



LANGLEY RESEARCH CENTER

LPR 8715.5B

Effective Date: 5/17/24

Expiration Date: 5/17/29

Range Safety Procedures and Requirements

National Aeronautics & Space Administration

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1. PURPOSE

This document describes the policies and coordination required to operate on NASA Langley ranges. Included are an overview of procedures for obtaining authorization for range use and project coordination between the range user and NASA Langley Research Services Directorate (RSD). This document will enable the Uninhabited Aerial Systems Operations Office (UASOO) to effectively plan for and support, as needed, the range user's project.

1.1. Applicability

It is the policy of National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC) (hence forth referred to as the Center), to abide by the range safety criteria in NASA Procedural Requirement (NPR) 8715.5B, Range Flight Safety Program, NASA Standard (STD) 8719.25, Range Flight Safety Requirements, and applicable sections to range safety of NPR 8715.3D, NASA General Safety Program Requirements, to provide for overseeing, monitoring, and evaluating Center and project implementation during range operations. This document prescribes rules governing the following:

- 1.1.1. Uninhabited Aerial Systems (UAS) Operations on Center and/or under NASA Certificates of Authority (COAs).
- 1.1.2. Crewed aircraft engaged in test and evaluation operations over Center (as defined in Section 7 CERTAIN range) when those operations involve activities such as drop tests, laser operations, or other hazardous instruments or payloads and could pose a risk to the public, NASA workforce, or property.
- 1.1.3. Other vehicles - e.g., moored balloons, kites, amateur rockets, unmanned free balloons, tethered UAS, robotic vehicles or any temporary or permanent operations that occupy the surface area of the CERTAIN range for research purposes.
- 1.1.4. Systems – e.g., ground based laser operations, total data stations, weather stations, etc. or any research operations that occupy the surface area of the CERTAIN range.
- 1.1.5. Non-participants within proximity to operations – e.g., pedestrians, bicyclists, motor vehicles, etc. who may enter a hazardous area.
- 1.1.6. Permanent and temporary UAS ranges, launch sites, or landing sites operated or controlled by the Center.

2. ROLES AND RESPONSIBILITIES

Several organizations play a role in facilitating Langley range operations. Their roles and responsibilities are described below. The focal point for coordination with all these organizations resides with the UASOO.

- 2.1. **Research Services Directorate** – RSD is the designated authority for range activities operated on behalf of the Center and is directly responsible to the Center Director for the safe and effective conduct of those activities. This responsibility includes maintaining operational and standards oversight of all airborne operations operated on behalf of the Center. All disputes and conflicts with range usage will be funneled up through the UASOO to RSD leadership for resolution.
- 2.2. **Center Range Flight Safety Lead** – CRFSL is responsible for overseeing, monitoring, and evaluating the Center and project range safety requirements implementation of NPR 8715.5B, NASA-STD-8719.25, NPR 8715.3D, and applicable laws and regulations. The CRFSL shall be notified of all operations defined in Sections 1.1.1.-1.1.6.
- 2.3. **Uninhabited Aircraft Systems Operations Office** – UASOO is responsible for:
 - 2.3.1. Managing and coordinating all Letters of Procedure (LOPs), Memorandum of Agreements (MOAs), Certificates of Authorization (COAs), or additional agreements necessary to conduct UAS operations both on Center and at designated external flight areas off Center. Designated external UAS ranges are defined as those sites currently under a LaRC LOP, MOA, and/or COA.
 - 2.3.2. Conducting and/or providing guidance with reviews of planned range UAS operations. This guidance may include assistance with Airworthiness Reviews, Hazard Working Groups, and Operational or Flight Readiness Reviews.
 - 2.3.3. Approving and scheduling range operations and, if needed, providing support for those operations.

