** used at any AFSPC or FAA-licensed range. Each SPO/SM/DET shall ensure adequate funding of the **System Safety program** for their systems or services consistent with validated requirements.

1.3.2.4. SMC SPO/SM/DETs are responsible for and shall conduct an OSS&E assurance program for each **SMC-procured launch service, system or end-item**, in accordance with AFI 63-1201, as implemented by SMCI 63-1201. Each SPO/SM shall ensure adequate funding of the Range Safety OSS&E support for their program.

1.3.2.5. SMC SPO/SM/DETs are responsible for and shall implement a formal space debris minimization program and a spacecraft end-of-life program for each **SMC-procured system** in accordance with DoDD 3100.10, DoDI 3100.12, and AFI 91-202_AFSPCSUP1.

1.3.2.6. SMC SPO/SM/DETs are responsible for ensuring that SMC-procured orbital systems that are designed to re-enter the earth's atmosphere shall not endanger the public to a collective casualty expectation (E_c) risk greater than 1×10^{-4} .

1.3.2.7. Each SMC SPO/SM/DET with control authority of their spacecraft is responsible for the **Orbital Safety Program** of their spacecraft until they relinquish control authority to a satellite control center (from the end of Range Safety control and/or satellite separation through spacecraft on-orbit checkout and transfer of on-orbit control authority). This includes collision avoidance; for example, obtaining and responding to conjunction assessments (C/As) from the 1 Space Control Squadron (SPCS).

1.3.2.8. Each SMC SPO/SM/DET shall ensure the applicable SW/SE, SMC/SE, 14AF/SE, and HQ AFSPC/SE point of contact is informed of any mishaps and Class E events [anomalies and High Accident Potentials (HAPs)] occurring at their contractor/vendor facilities or at the launch base that could affect Range Safety for **SMC-procured systems and launch services**. Special attention shall be applied to flight termination system components.

1.3.2.9. SMC/SE shall compile and maintain a Lessons Learned file from all reported anomalies/mishaps/HAPs and disseminate the information to HQ AFSPC/SE, 14AF/SE, SW/SEs, and all SMC/SPO/SM/DET safety offices.

1.3.2.10. SMC/SE shall provide copies of all SW-approved ELS determinations and waivers to the SMC SPOs/DETS for information purposes.

1.3.2.11. SMC/SE shall coordinate all proposed changes/revisions to any of the AFSPC 91-7XX documents, specifically AFSPCMAN 91-710 with the SMC/SPOs/DETs for information and comment. SMC/SE shall obtain and provide consolidated SMC comments in accordance with AFSPCI 91-700 to the applicable SW/SE and to HQ AFSPC/SE.

1.3.2.12. SMC/SE, as the HQ AFSPC Chief of Systems Safety, shall coordinate on all **range** system requirements and **range** system upgrades and/or modifications.

1.3.2.13. SMC/SE shall participate with and support the CSWG, the Relief Review Panel, and the RCCs appropriate subgroups.

1.3.3. Fourteenth Air Force Responsibilities:

1.3.3.1. The 14 AF/CC shall notify and obtain approval from the AFSPC/CC if either **range** intends to exceed a predicted collective casualty expectation (E_c) risk of $3,000 \times 10^{-6}$ for any launch (See **Figure 1**). The AFSPC/CC will relay his response via an AFSPC Command Center-released Air Force Space Order (AFSORD).

1.3.3.2. 14AF/SE shall oversee the Launch Safety programs at the **ranges**.

1.3.3.3. 14AF/SE shall ensure that consistent and standard Range Safety processes and approvals, as identified in AFSPCMAN 91-710, are levied on all **Range Users**.

1.3.3.4. 14AF/SE shall oversee the Orbital/**Space Safety Programs** conducted by the 21 SW.

1.3.3.5. 14AF/SE shall participate in and support the CSWG, the Relief Review Panel, and appropriate RCC subgroups.

1.3.4. Space Wing Responsibilities:

1.3.4.1. **21 SW**. The 21 SW/CC has the authority and responsibility for the **Space Safety Program** in support of missile warning and space control.

1.3.4.1.1. The 21SW/CC is responsible for establishing, maintaining, and enforcing an **Orbital Safety Program** necessary for pre-launch collision avoidance (COLA) screening, debris identification through the maintenance of the space catalog, and performing C/As. These programs shall be based upon AFI 91-202_AFSPCSUP1.

1.3.4.1.1.1. The 1 Space Control Squadron (1 SPCS) shall perform C/A support for all launches from the **ranges** in accordance with USSTRATCOMI 505-1, VOL 2, *Space Surveillance Operations – Event Processing*.

