BY ORDER OF THE COMMANDER
SPACE LAUNCH DELTA 45

SPACE LAUNCH DELTA 45
INSTRUCTION 91-710

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Safety

LAUNCH SHELTER CERTIFICATION PROCESS

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(Colonel Jessica A. Wedington)

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This instruction implements the requirements in Space Systems Command Manual (SSCMAN) 91-710 Volume 1, *Range Safety User Requirements Manual – Space Systems Command Range Safety Requirements and Procedures*. This instruction supplements the Space Launch Delta 45 Instruction (SLD45I) 91-204, *Launch Vehicle On-Base Risk Mitigation Practices*, SLD45I 91-206, *Danger Area Information Plan* and the Space Launch Delta 45 (SLD 45) Installation Emergency Management Plan (IEMP) 10-2. This instruction is published in the interest of public safety in the event of an accidental release of a toxic material(s) during a space launch from Cape Canaveral Space Force Station (CCSFS) and ensures an adequate CCSFS launch shelter certification process is in place and assists facility managers in developing and maintaining their launch shelter procedures. This instruction documents the SLD 45 organizational responsibilities and compliance guidelines and applies to SLD 45 military members and civilian government employees. It is not applicable to Air National Guard or Air Force Reserve. Ensure all records generated as a result of processes prescribed in this publication adhere to Air Force Instruction (AFI) 33-322, *Records Management and Information Governance Program*, and are disposed in accordance with the Air Force Records Disposition Schedule, which is located in the Air Force Records Information Management System. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the Air Force (AF) Form 847, *Recommendation of Change of Publication*; route AF 847 from the field through the appropriate functional chain of command. This publication may be supplemented at any level, but all direct supplements must be routed to the OPR of this publication for coordination prior to certification and approval. Submit requests for waivers through the chain of command to the approval authority, or alternately, to the Publication OPR.

SUMMARY OF CHANGES

This publication has been revised and must be completely reviewed. Changes include updates to the shelter certification process and to several of the organization references that were either re-designated or deactivated.

1. Overview.

1.1. During the last several years, there has been an increase in the number of personnel working on CCSFS. This increase has been due to organizations relocating from Patrick Space Force Base, new on-site contractor facilities being built, and a resulting increase in visitors. With this increase in personnel comes an even greater need for adequate CCSFS launch shelters to protect them from possible exposure to harmful launch-related toxic substances. Not all facilities are qualified to be a launch shelter. This instruction spells out the necessary steps to request that a facility be inspected/evaluated and certified/decertified as a launch shelter. The certification process consists of the facility manager's request, justification review, physical inspection and evaluation, approval decision, procedure development, and posting of the launch shelter sign outside of the facility.

1.2. The SLD 45 OPR for the launch shelter program activities is the SLD 45 Launch Safety (45 SEL) office. This office is supported by the 45th Operations Medical Readiness Squadron, Bioenvironmental Engineer (45 MDG OMRS/SGXB) and the 45th Civil Engineer Squadron (45 CES).

2. Responsibilities.

2.1. **Launch Safety (SLD 45/SEL):**

2.1.1. Participates/manages the physical inspection and evaluation of facilities identified as candidates for shelter certification.

2.1.2. Provides technical expertise to 45 CES and 45 MDG OMRS/SGXB for the launch shelter program.

2.1.3. Assists in developing, implementing and maintaining an emergency shelter notification system. Coordinates the emergency notification plan with Kennedy Space Center (KSC) Safety and Brevard County Emergency Management.

2.1.4. Serves as the point of contact with the facility manager for certification requests. Leads the coordination of launch shelter requests with 45 CES and 45 MDG OMRS/SGXB to determine justification.

2.1.5. Assists in developing standardized safety language to be placed in contracts where launch sheltering applies.

2.1.6. Serves as the SLD 45 organization responsible for modeling hazardous chemical releases. Modeling types include launch support, worst-case release scenarios and alternative release scenarios during vehicle processing.

2.1.7. Serves as the point of contact for 45 CES engineers to notify when changes are planned to be made to a facility that may affect the launch shelter status.

2.1.8. Assists in developing and maintaining the facility manager's launch shelter configuration plans and monitors the facility manager's progress to submit plans for facilities that are designated as launch shelters. Maintains a database of all CCSFS launch shelters and facility manager developed launch shelter procedures.