- 2.3.4. Working with the project to help coordinate clearances for airspace, aquatic, and land use impact from the Federal Aviation Administration (FAA), LaRC Environmental Management Office, Langley Air Force Base (LAFB), private landowners, and partnering government agencies.
- 2.3.5. Coordinating with LAFB and submitting NOTAMS for all airborne Center operations that launch from the CERTAIN range and fly in the national airspace (see Section 7 for the definition of CERTAIN). Note: Caged flights and tethered flights less than 150 feet do not constitute flights in the national airspace.
- 2.3.6. Monitoring all LAFB Tower communications for flights in the national airspace that launch from or recover to the CERTAIN range.
- 2.3.7. Conducting monthly range inspections at the CERTAIN range that include the condition of range facilities, fencing, and hard surface areas.
- 2.4. **Safety & Facility Assurance Branch** – SFAB is responsible for:
 - 2.4.1. Establishing the safety, reliability, and maintainability policies and technical requirements for NASA Langley Research Center’s facilities and operations. The Center’s facilities consist of a wide range of continuous circuit and blow-down wind tunnels, material testing apparatus, laboratory and range operations, and flight simulators.
 - 2.4.2. Planning, developing, and implementing facility assurance programs and controls for the safety of personnel, protection of property, and reliability of facility operations.
 - 2.4.3. Providing safety and facility assurance support to the Center through the following activities: Facility Assurance, Occupational Safety and Industrial Hygiene, and Fire and Emergency Services.
 - 2.4.4. Participating in the various reviews listed in Section 2.3.2, if requested by the CRFSL.
 - 2.4.5. Reviewing and approving UAS operations that require the use of airspace over designated [no-fly zones \(ArcGIS Enterprise - LaRC No Fly Zones \(nasa.gov\)\)](#) on the CERTAIN range, involve over-flight of people (operations over people) or involve designated no-fly zone facilities on Center (see Section 7 for the definition of CERTAIN).
- 2.5. **Langley Air Force Base** - LAFB Tower submits the Notice to Air Mission (NOTAM) information to the FAA for Center specific flight operations and provides flight approval for all UAS flight operations on Center (as defined in Section 7 CERTAIN range). When LAFB Tower is closed, NOTAM submission and approval to launch is handled in accordance with the approved airspace authorization.
- 2.6. **Environmental Management Office** - EMO is responsible for:
 - 2.6.1. Overseeing, monitoring, and compliance with federal, state, and local government environmental regulations and mandates.
 - 2.6.2. Conducting environmental reviews of the range in accordance with federal, state, and local government environmental regulations and mandates (e.g., ensuring water quality, air quality, and mission impact to sub-surface levels are in compliance).
- 2.7. **Office of Protective Services** – OPS is responsible for:
 - 2.7.1. Policy formulation, oversight, coordination, and management of agency protective services, fire and security services, counterintelligence, counterterrorism, emergency management planning, and continuity of operations functions.
 - 2.7.2. Participating in the various reviews listed in Section 2.3.2.
 - 2.7.3. Approving operations on the CERTAIN range that require road closures, keep out areas, etc. (see Section 7 for the definition of CERTAIN).
- 2.8. **Spectrum Management Office** – SMO is responsible for:
 - 2.8.1. Issuing LaRC radio frequency spectrum authorizations and coordinating with National Telecommunications and Information Administration for radio frequency authorizations (RFA).
 - 2.8.2. Tracking all radio frequency emissions on center.
- 2.9. **Technical Authority** – The CRFSL and SFAB have Safety and Mission Assurance technical authority over NASA Langley ranges.

3. RANGE SAFETY

- 3.1. UASOO will review all activities conducted on NASA Langley ranges involving UAS flights or any outdoor research or operations related activities that have the possibility of creating hazardous situations for mission essential or non-participant personnel. All range activities will be conducted in accordance with safety policy and criteria established in NPR 8715.3D, NASA General Safety

4. RANGE RESTRICTIONS

- 4.1. To minimize impact to non-participants within proximity to hazardous operations, UASOO will coordinate signage, community communication (LaRC internal and external), road closures, personal protective equipment, and keep out areas as appropriate with LAFB, OPS, Facility Coordinators, and LaRC Dispatch. Range restrictions are highly dependent upon the type of operation and their necessity will be assessed based on risks and available mitigations.

5. FREQUENCY UTILIZATION AND MANAGEMENT

- 5.1. An approved radio frequency spectrum authorization issued by the Spectrum Management Office shall be submitted to UASOO prior to range scheduling.
- 5.2. Range users should coordinate with the Spectrum Management Office for appropriate electromagnetic interference testing if required.