1.3.4.1.1.2. The 1 SPCS, as the Center of Excellence for C/A, shall provide the **ranges** with the probability of impact and/or miss distance analysis results from the conjunction analysis performed during pre-launch screening for each launch in accordance with USSTRATCOMI 505-1, VOL 2.

1.3.4.1.1.2.1. C/A shall be performed using a minimum standoff distance of 200 kilometers for manned/mannable orbiting objects and a minimum 50 kilometers standoff distance for all other orbiting objects. Projected violation of the minimum standoff distances shall be immediately reported to the affected satellite control authority. If a manned/mannable orbiting object is at risk notify the AFSPC/CC. Deviations from this requirement shall be approved in accordance with established, approved protocol.

1.3.4.1.1.3. The 1 SPCS shall provide assistance for orbit determination for any anomalous launch when requested by the **ranges**.

1.3.4.1.1.4. For each **SMC-procured systems** and/or end-items, the SW/SE shall support SMC/SPO/SM/DETs in performing Orbital Ground Based Space System Safety related OSS&E functions. SW/SE shall participate in scheduled program reviews, including SRR, SDR, PDR and CDR, provide safety inputs, and support scheduled Technical Interchange Meetings.

1.3.4.2. **30 SW and 45 SW.** The SW/CC has the authority and responsibility for **public safety** and the Launch Safety program at his/her **range**.

1.3.4.2.1. The SW/CC is responsible for establishing, maintaining, and enforcing a Launch Safety program with responsibilities ranging from program introduction through launch, including impact or **orbital insertion** or attainment of earth escape velocity and/or end of programmed Range Safety control. To ensure an independent safety assessment, Range Safety organizations shall report directly to the SW/CC. The Wing Safety organization shall define clear roles and responsibilities for each safety function. Changes to the Wing Safety organizational structure should only be made with careful consideration of their effect on the system and their possible unintended consequences. The Launch Safety program is a two-part program:

1.3.4.2.1.1. Part One. Implementation and enforcement of AFSPC policies and requirements that **Range Users** shall meet to be approved to perform operations on and from the **ranges**. The SW/CC or his/her designated representatives shall ensure the Range User utilizes the Universal Documentation System (UDS) as the means to establish their launch requirements, including the requirement to comply with AFSPC-MAN 91-710. The SW/CC or his/her designated representatives are delegated the authority to prepare and approve tailored versions of AFSPCMAN 91-710 or EWR 127-1 for each program.

1.3.4.2.1.2. Part Two. Development and implementation of internal SW infrastructure, requirements, processes, and procedures necessary to establish and support the Launch Safety program.

1.3.4.2.2. The SW/CC shall comply with the AF/FAA MOA. In addition to the SW/CC's stated authority, the FAA has the responsibility and authority to prohibit, suspend, or immediately stop an **FAA-licensed launch** before flight if, at any time, the FAA deter-

mines the launch is detrimental to public health and safety, the safety of property, or any national security or the foreign policy interest of the United States. For **FAA-licensed launches**, the SWs shall not approve waivers to AFSPC/FAA **common launch standards** without FAA approval.

1.3.4.2.3. The SW/CC shall use a predicted collective casualty expectation (E_c) risk guidance of 30×10^{-6} for every launch unless national need dictates exceeding this limit. The SW/CC shall notify the 14 AF/CC if he/she intends to exceed the predicted collective casualty expectation (E_c) risk guidance of 300×10^{-6} for any launch. The SW/CC shall not launch without AFSPC/CC approval if the predicted collective casualty expectation (E_c) risk exceeds 3000×10^{-6} for any launch.

1.3.4.2.4. The SW/CC or his/her designated representative shall establish and enforce SW procedures or supplements defining internal SW Launch Safety requirements, procedures, processes, and interfaces/infrastructure. These procedures or supplements shall be identified and made available to 14 AF/SE, SMC/SE, and HQ AFSPC/SE for review and comment.

1.3.4.2.5. The SW/CC or his/her designated representative shall coordinate agreements (e.g., MOAs, MOUs, and/or other joint agreements) with non-AFSPC organizations that affect Launch Safety with 14 AF/SE and HQ AFSPC/SE.

1.3.4.2.6. The SW/CC or his/her designated representative shall coordinate and document actions between the **ranges** to ensure that consistent and standard Launch Safety requirements, processes, and approvals are levied on all **Range Users**. Documentation shall include the rationale for any differences.

1.3.4.2.7. The SW/CC or his/her designated representative shall identify and announce at the LRR the launch mishap investigation authority.

