DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Waiver to Space Exploration Technologies Corporation of Acceptable Risk Limit for Launch

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of waiver.

SUMMARY: This notice concerns a petition for waiver submitted to the Federal Aviation Administration (FAA) by Space Exploration Technologies Corporation (SpaceX) to waive a limit that the risk to the public from the launch of an expendable launch vehicle not exceed an expected average number of 0.00003 casualties ($E_c \leq 30 \times 10^{-6}$) from far field blast overpressure. The FAA grants the petition, but limits collective risk to an expected average number of 0.0001 casualties.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this waiver, contact Charles P. Brinkman, Licensing Program Lead, Commercial Space Transportation—Licensing and Evaluation Division, 800 Independence Avenue SW., Washington, DC 20591; telephone: (202) 267–7715; email: *Phil.Brinkman@faa.gov.* For legal questions concerning this waiver, contact Laura Montgomery, Manager, Space Law Branch, AGC–250, Office of the Chief Counsel, Regulations Division, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–3150; email: *Laura.Montgomery@faa.gov.*

SUPPLEMENTARY INFORMATION:

Background

On July 10, 2013, SpaceX submitted a petition to the FAA's Office of Commercial Space Transportation (AST) requesting a waiver for a launch from Vandenberg Air Force Base (VAFB) of a Falcon 9 Version 1.1 (v1.1) launch vehicle carrying, a Canadian scientific and research satellite called Cassiope, and several small secondary payloads. SpaceX requested a waiver of 14 CFR 417.107(b)(1), which prohibits the launch of an expendable launch vehicle if the total expected average number of casualties (E_c) for the launch exceeds 0.00003 for risk from far field blast overpressure.

The FAA licenses the launch of a launch vehicle and reentry of a reentry vehicle under authority granted to the Secretary of Transportation in the Commercial Space Launch Act of 1984, as amended and re-codified by 51 U.S.C. Subtitle V, chapter 509 (Chapter 509), and delegated to the FAA Administrator and the Associate Administrator for Commercial Space Transportation, who exercises licensing authority under Chapter 509.

SpaceX is a private commercial space flight company. It has initiated activities with the U.S. Air Force's EELV Program to become a certified launch service provider for National Security space missions. In addition, SpaceX launches commercial payloads such as Cassiope.

This petition for waiver addresses an upcoming flight that SpaceX plans to undertake transporting the Cassiope satellite and several small secondary payloads to earth orbit. This will be the first launch by SpaceX from VAFB. It will also be the first flight of the Falcon 9 v1.1 vehicle, which is larger and has greater thrust and payload capacity than SpaceX's Falcon 9 vehicle. SpaceX's Falcon 9 v1.1 launch vehicle will launch from VAFB and place the Cassiope satellite into a near-polar orbit. The launch vehicle will also carry five secondary payloads to the same orbit. The first stage will coast after stage separation, and then perform an experimental burn with three engines to reduce the entry velocity just prior to entry. Prior to landing in the water, it will perform a second experimental burn with one engine to impact the water with minimal velocity. The second stage will coast and then perform an experimental burn to depletion.

The preliminary calculation of E_c for far field blast overpressure shows that the launch would exceed the 0.00003 limit imposed by section 417.107(b)(1) under anticipated weather conditions for a daytime launch in September. Atmospheric conditions at the launch site during the anticipated time of launch increase the far field blast overpressure risk. The presence of inversion layers at VAFB is common, and results in the reflection of shock waves from an explosion. This reflection of shock waves can cause greater damage than would otherwise be caused without the reflection from the inversion layer. Chances of advantageous weather conditions during the day in September that would allow a launch that meets the FAA's risk requirements are virtually zero percent.[1]

The Falcon 9 v1.1 is a new launch vehicle. The U.S. Air Force has determined that its overall failure probability is nearly fifty percent for each of the first two launches. AST has determined that the Air Force's calculation of probability of failure satisfies the requirements in part 417. Weather conditions during the day in September are likely to be unfavorable and delays may last for days. SpaceX, therefore, seeks a waiver of this risk requirement.