6. SCHEDULING

- 6.1. UASOO has developed several procedures to facilitate the scheduling of airspace and ground operations. Range users shall coordinate with UASOO prior to conducting range operations via email at larc-uas-ops@mail.nasa.gov.
- 6.2. The range user shall submit project scheduling information to UASOO by third Wednesday of every month for the following month's activities. Every effort is made to resolve conflicts between projects in a manner that permits each project to successfully complete milestones on an acceptable schedule.
- 6.3. Range scheduling meetings are held monthly. As new information becomes available, schedules are updated, and projects are notified of relevant changes.
- 6.4. Range scheduling services include integrating operations (e.g., UAS, balloon, systems, tethers, etc.) into the range schedule, scheduling individual range assets/resources for specific project requirements so simultaneous operations planning can occur, and reporting potential conflicts. Other services include tracking and scheduling facilities maintenance schedules around mission operations, scheduling project reviews, and presentation of any above information at various meetings and reviews.

7. CERTAIN RANGE

The Center City Environment Range Testing for Autonomous Integrated Navigation (CERTAIN) range is approximately 800 acres of urban and rural airspace within the boundaries of Langley Research Center that currently extend from the surface to 400 ft AGL and was established for UAS use. See Figure 1 for layout of the CERTAIN operations areas. The guidelines for CERTAIN are defined in a Letter of Procedure (LOP) agreement with LAFB. Depending upon the current LOP agreement and COA used, approved airborne operations may extend beyond the limits of the current CERTAIN range. Contact the UASOO for the current LOP.

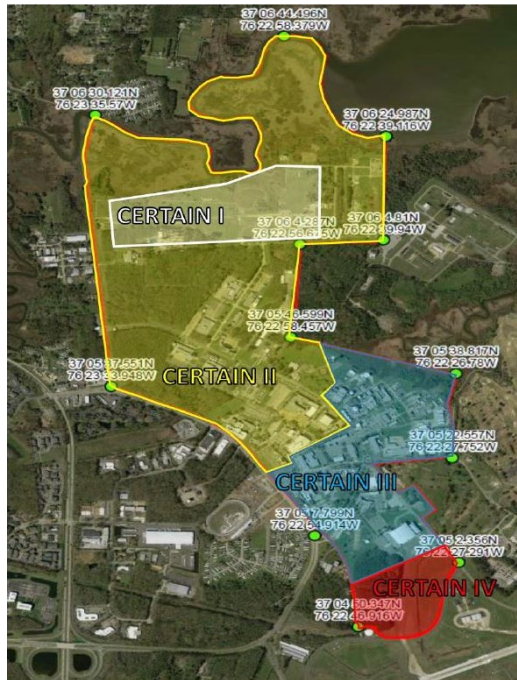


Figure 1: CERTAIN Operations Areas

- 7.1. **UAS Operations** - The LOP with LAFB identifies responsibilities for the safe, orderly, and expeditious operation of UAS in LAFB's Class D airspace, as well as provides instructions for operations of UAS when LAFB's Air Traffic Control Tower is closed (e.g., holidays, after hours), during which the airspace becomes Class G.
- 7.2. **14 CFR Part 107 UAS Operations** - If a range user wishes to conduct UAS operations under 14 CFR Part 107 (operations as a civil operator), it is required to first coordinate with UASOO to determine adherence with the LOP, 14 CFR Part 107, NPR 7900.3D, and LPR 1710.16J.
- 7.3. **National Airspace Rules and Regulations for Aircraft**- All aircraft operations not under Part 107 will be conducted in compliance with applicable Title 14 CFR regulations (i.e., Title 14 CFR Chapter I; part 91, part 135, part 137, etc.). If the operator cannot adhere to these requirements a separate FAA Form 7711-2 Waiver or an RSD waiver in accordance with NPR 7900.3D may be required.
- 7.4. **14 CFR Part 101 Operations** - 14 CFR Part 101 regulates moored balloons, kites, amateur rockets, and unmanned free balloons. Coordination with UASOO is required for these types of operations from the CERTAIN range to manage communication with LAFB, deconfliction of user groups, and range scheduling.
- 7.5. **Systems Operations** - If a range user desires to use a system as defined in Section 1.1.4 of this document on the CERTAIN range, they are required to coordinate with UASOO for deconfliction of user groups and range scheduling.
- 7.6. **Other vehicles** - If a range user desires to use a vehicle as defined in Section 1.1.3 of this document and not defined in 14 CFR Part 101 operations on the CERTAIN range, they are required to coordinate with UASOO for a safety review, deconfliction of user groups, and range scheduling.