1.3.4.2.8. The SW/CC is delegated the authority to approve ELS determinations or waivers to Launch Safety requirements contained in AFSPCMAN 91-710 or EWR 127-1, **Range Safety Requirements**, for grandfathered programs. Range User requested ELS determinations and/or waiver requests shall be based upon Range User provided and substantiated rationale. Waiver approval for Mandatory safety requirements during final countdown for launch shall be based on the recommendation of the Mission Flight Control Officer and Range Safety. Other safety requirements may be waived by the Mission Flight Control Officer or upgraded to a Mandatory requirement. In either case, written substantiation shall be provided after the countdown/launch. On **FAA-licensed launches**, the Range User (FAA-licensed **launch operator**) is required to obtain approval from the FAA for all requests for ELS determinations and waivers in accordance with the AF/FAA MOU for Resolving Requests for Relief.

1.3.4.2.8.1. All applicable waivers shall be reviewed by the SW Chief of Safety (SW/SE) or his/her designated representative for validity before each launch or launch cycle. Before each launch, the SW/SE shall inform the SW/CC of the safety status of the launch vehicle and its payload(s).

1.3.4.2.8.2. The SW/SE or his/her designated representative shall review all waivers on an annual basis and close where appropriate.

1.3.4.2.9. The SW/SE shall report directly to the SW/CC.

1.3.4.2.10. The SW/SE or his/her designated representative shall maintain, implement, and enforce the requirements of AFSPCMAN 91-710, as it applies to Range User programs on their **range**. The SW/SEs or their designated representatives have the authority to suspend Range User operations that are not in compliance with the requirements of AFSPCMAN 91-710.

1.3.4.2.11. The SW/SE or his/her designated representative is delegated authority to approve ELS determinations to Launch Safety requirements contained in AFSPCMAN 91-710 that do not impact **public safety**. Range User requested ELS determinations shall be based on Range User provided and substantiated rationale.

1.3.4.2.12. The SW/SE or his/her designated representative shall forward copies of all approved AFSPCMAN 91-710 ELS determinations and waivers to 14 AF/SE, SMC/SE, and HQ AFSPC/SE for information.

1.3.4.2.13. The SW/SE or his/her designated representative shall coordinate with 14 AF/SE and SMC/SE and obtain approval from HQ AFSPC/SE for all changes/revisions to AFSPCMAN 91-710 in accordance with AFSPCI 91-700.

1.3.4.2.14. The SW/SE or his/her designated representative shall inform 14 AF/SE and HQ AFSPC/SE of any Range User that requests to launch nuclear reactors or radioactive materials in quantities in excess of the threshold limits established by AFI 91-110, ***Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems***, Attachment 2, "Analysis Threshold Quantities for Radioactive Materials."

1.3.4.2.15. The SW/SE or his/her designated representative shall inform 14 AF/SE, SMC/SE, and HQ AFSPC/SE of all Range User mishaps. AF programs or programs with AF involvement that have mishaps shall be reported in accordance with AFI 91-204, ***Safety Investigations and Reports*** (AFSPC Sup 1), and Air Force Manual (AFMAN) 91-222, ***Space Safety Investigations and Reports***. Non-USAF mishaps may be investigated under the cognizance of other agencies (e.g., FAA, NTSB, NASA). In such cases, USAF units shall cooperate fully with the investigating authority. The USAF shall have access to the findings of the mishap investigation so as to affect resolution.

1.3.4.2.16. For each **SMC-procured launch service, system, and/or end-item**, the SW/SE shall support SMC/SPO/SM/DETs in performing Launch Safety related OSS&E functions, such as:

1.3.4.2.16.1. Participate in program reviews (e.g., SRR, SDR, PDR and CDR) and technical interchange meetings. Review and provide safety inputs on **Range User** programs.

1.3.4.2.16.2. Review and evaluate and upon inclusion of comments, approve Range User prepared safety data packages, hazardous and safety critical test/processing procedures, and other safety data in accordance with AFSPCMAN 91-710.

1.3.4.2.16.3. Enforce Launch Safety requirements and procedures.

1.3.4.2.16.4. Evaluate and provide flight safety system, also known as the *range safety system*, (tracking, telemetry, and flight termination system) and flight safety approval and certification.

1.3.4.2.17. The SW/SE or his/her designated representative shall assess the safety risks on day of launch and provide a safety go/no-go advisement to the Space Lift Commander.

1.3.4.2.18. The SW/SE or his/her designated representative shall support SMC/SPO/SM/DETs in Launch Safety-related SFW certification tasks.

1.3.4.2.19. The SW/SE or his/her designated representative shall provide a memo indicating Launch Safety approval status of the launch vehicle or spacecraft, and/or ground system to the SMC/SPO/SM/DET before or at the SMC flight readiness review or **range** ground system acceptance. This memo shall be based on the review and approval of safety designs, test data, and other information collected before the SMC flight readiness review or ground system acceptance.