2.1.9. Runs physics models based on Air Force Weather Agency forecasted T-0 meteorological data and compares model output against 45 SEL toxic on-base and off-base Launch Commit Criteria (LCC). If toxic off-base LCC is violated, recommend a "no-go" to the Launch Decision Authority. If toxic on-base LCC is violated, implement SLD45I 91-204.

2.1.10. If the potential exists for a violation of governing toxic on-base LCC, 45 SEL shall perform real-time calculations. These calculations are based on physics models and assess whether shelter facility air change rates in affected aural warning zones can protect inhabitants to a Level of Concern (LOC) for the commodity in question. The goal is to meet the short-term Public Emergency Guidance Levels in the breathing zone, based on actual concentration and dwell time.

2.2. **45MDG OMRS/SGXB:**

2.2.1. Reviews and approves shelter certification procedures.

2.2.2. Reviews the facility manager's request for shelter certification. Determines if there is sufficient justification as to why the facility should be a launch shelter.

2.2.3. Monitors program effectiveness.

2.2.4. Provides medical expertise as needed to the launch shelter program.

2.3. **SLD45/CES:**

2.3.1. Serves as the point of contact for changes to CCSFS facilities.

2.3.2. Reviews and approves shelter certification test procedures and/or test plans.

2.3.3. For facilities that are currently designated as launch shelters, provides documentation of facility changes that may impact their status as a launch shelter to 45 MDG OMRS/SGXB and SLD 45/SEL.

2.3.4. Upon request by the facility manager and once notified by 45 SEL that a particular facility has been certified as a launch shelter, 45 CES shall affix a shelter plaque to the facility in question. If notified that a building no longer meets sheltering criteria, and therefore is removed from the sheltering program, 45 CES shall remove the shelter plaque from the facility in question.

2.4. **Facility Manager:**

2.4.1. If a range user desires a building to be designated as a launch shelter, the facility manager for the building in question shall submit a request to the 45 SEL or Operations Safety support contractor. See **paragraph 3.2** of this publication.

2.4.2. Participate in the inspection as performed by 45 SEL personnel or Operations Safety support contractor.

2.4.3. For facilities that are designated as launch shelters, the facility managers shall develop and maintain certified procedures that place their facility in the same configuration it was in when it was evaluated for having an outside air exchange rate of 0.5 or less per hour. Draft procedures shall be submitted to 45 SEL and Operations Safety support contractor for review and approval.

2.4.4. Implement facility procedures if the facility in question is in an affected Aural Warning Zone on launch day and will be used as a shelter.

3. Launch Shelter Elements.

3.1. General Background:

3.1.1. The exhaust plume created by firing of the solid rocket motors (SRMs) during a nominal launch contains hazardous materials (primarily hydrogen chloride, an irritant gas). In the case of a catastrophic failure of a launch vehicle early in flight, rocket fuel and oxidizer residues (e.g., Aerozine-50, nitrogen tetroxide, hydrogen chloride from SRMs, and their combustion products) may also be present.

3.1.2. Under certain meteorological conditions, high concentrations of these materials may drift over CCSFS at levels greater than health standards permit. Under these conditions, all personnel must be protected from the potential toxic hazards. This requires that launch shelters be established.

3.1.3. The original purpose of the launch shelter program was to develop a feasible method of sheltering personnel in-place as an option for evacuation to protect personnel from toxic plume clouds such as those produced by a catastrophic failure of a launch vehicle. The scenario assumes a facility is exposed to a concentration level equal to Immediate Danger to Life and Health for the commodity in question (parts per million) for a half hour duration as the baseline, while affording protection to LOC for the commodity in question for personnel inside the facility.

3.1.4. The standard cut-off point for certification purposes is 0.5 outside Air Changes per Hour (ACH). Certain procedures can reduce the number of outside ACH, for example, closing all Heating, Ventilation, and Air Conditioning (HVAC) outside air intake vents, closing outside exhaust vents, shutting down the HVAC completely, and maintaining a secure door and window policy.

3.2. Shelter Certification Request:

3.2.1. The request that a building be certified as a shelter should come from the facility manager responsible for the building.