8. CERTAIN RANGE FACILITIES

CERTAIN has several facilities supporting range operations. Unless specified otherwise, coordinate with the UASOO for use of these facilities.

- 8.1. **Vertiports** - A vertiport is a defined area that can support the landing and take-off of Vertical Take-off and Landing (VTOL) aircraft during flight operations. There are currently three vertiport locations located in CERTAIN I and II. The ramp in front of the hangar (building 1244) could also be used as a vertiport.
- 8.2. **Trailers** - Several different sized trailers are available for use for storing and transporting equipment, acting as mobile command centers, providing shelter during cold/hot weather operations, etc.

- 8.3. **Pavilion** – An open-air pavilion with shore power and tables is available on the CERTAIN I range.
- 8.4. **Outdoor Cages** – An open-air, fully netted (four sides and a ceiling, 100 ft x 50 ft x 36 ft) cage is available on the CERTAIN I range. Coordinate with UASOO for CERTAIN I cage use. An additional indoor/outdoor cage (60 ft x 60 ft x 50 ft) is available for use at building 1230. Coordinate with the Building 1230 Facility Coordinator for 1230 cage use. A temporary netted cage at the Gantry (110 ft x 110 ft x 120 ft) is also available for use. Coordinate with the Gantry and UASOO for Gantry cage use.
- 8.5. **Mission Operations & Autonomous Integration Center (MOSAIC)** - MOSAIC is an indoor operational facility on Center for remote UAS operations. It is possible to monitor and control UAS as well as communicate with test range personnel and air traffic control.
- 8.6. **Remote Operations for Autonomous Missions (ROAM)** – ROAM is an indoor research facility on center for remote UAS operations. It is possible to monitor and control UAS as well as communicate with test range personnel and air traffic control. Coordinate with Crew Systems Aviation and Operations Branch for use of ROAM.
- 8.7. **Range Radar** – Radars are available for monitoring airspace on and around the CERTAIN range.
- 8.8. **Range Cameras** – Camera feeds are available from established vertiports.
- 8.9. **Weather Stations** – Weather stations are located across the Center and weather data is readily available if needed.

9. LANGLEY EXTERNAL UAS FLIGHT AREAS

Off Center UAS flight areas are typically defined and operated under a COA issued by the FAA's Air Traffic Organization to a public operator (e.g., Government organizations) for flight operations over a specified period (i.e., temporary). Other external flight areas may be established under MOAs or LOPs. For the purposes of this policy an External UAS flight area is considered under RSD's UASOO supervision when Center personnel are operating, supporting, or sponsoring flight activities under a Center COA, P107 authority, NASA-FAA MOA, NASA Blanket UAS COA or other agreement established between UASOO or NASA Headquarters and the desired flight area.