1.3.4.2.20. The SW/SE or his/her designated representative shall coordinate with and obtain launch screening data from the 1 SPCS to be used for each launch.

1.3.4.2.21. The SW/SE or his/her designated representative shall participate with and support the CSWG, the Relief Review Panel, and appropriate RCC subgroups.

1.3.4.2.22. The SW/SE or his/her designated representative shall approve mission rules.

1.3.5. **Responsibilities for HQ AFSPC Directorates.** HQ AFSPC directorates acquiring systems from product centers other than SMC shall ensure that HQ AFSPC/SE reviews and coordinates on system requirements; for example, Electronic Systems Center acquired radars shall be evaluated for capability to support Space Control and the mission of space track that supports C/A, COLA, and debris limitation.

1.3.6. **Responsibilities for Commercial Space Launch.** In accordance with 49 United States Code (USC), Subtitle IX, *Commercial Space Transportation*, Chapter 701, *Commercial Space Launch Activities*, USC paragraphs 70101 – 70121, the FAA has licensing authority for commercial launch activities. The FAA has the responsibility and authority to prohibit, suspend, or end immediately a licensed launch before flight if, at any time, the FAA determines the launch is detrimental to public health and safety, the safety of property, or any national security or foreign policy interest of the US. This responsibility extends to federal as well as to non-federal launch sites.

1.3.6.1. **FAA-licensed launch operators (Range Users)** are responsible to comply with the requirements in AFSPCMAN 91-710 to process and launch from the AFSPC **ranges**, as well as their FAA license requirements. AFSPCMAN 91-710 encompasses the AFSPC/FAA **common Launch Safety requirements**.

1.3.6.2. The FAA reviews and approves all requests not to comply with any of its 14 Code of Federal Regulations (CFR) Part 417 requirements submitted by **FAA-licensed launch** operators. The FAA provides copies of these approvals to the SW/CCs for information purposes. The SWs shall not approve waivers to AFSPC/FAA **common Launch Safety requirements** without FAA approval.

1.3.6.3. For **FAA-licensed launches**, the **ranges** shall coordinate with the FAA regarding the following activities as outlined in the AF/FAA MOU for Resolving Requests for Relief:

1.3.6.3.1. Safety requirements (AFSPCMAN 91-710) tailoring.

1.3.6.3.2. ELS and waiver requests review and approval.

1.3.6.3.3. LRR/day of launch real time waiver approval.

1.3.6.4. The FAA performs a Launch Site Safety Assessment (LSSA) of each **range**, as part of its program to ensure its safety requirements are satisfied on the federal ranges. The FAA and the **ranges** shall cooperate to assure that the LSSAs are comprehensive and accurate.

1.3.7. **Range User Responsibilities.** **Range Users** are solely responsible for complying with the requirements identified in AFSPCMAN 91-710. **Range Users** are responsible for requesting and substantiating any AFSPCMAN 91-710 tailoring, ELS and/or waiver requests required for their programs. **Range Users**, including government contractors, are solely responsible for compliance with Occupational Safety and Health Administration standards and the protection of their employees and resources. Further, they have an inherent responsibility to protect government employees and property when such are involved in contractor operations or on contractor leased facilities. No instruction, requirement, standard, or policy issued by the USAF, or by any unit of the USAF, shall be misinterpreted as relief or authority to deviate from the Range User's required compliance with any existing laws, rules, regulations, or statutes. Any perceived conflict shall be brought immediately to the attention of the Wing Safety organization.

2. Launch Safety Program Policy and Requirements. All **range** operations shall be accomplished in such a manner as to ensure that the risk to the public, **range**/third party launch area and launch complex personnel, and **range**/third party owned resources are provided an acceptable level of safety consistent with mission needs and national priorities. This policy shall be implemented by using risk management practices and procedures as established in this document and AFSPCMAN 91-710.

2.1. **Range** management shall strive to ensure that the risk to the public, including foreign countries (personnel and resources), from **range** operations is no more than the risk accepted by the general public in normal day-to-day activities. SW/SE flight safety analysts shall analyze the risk to the public and the launch area for each launch. **Figure 1.** illustrates risk management criteria used in determining acceptable risk for individual launches. Risk criteria shall be applied as follows:

2.1.1. The general public shall not be exposed to a collective casualty expectation (E_c) risk level of more than 30 casualties in 1 million (30×10^{-6}) for each hazard per mission, and not more than an individual E_c risk of 1 in 1 million (1×10^{-6}) for each hazard per mission.