3.2.2. The facility manager submits a request, with justification, for certification or recertification by either e-mail or letter to the 45 SEL and Operations Safety support contractor. The SLD 45 Safety (45 SE) Operations Safety support contractor will coordinate the launch shelter request with 45 CES and 45 MDG OMRS/SGXB to determine if there is sufficient justification to certify the facility as a launch shelter. The facility manager will be notified of the results and either an inspection will be scheduled, or the facility will be removed from the request list.

3.2.2.1. Data required to evaluate outside air exchange rates for each Air Handler Unit (AHU) to be provided by the facility manager:

3.2.2.1.1. Volume in cubic feet serviced by the AHU.

3.2.2.1.2. Cubic Feet per Minute (CFM) and outside air CFM. If outside air CFM is not available, assume 20% of the supply air CFM is used as the estimated outside air CFM as is done by KSC.

3.2.3. With the assistance of the facility manager, 45 SEL or Operations Safety support contractor will perform an inspection and evaluation of the building.

3.2.4. The 45 SEL will report the results of the test to SLD 45 and 45 MDG OMRS/SGXB.

3.2.5. The 45 SEL will notify the facility manager of the results. If the building has an air exchange rate of 0.5 outside ACH or less, the facility manager will place a work order request with 45 CES to install a shelter plaque on the building. If the facility has previously been certified as a shelter and is being reevaluated, no action will be required unless the facility fails. In that event, the facility manager will be notified to issue a work request to have the shelter sign removed.

3.3. **Launch Shelter Procedures:**

3.3.1. The procedures for preparing a certified launch shelter for launches will be written by the facility managers. These procedures must address closing all doors and windows and turning off ventilation systems that draw fresh air from the outside. These procedures shall be submitted to 45 SEL and Operations Safety support contractor for review and approval. See Attachments **2 and 3** for an example of launch shelter facility procedures and checklist.

3.3.2. For previously certified shelters that do not have approved shelter procedures, the facility managers must submit launch shelter procedures for approval within 60-days after the effective date of this publication.

3.3.3. All organizations must ensure that their employees know where appropriate launch shelters are located for their place of duty or work area. For additional information on the Aural Warning Zones, refer to SLD45I 91-204.

3.3.4. Supervisors must ensure employees know where their primary and alternate shelters are located for both normal duty hours and other than normal duty hours. If the primary or alternate shelter is not available for the planned launch period, refer to SLD45I 91-204.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

SSCMAN 91-710V1, *Range Safety User Requirements Manual – Space Systems Command Range Safety Requirements and Procedures,* 27 December 2022

SLD45I 91-204, *Launch Vehicle On-Base Risk Mitigation Practices,* 12 September 2023

SLD45I 91-206, *Danger Area Information Plan,* 05 May 2023

SLD 45 *Installation Emergency Management Plan (IEMP)* 10-2

Adopted Form

AF Form 847, *Recommendation of Change of Publication*

Abbreviations and Acronyms

ACH—Air Changes per Hour

AF—Air Force

AFI—Air Force Instruction

45 MDG OMRS/SGXB—45th Operations Medical Readiness Squadron, Bioenvironmental Engineer

AFRIMS—Air Force Records Information Management System

AHU—Air Handler Unit

CCSFS—Cape Canaveral Space Force Station

CFM—Cubic Feet per Minute

HVAC—Heating, Ventilation, and Air Conditioning

IAW—in accordance with

IEMP—Installation Emergency Management Plan

ILL—Impact Limit Line

KSC—Kennedy Space Center

LCC—Launch Commit Criteria

LOC—Level of Concern

OPR—Office of Primary Responsibility

45 CES—45th Civil Engineer Squadron

45 SE—Safety

45 SEL—Launch Safety

SF—Space Force

SLD 45—Space Launch Delta 45

45 SELF—Space Launch Delta 45 Launch Safety, Flight Analysis

SLD45I—Space Launch Delta 45 Instruction

SRMs—Solid Rocket Motors

Attachment 2

SAMPLE LAUNCH SHELTER PROCEDURES

Figure A2.1. Sample Launch Shelter Procedures.

FACILITY NUMBER _____, AURAL WARNING ZONE _____

A1.1. Purpose. This procedure establishes measures to be taken to protect personnel at this facility from possible exposure to hazardous materials contained in the exhaust plume or launch failure explosion debris cloud from launch vehicles launched from either Cape Canaveral Space Force Station or Kennedy Space Center. This procedure fulfills SLD45I 91-204, *Launch Vehicle On-Base Risk Mitigation Practices,* requirements for establishing facility unique launch shelter procedures.