- 9.1. **UAS National Airspace Operations** – If a user wishes to conduct operations under a LaRC COA, it is required to coordinate with UASOO to determine adherence with applicable UAS related COAs, NPR 7900.3D, and LPR 1710.16J.
- 9.2. **14 CFR Part 107 UAS Operations** – If a user wishes to conduct operations under 14 CFR Part 107 (operations as a civil operator), it is required to first coordinate with UASOO to determine adherence with 14 CFR Part 107, NPR 7900.3D and LPR 1710.16J
- 9.3. **NASA – FAA sUAS Memorandum of Agreement (MOA)** – If a user wishes to conduct operations under the NASA-FAA MOA, it is required to first coordinate with UASOO to determine adherence with the MOA, NPR 7900.3D and LPR 1710.16J.
- 9.4. **National Airspace Rules and Regulations for Aircraft**- All aircraft operations not under Part 107 will be conducted in compliance with applicable Title 14 CFR regulations (i.e., Title 14 CFR Chapter I; part 91, part 135, part 137, etc.). If the operator cannot adhere to these requirements a separate FAA Form 7711-2 Waiver or an RSD waiver in accordance with NPR 7900.3D may be required.
- 9.5. **14 CFR Part 101 operations** - 14 CFR Part 101 regulates moored balloons, kites, amateur rockets, and unmanned free balloons. Coordination with UASOO is required for these types of operations from designated external flight areas to manage communication with appropriate air traffic control facility, deconfliction of user groups, and scheduling.
- 9.6. **Systems or Vehicle Operations** - If a user desires to use a system or vehicle defined in Section 1.1.3 or 1.1.4 of this document on a designated external UAS flight area, it is required to coordinate with UASOO for deconfliction of user groups and scheduling.

10. LANGLEY RANGE SAFETY POLICIES

- 10.1. **Ground Safety** - Specific policies and criteria, such as radiation exposure limits, power switching, multiple operations, electro-explosive circuit requirements, electrical storm criteria, radio frequency (RF) restrictions, personnel requirements, radioactive sources, lifting operations, and pressure vessels, shall be coordinated with the appropriate subject matter expert at the center. All operations will be planned by the range user to minimize the risks involved and deconflict range users while

enhancing the probability for attaining mission objectives. All non-participants within proximity to the operations (see definition in Section 1.1.5) shall comply with posted road closures, keep out zones, and signage near the designated flight area. As such, ground safety activities shall plan mitigations such that non-participants should readily observe the keep out zones and reduce the probability of inadvertent intrusion into an unsafe area. Coordinate with UASOO for operations safety planning and range policy adherence.

- 10.2. **Flight Safety** - Specific flight safety policies and criteria for impacts, land over-flights, and ship and aircraft hazard areas are defined in various policies identified in Section 11. All flights on LaRC UAS ranges will be planned to minimize the risks involved and deconflict range users while enhancing the probability for attaining mission objectives. Coordination with UASOO is required to assure compliance with additional applicable policies for range user operations as well as range scheduling.

11. REFERENCE

- 11.1. NASA Policy Directive (NPD) 8700.1, NASA Policy for Safety and Mission Success
- 11.2. NASA Procedural Requirement (NPR) 8715.5B, Range Flight Safety Program
- 11.3. 14 CFR Part 107, Small Unmanned Aircraft Systems
- 11.4. NASA-STD-8719.25, Range Flight Safety Requirements
- 11.5. 14 CFR Part 101, Moored Balloons, Kites, Amateur Rockets, and Unmanned Free Balloons
- 11.6. LPR 1710.16J, Aviation Operations and Safety Manual
- 11.7. NPR 8715.3, NASA General Safety Program Requirements
- 11.8. NPR 7900.3D, Aircraft Operations Management
- 11.9. 14 CFR part 91, General Operating and Flight Rules

APPENDIX: A ACRONYMS

AGL	Above ground level
CERTAIN	City Environment for Range Testing of Autonomous Integrated Navigation
CFR	Code of Federal Regulations
COA	Certificate of Authority
CRFSL	Center Range Flight Safety Lead
EMO	Environmental Management Office
FAA	Federal Aviation Administration
LAFB	Langley Air Force Base
LaRC	Langley Research Center
LOP	Letter of Procedure
LPD	Langley Policy Directive
LPR	Langley Procedural Requirements
MOSAIC	Mission Operations & Autonomous Integration Center
NASA	National Aeronautics and Space Administration
NOTAM	Notice to Air Mission
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OPS	Office of Protective Services
RF	Radio frequency
RFA	Radio frequency authorization
RSD	Research Services Directorate
SFAB	Safety and Facilities Assurance Branch
SMO	Spectrum Management Office
STD	Standard
UAS	Uninhabited Aerial Systems
UASOO	UAS Operations Office
VTOL	Vertical Take-off and Landing