2.1.2. The collective Launch Essential and Neighboring Operations Personnel shall not be exposed to a collective E_c risk level of more than 300 casualties in 1 million (300×10^{-6}) per mission, and not more than an individual E_c risk of 10 in 1 million (10×10^{-6}) per mission.

2.1.3. These risk criteria shall be used by all AFSPC **ranges** as a level defining "acceptable launch risk" for individual launches, without SW/CC review/approval. The SW/CC may vary from these criteria for particular programs or missions based on national need (see **2.1.4.**). For **FAA-licensed launches** that exceed these criteria, the licensed launch operator shall also apply for FAA permission and obtain appropriate determination under its FAA license.

2.1.4. If an SW/CC intends to launch with a collective E_c risk in excess of 300×10^{-6} (national need), he/she shall inform the 14 AF/CC prior to the launch. If either **range** intends to exceed an E_c risk of $3,000 \times 10^{-6}$ for any launch, the SW/CC shall notify the 14 AF/CC that AFSPC/CC

approval is required. The 14 AF/CC shall request approval from the AFSPC/CC (See **Figure 1.**). The AFSPC/CC will relay his response via an AFSPC Command Center-released AFSORD. All variations from the risk criteria and established Range User requirements as stated in AFSPC-MAN 91-710 shall be documented by the wings and approved at the appropriate levels.

2.1.5. Boats and ships shall not be exposed above 1×10^{-5} collective probability of impact.

2.1.6. Aircraft shall not be exposed above 1×10^{-6} collective probability of impact. A more conservative criterion of a 1×10^{-8} collective probability of impact for ships may be used for aircraft that accounts for introduced risk uncertainty caused by variability in aircraft type, position, altitude, and speed.

2.1.7. Trains (WR only) shall not be exposed above 1×10^{-6} probability of impact.

2.2. The SW/SE or his/her designated representative shall define and control hazardous launch areas and develop procedures to protect the public on land, on the sea, and in the air for each launch and launch vehicle that operates on the **ranges**.

2.3. The SW/SE or his/her designated representative shall ensure that all USAF or third party personnel and USAF or third party resources located on Cape Canaveral Air Force Station or Vandenberg Air Force Base or on any supporting site of the ER or WR are provided an acceptable degree of protection from the hazards associated with **range** operations.

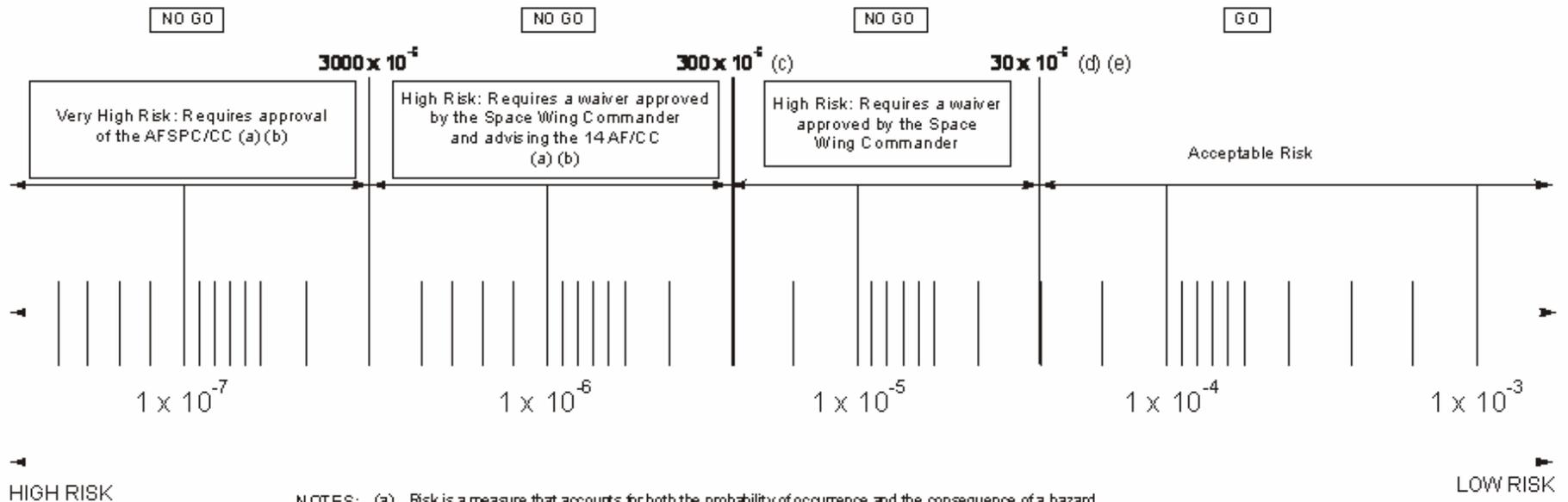
2.4. The **ranges** shall enforce the requirements established in AFSPCMAN 91-710 on all **Range Users**. The **ranges** may tailor the requirements on a programmatic basis and may waive requirements when there is acceptable justification or when there is significant national need.