Waiver Criteria

Chapter 509 allows the FAA to waive a license requirement if the waiver (1) will not jeopardize public health and safety, safety of property; (2) will not jeopardize national security and foreign policy interests of the United States; and (3) will be in the public interest. 51 U.S.C. 50905(b)(3) (2011); 14 CFR 404.5(b) (2011).

Sections 417.107(b)(1) Waiver Petition

Section 417.107(b)(1) prohibits the launch of a launch vehicle if the E_c for the flight exceeds 0.00003 for any of the following three risks: (1) Impacting inert and impacting explosive debris, (2) toxic release, and (3) far field blast overpressure. For reasons described below, the FAA waives the restrictions in section 417.107(b)(1) to allow SpaceX to conduct a flight with the E_c resulting from far field blast overpressure exceeding 0.00003 as long as total E_c for the three hazards combined does not exceed 0.0001. The FAA is not waiving the E_c requirement for impacting inert and impacting explosive debris or for toxic release.

Launch of the Falcon 9 Vehicle

The FAA waives the far field overpressure risk requirement of section 417.107(b)(1) because the Falcon 9 v1.1 launch will not jeopardize public health and safety or safety of property, a national security or foreign policy interest of the United States, and is in the public interest.

i. Public Health and Safety and Safety of Property

The Falcon 9 v1.1 launch is the first launch of the v1.1 vehicle, and the first SpaceX launch from VAFB. Although the risk from far field blast overpressure is likely to exceed 0.00003, the estimated risks for debris and toxic release are very low. Based on preliminary calculations performed by the U.S. Air Force for SpaceX, the collective risk to the public from the Falcon 9 v1.1 launch will be less than 0.0001 approximately forty percent of the time during September.[2] NASA, the

[1] In calculating this percentage, the FAA relies on the standard model developed by the 30th Space Wing from observation of Mission Flight Control Officer response times to initiate flight destruction of a malfunctioning launch vehicle. The 30th Space Wing uses this standard time for its analysis.

[2] The FAA assumes the standard model developed by the 30th Space Wing from observation of Mission Flight Control Officer response times to initiate flight destruction of a malfunctioning

U.S. Air Force and other U.S. National Test ranges use 0.0001 as the expected casualty limit across all three hazards as their criterion *See* U.S. Air Force Instruction 91–217, *Space Safety and Mishap Prevention Program* (2010); NASA Procedural Requirements 8715.5 Rev A, *Range Flight Safety Program* (2010); Range Commanders Council (RCC) Standard 321–10, *Common Risk Criteria Standards for National Test Ranges* (2010). If the Falcon 9 v1.1's collective risk were to exceed 0.0001 expected casualties, SpaceX would not launch until conditions improved sufficiently for the risk of the launch to satisfy the limits allowed by the waiver.

The increase in the E_c for the first launch of the Falcon 9 v1.1 vehicle from VAFB is largely attributable to two factors. First, the launch will take place from VAFB. VAFB is located in California, and frequently experiences unique weather conditions that exacerbate far field blast overpressure from a launch. An inversion layer, an atmospheric region with a warmer temperature than the region below, is common much of the year at VAFB. The presence of an inversion layer could increase damage caused by an explosion because an inversion layer may reflect the shock wave from an explosion back towards the ground. By reflecting the shock wave back towards the ground, surrounding buildings, and particularly glass windows, may experience greater pressure, which could cause greater glass breakage. Second, the estimated probability of failure to the Falcon 9 v1.1 is high because it is a new launch vehicle. There is no way to reduce this estimated failure probability, which is derived from the historically high number of launch failures in new vehicles. This probability of failure is one of the most critical variables in the E_c calculations.