A1.2. Background. On-base personnel within potential toxic hazard corridors during a specific launch must be provided adequate shelter to ensure they are not exposed to hazardous concentrations from a rocket exhaust plume or fuel residue from a catastrophic failure of a rocket.

A1.3. Procedure.

A1.3.1. The building custodian is designated as the manager for this facility. He/She must be prepared to implement these procedures using the Launch Shelter Procedure Checklist (Attachment 3) upon hearing the Cape Aural Warning system announcement to shelter in this area or "zone."

A1.3.2. Once shelters are "activated" (opened), the Shelter Manager must not leave prior to launch. The Shelter Manager or trained alternate must stay at the shelter until the launch is complete. If launch operations are scheduled after duty hours or on weekends, the Shelter Manager is not required to "open" the shelter unless the shelter is normally open (unlocked) during these hours. If the facility is open during these launch operations, the Shelter Manager or trained alternate must be present to implement this procedure.

A1.3.3. It is the Shelter Manager's responsibility to learn how to turn off the facility's power to the fans and HVAC system. It is also his/her responsibility to brief an alternate for his/her building(s). Building Managers responsible for more than one building must brief a primary and an alternate to carry out his/her duties at the other buildings. NOTE: Critical facilities that must shut down HVAC systems should conduct a test in advance to ensure other critical systems are not affected.

A1.3.4. L-1 hour, all personnel in the downwind corridor must proceed to a shelter prior to launch but may view the launch outside the shelter. If an accident occurs, the Shelter Manager should direct personnel inside until the “All Clear” is passed from Consolidated Support Operations Center or other competent authority such as security police.

A1.3.5. Personnel with questions or needing clarification on these procedures should call 45 SELF office at (321) 494-5845.

Attachment 3

LAUNCH SHELTER PROCEDURE CHECKLIST

Figure A3.1. Launch Shelter Procedure Checklist.

LAUNCH SHELTER PROCEDURE CHECKLIST			
FACILITY NUMBER _____, AURAL WARNING ZONE _____ Building Custodian (Primary) _____ Phone Number _____ (Name) Building Custodian (Alternate) _____ Phone Number _____ (Name)			
NO: ITEM	YES	NO	N\AN/A
PRE-LAUNCH 1. Announcement: (Message #1) Consolidated Support Operations Center will make announcements beginning at L-48 hours, repeating every four (4) hours (unless the launch is classified) advising personnel that launch shelters may be required for the launch. Long-term preparation of the launch shelter may begin here. You may also determine if your facility/facilities will be used during the launch and who will be in charge of the facility. 2. At L-2 hours if the SLD 45 on-base toxic Launch Commit Criteria (LCC) is exceeded, (Message #2) Consolidated Support Operations Center will instruct personnel to identify their launch shelter, and for personnel with documented respiratory disorders, to relocate to up-wind shelter locations. This the shelter manager's cue to complete the following shelter preparation: a. Begin closing windows and doors (except entrances). b. Prepare a sign-in roster for shelterees. c. Implement special instructions (from facility list) for example: (1) Turn off Heating, Ventilation, and Air Conditioning (HVAC) system (list in detail the steps required to do so) (2) Close dampers on HVAC system 3. At L-1 hour, if the SLD 45 on-base toxic LCC is exceeded, Consolidated Support Operations Center will direct personnel to their launch shelters and for the launch shelter manager to activate their shelter. Personnel may remain outside to view the launch, but they must be located in close proximity to their shelter for immediate sheltering, if so directed.			

LAUNCH/ACCIDENT 1. The next announcement may direct personnel to shelter from an exhaust plume or accident. When this announcement comes, get personnel to enter the shelter. 2. Ensure personnel enter shelter and sign in. 3. Ensure all windows and doors are secured (doors should be guarded). 4. Restrict telephone usage to emergency and official calls. 5. Brief personnel on shelter procedures. **ALL-CLEAR** If your shelter is located outside impact limit lines (ILL), remain in shelter until all clear for your area has been issued over the Cape Aural Warning system. If your shelter is located inside the ILL, remain in the shelter until retrieved by the Launch Emergency Operations Center.			