2.5. The **ranges** shall verify that each **launch system** provides a positive, controlled capability that allows the initiation of a hold-fire to prevent a launch in the event of loss of a safety critical system or violation of mandatory launch commit criteria.

2.6. The SW/SE or his/her designated representative shall verify that all launch vehicles launched from or onto the **ranges** have a positive, **range**-approved method of controlling errant vehicle flight to meet the objective of minimizing the risks to the public, launch area, launch complex personnel, and **range**-owned resources. Mission rules and flight termination policy for the Space Transportation System shall be in accordance with the *NASA Johnson Space Center Flight Rules, A4.1.6*.

2.7. The SW/SE or his/her designated representative shall evaluate all launch vehicle, payload, ground support, and facility systems used on the **ranges** to test, checkout, assemble, handle, support, or launch vehicles or payloads with regard to their hazard potential and to ensure that they are designed to minimize Launch Safety risks and fall within acceptable exposure levels for launch area and launch complex safety. Wing Safety shall evaluate each launch vehicle program for post-launch, hold-fire/misfire, and back-out capability.

Figure 1. Acceptable Public Exposure Launch Operations Risk Guidance



- NOTES: (a) 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 casualties and expressed as individual risk or collective risk. A casualty is a serious injury or worse, including death, to a human.
- (b) High risk to the general public, requires a "national need" assessment with appropriate justification to launch above 300×10^{-4} .
- (c) The upper bound for launch-essential personnel/neighborhood operations personnel may be thought of as an average of 1 casualty per 100 years, with a launch rate of 33 per year.
- (d) The upper bound for the acceptable risk (GO) may be thought of as an average of 1 casualty per 1000 years, with launches at the rate of 33 per year.
- (e) A waiver, approved by the FAA, is required for FAA licensed launches that exceed 30×10^{-4} .

2.8. All **Range Users** shall be required to minimize the hazards they generate to protect the resources of other **Range Users** and the **range**. Conversely, all **Range Users** shall recognize that the nature of the launch industry will expose their resources, which are located close to other launch-related facilities, to a higher level of risk than would generally be experienced off-**range**.

2.9. If a Range Users' **launch system** experiences a launch failure, then the Range User shall obtain a "Safety Return to Flight" approval per AFI 10-1212, *Space Launch Vehicle Return to Flight*, before attempting to launch again.

2.10. Programs coming to the AFSPC ranges that already have approval to launch from other ranges shall be evaluated by the 30 SW/SE and/or 45 SW/SE for compliance verification with the Range Safety user requirements specified in AFSPCMAN 91-710. **Range Users** may submit their previously approved safety documentation without modification for this evaluation. For example, if a program already has a flight termination system approval under the RCC Flight Termination System Commonality Standard 319-99 (or later version) or the FAA licensing rules, that approval may be transferable to the ER and/or WR with only a compliance verification review.

2.11. The SW/SE or his/her designated representative shall obtain and enforce launch collision avoidance hold criteria for mannable orbiting objects.

BILLY R. COLWELL, Col, USAF
Director of Safety

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

45 SW No. 15E-2-8 KCA 1305 Rev. B, *Memorandum of Agreement (MOA) Among The 45th Space Wing (45 SW), The National Aeronautics and Space Administration's John F. Kennedy Space Center (NASA-KSC,) and The Space Shuttle Program Office (NASA SSPO) For Range Safety*

AF/FAA MOA, *Memorandum of Agreement between Department of the Air Force and Federal Aviation Administration for Space Transportation and Range Activities*

AF/FAA MOU for Resolving Requests for Relief, *Memorandum of Understanding between Air Force Space Command and Federal Aviation Administration Office of the Associate Administrator for Commercial Space Transportation for Resolving Requests for Relief from Common Launch Safety Requirements*

AFI 10- 1211, *Space Launch Operations*

AFI 10-1212, *Space Launch Vehicle Return to Flight*

AFI 13 – 201, *Air Force Airspace Management*

AFI 13-212, Volume 1, *Range Planning and Operations*

AFI 63-1201, *Assurance of Operational Safety, Suitability, and Effectiveness*

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

AFI 91-202, *U.S. Air Force Mishap Prevention Program* (AFSPC Sup1)

AFI 91-204, *Safety Investigations and Reports* (AFSPC Sup 1)