This waiver for the risk from far field blast overpressure is consistent with the Air Force total risk threshold for E_c of 100×10^{-6} for risks from debris, toxic release, and far field blast overpressure combined. The current E_c requirement for U.S. Government launches from U.S. National Test Ranges is 0.0001, which, because it comprises debris, toxics, and overpressure, means that the federal launch ranges permit the risk attributable to overpressure to exceed the FAA's risk threshold. *See* Air Force Instruction 91–217, *Space Safety and Mishap Prevention Program* (2010). The U.S. Air Force approved a government launch of a Titan, where the risk ranged from 145 to 317 in a million. Dept. of the Air Force Memorandum, Overflight Risk Exceedance Waiver for Titan IV B–30 Mission, (Apr. 4, 2005). Additionally, the FAA granted a waiver on April 17, 2012, for risk from debris up to 0.000130 for a Falcon 9 launch from Cape Canaveral Air Force Station. *Waiver of Acceptable Risk Restriction for Launch and Reentry,* Notice of Waiver, 77 FR 24556 (April 24, 2012). Again, risk was largely a result of a relatively high failure probability that is unavoidably attached to a new launch vehicle. Based on the fact that risk will remain very low, and will be limited to the requirement for government launches (E_c of less than 0.0001), granting a waiver in this case would not jeopardize public health and safety or safety of property.

ii. National Security and Foreign Policy Implications

The FAA has identified no national security or foreign policy implications associated with granting this waiver.

iii. Public Interest

The waiver is consistent with the public interest goals of Chapter 509. Three of the public policy goals of Chapter 509 are: (1) To promote economic growth and entrepreneurial activity through use of the space environment; (2) to encourage the United States private sector to provide launch and reentry vehicles and associated services; and (3) to facilitate the strengthening and expansion of the United States space transportation infrastructure to support the full range of United States space-related activities. *See* 51 U.S.C. 50901(b)(1), (2), (4).

With a requirement that E_c be less than 0.00003 for far field blast overpressure, launch availability for the Western Range is estimated to be virtually zero percent due to atmospheric conditions at the launch site and the high failure probability necessarily assigned to a new launch vehicle. This would certainly make the launch site impractical for commercial launches, at least of new launch vehicles. Granting a limited waiver for risk from far field blast overpressure as long as the risk for all three risks does not exceed 100×10^{-6} increases launch availability for the first launch of Falcon 9 v1.1 at VAFB to approximately forty percent for September, depending on detailed analytical assumptions concerning flight termination action. VAFB is the most suitable U.S. launch facility for supporting the launches of satellites by large vehicles into polar orbits. Granting this waiver makes VAFB a viable site for commercial launches, helping to sustain the launch capacity for U.S. launch providers, thereby supporting the industrial base and lowering overall launch costs for commercial customers and the U.S. Government.

Additionally, the proposed launch is consistent with the principles and goals of the 2010 National Space Policy, which emphasizes the importance of developing a robust domestic commercial space transportation industry and acquiring commercial space services to meet United States Government requirements. The development of commercial launch service providers is crucial because, as noted in the 2010 National Space Policy, United States access to space depends in the first instance on launch capabilities. To that end, SpaceX has applied to the U.S. Air Force's EELV Program to become a certified launch service provider for National Security space missions. In accordance with the Air Force's approved New Entrant Certification Guide, SpaceX is required to demonstrate its compliance with EELV program requirements, including successfully demonstrating launches of the launch vehicle being proposed for certification. In the certification approach being taken under the New Entrant Certification Guide, SpaceX is required to successfully launch three Falcon 9 launch vehicles, the first of which is planned to be the Cassiope mission from VAFB. Each flight of the Falcon 9 builds heritage for this vehicle, which will be used by the United States Government. NASA has already contracted with SpaceX for Cargo Resupply Services missions from CCAFS using Falcon 9 v1.1. Accordingly, proceeding with the proposed launch is in the public interest.

Issued in Washington, DC, on August 19, 2013.

Kenneth Wong,

Licensing and Evaluation Division Manager, Commercial Space Transportation.

[FR Doc. 2013–20726 Filed 8–26–13; 8:45 am]

BILLING CODE 4910–13–P

launch vehicle. The 30th Space Wing uses this standard time for its analysis.

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Notice of Final Federal Agency Actions on Proposed Highway in Indiana

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Notice of Limitation on Claims for Judicial Review of Actions by FHWA and United States Fish and Wildlife Service (USFWS), DOI.