AFMAN 91-201, *Explosive Safety Standards*

AFMAN 91-222, *Space Safety Investigations and Reports*

AFPD 10-12, *Space*

AFPD 63-12, *Assurance of Operational Safety, Suitability, and Effectiveness*

AFPD 91-1, *Nuclear Weapons and Systems Surety*

AFPD 91-2, *Safety Programs*

AFSPCI 91-700, *Range Safety Publications Series*

AFSPCMAN 91-710, *Range Safety User Requirements Manual*

Charter for the Common Standards Working Group of the United States Air Force and Federal Aviation Administration Associate Administrator for Space Transportation

DoDD 3100.10, *Space Policy*

DoDD 3200.11, *Major Range and Test Facility Base*

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

DoDD 4540.1, *Use of Air Space by U. S. Aircraft and Firings Over High Seas*

DoDD 6055.9, *DoD Ammunition and Explosive Safety Standards*

DoDI 3100.12, *Space Support*

EW 127-1, *Range Safety Requirements*

NASA Johnson Space Center Flight Rules, A4.1.6

Presidential Directive/National Security Council 25, *Scientific or Technological Experiments with Possible Large Scale Adverse Environmental Effects and Launch of Nuclear Systems into Space*

Public Law 10, 10 USC, Section 172, *Ammunition Storage Board*

RCC 319, *Flight Termination Systems Commonality Standard*

RCC 321, *Common Risk Criteria for National Test Ranges (Inert Debris)*

SMCI 63-1201, *Assurance of Operational Safety, Suitability, and Effectiveness for Space and Missile Systems*

SMCI 63-1202, *Space Flight Worthiness*

US Space Command Policy Directive 10-39, *Satellite Disposal Procedures*

US SPACE TRANSPORTATION POLICY January 6, 2005

USC 49, Subtitle IX, *Commercial Space Transportation*, Chapter 701, *Commercial Space Launch Activities*, 49 USC § 70101 – §70121; 14 CFR Chapter III

USC 49, Title 14, Vol 4, Chap III, Part 400-499, *Commercial Space Transportation*

USC Title 29, *Occupational Health and Safety Act, Public Law 91-596*

USSTRATCOMI 505-1, VOL 2, *Space Surveillance Operations – Event Processing*

Abbreviations and Acronyms

AF—Air Force

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFPD—Air Force Policy Directive

AFSPC—Air Force Space Command

AFSPCI—Air Force Space Command Instruction

AFSPCMAN—Air Force Space Command Manual

AST—Associate Administrator for Commercial Space Transportation

C/A—conjunction assessment

CC—Commander

CDR—Critical Design Review

CFR—Code of Federal Regulations

COLA—collision avoidance
CSWG—Common Standards Working Group
DET—detachment
DoD—Department of Defense
DoDD—Department of Defense Directive
DoDI—Department of Defense Instruction
Ec—casualty expectation
ELS—equivalent level of safety
ER—Eastern Range
FAA—Federal Aviation Administration
HAP—High Accident Potential
MRTFB—Major Range and Test Facility Base
NASA—National Aeronautics and Space Administration
OSS&E—Operational Safety, Suitability and Effectiveness
PDR—Preliminary Design Review
PESHE—Programmatic Environmental, Safety, and Health Evaluation
RCC—Range Commanders Council
SC—Spacecraft
SDR—System Design Review
SFW—Space Flight Worthiness
SM—Single Manager
SMC—Space and Missile Systems Center
SMCI—Space and Missile Center Instruction
SMC/CC—Space and Missile Systems Center Commander
SMC/RN—Satellite and Launch Control Systems Program Office
SMCI—Space and Missile Systems Center Instruction
SPCS—Space Control Squadron
SPO—System Program Office
SRR—System Requirements Review
Sup—supplement
SW—Space Wing
SW/CC—Space Wing Commander (Range Commander)

SW/SE—Space Wing Safety Office (Range Safety)

US—United States

USC—United States Code

USAF—United States Air Force

USSTRATCOM—United States Strategic Command

WR—Western Range

Terms

Common Launch Safety standard—Any Launch Safety requirement located in both the AF Range Safety Requirements and FAA Launch Safety Requirements documents.

Critical ground system—Any ground system that has a direct impact on mission performance or safety operation, such as flight tracking or flight termination.

FAA-licensed launch—Any launch by a US citizen or company that requires a license from the FAA, or is specifically requested to be licensed by the responsible government agency.

Initial drift orbit— The first orbit of a satellite following payload separation from the launch vehicle.

Launch mishap—**Space mishaps** occurring during launch vehicle operations, including upper stages. This includes payloads that do not obtain the intended orbit, re-contact of the payload with the upper stage/launch vehicle, or collisions before completion of the **initial drift orbit**, and range safety system failures.

Launch operator—Any individual or organization that conducts any launch activity under an FAA launch license.

Launch Safety Program—A comprehensive safety program for launch vehicles and related operations and facilities starting with program introduction at a **range**. It addresses design, manufacturing, transportation, ground handling/processing, pre-launch testing, launch of space systems through **orbital insertion**, and/or impact of suborbital systems. This includes collision avoidance through **orbital insertion**, attainment of earth escape velocity or reentry, and/or end of programmed Range Safety control. Also includes safety of activities connected with the deployment (debris minimization), and recovery (if required) of test vehicles or payloads that don't obtain initial orbit (either planned or unplanned). The Launch Safety program is a subset of the **Space Safety Program**.

Launch system—A launch system consists of the launch vehicle, upper stages, spacecraft or reentry vehicle, and associated ground support equipment and direct support facilities.

Operational Safety, Suitability, and Effectiveness—The condition of having acceptable risk to life, health, property, and environment caused by a system when employing that system in an operational environment. The degree to which a system can be placed satisfactorily in field use, with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime use rates, maintainability, full-dimension protection, operational safety, human factors, architectural and infrastructure compliance, manpower supportability, logistics supportability, natural environment effects and impacts, and documentation and training requirements. The overall degree of mission accomplishment of a system used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, information assurance,

force protection, survivability, vulnerability, and threat. **NOTE:** The safety portion of OSS&E is accomplished through the implementation of a comprehensive **System Safety Program**.

Orbital insertion—Defined as attainment of an orbital velocity vector that will result in at least one orbit around the earth. Orbital insertion plus one revolution is the nominal time when Range Safety responsibility ends and **Orbital Safety Program** responsibility begins.

Orbital mishap— **Space mishaps** occurring during spacecraft operation after separation from all launch vehicle components, including upper stages and transfer motors. Also includes mishaps to ground based orbital support equipment.

Orbital Safety Program—A comprehensive safety program that ensures safe satellite design, testing, and on-orbit operations. The initial aspects of the Orbital Safety Programs begin in the earliest phases of a program when considerations of safety are incorporated in the design and testing. This specifically includes debris identification/minimization and end-of-life disposal. The on-orbit aspects of Orbital Safety Programs cover activities after initial drift orbit from payload separation, associated with testing and operating space vehicles in orbit or deep space, including collision avoidance, reentry, recovery, and disposal. The Orbital Safety Program is a subset of the **Space Safety Program**.

Programmatic Environmental, Safety, and Health Evaluation—A program to evaluate the safety, health, and environment presented by a specific DoD program. **NOTE:** The safety portion of PESHE is accomplished through the implementation of a comprehensive **System Safety Program**.

Public safety—Safety involving risks to personnel and/or property not directly involved in the activity of concern. This may involve personnel and/or property located off-base or on-base.

Range or ranges—Refers to both AFSPC ranges (Eastern Range and Western Range).

Range Safety Program— A program implemented to ensure that processing, launch and flight of launch vehicles and payloads, and other authorized operations, present no greater risk to the general public than that imposed by over-flight of conventional aircraft; such a program also includes launch complex and launch area safety and protection of national resources.

Range Safety Requirements Documents—Range User Safety Requirements, AFSPCMAN 91-710, or equivalent documents.

Range Users—any individual or organization that conducts or supports any activity on resources (land, sea, or air) owned or controlled by AFSPC ranges; includes such organizations as the DoD, US government agencies, civilian launch operators, and foreign government agencies and other foreign entities that use AFSPC range facilities and test equipment; conduct pre-launch and launch operations, including payloads to **orbital insertion** or impact; and/or require on-orbit or other related support.

SMC-procured space systems and services—A space system consisting of an AF launch vehicle or an AF spacecraft or both, and associated ground support equipment.

Space Flight Worthiness—A **launch system** condition where the design meets requirements adequate for the intended mission, the hardware is built in accordance with that design, the processes and procedures used in the factory and at the launch base meet requirements, launch base processing is completed in accordance with the approved procedures, and any anomalous conditions are identified and resolved.

Space mishap—A mishap involving a space system and/or unique space support equipment.

Space Safety Program—Space Safety Program consists of two elements: Launch Safety (also known as Range Safety) and Orbital Safety. **NOTE:** The **Orbital Safety Program**, Launch Safety program, and/or **Range Safety Programs** are subsets of the overall comprehensive **System Safety Program**.

System Safety Program— The application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operational effectiveness and suitability, time, and cost, throughout all phases of the system life cycle. **NOTE:** A properly implemented comprehensive System Safety Program provides for the Launch Safety, Orbital Safety, OSS&E Safety, PESHE Safety, and **Range Safety program** efforts.