

SECOND ADDENDUM TO THE 2019 WRITTEN RE-EVALUATION FOR SPACEX'S REUSABLE LAUNCH VEHICLE EXPERIMENTAL TEST PROGRAM AT THE SPACEX LAUNCH SITE

Introduction

Since completing the Written Re-evaluation (WR; May 21, 2019) and the Addendum to the WR (August 21, 2019) for SpaceX's proposed reusable launch vehicle experimental test program at the Texas Launch Site, SpaceX has continued to develop its vehicle technology and testing approaches. The proposed experimental test program has progressed to the extent that further operational details can be provided and considered within the context of the 2014 *Final Environmental Impact Statement for the SpaceX Texas Launch Site* (2014 EIS). This addendum re-evaluates the potential environmental consequences of the updated operational details within the context of the 2014 EIS.

Proposed Action

The FAA's Proposed Action, which was the subject of the 2019 WR and is described in full in Section 2.1 of the 2014 EIS, is to issue launch licenses or experimental permits to SpaceX to conduct launches of a reusable suborbital launch vehicle from the Texas Launch Site.

Test Program Updates

Table 1 in the 2019 WR summarizes SpaceX's proposed phases of its experimental test program. Phase 1 is complete. Phase 2 included up to three small hops (up to 150 meters) and up to three medium hops (up to 3 kilometers). Phase 3 included up to three large hops (up to 100 kilometers). SpaceX is no longer proposing to perform the large hops in Phase 3. However, SpaceX is proposing to increase the flight altitude of the three medium hops associated with Phase 2 from 3 kilometers to approximately 30 kilometers. The test vehicle (referred to as Starship Mark 1 or Mk1) would be used for the Phase 2 testing. SpaceX plans to perform another set of medium hops up to 30 kilometers in Phase 3. The Starship Mark 2 or Mk2 vehicle would be used for Phase 3 testing. The previously proposed test plan and the revised test plan are shown in Tables 1 and 2. The test vehicles are nearly identical in appearance and have similar capabilities. Each serve different goals for final Starship development. Mk 1 and Mk 2 would use up to three Raptor engines powered by liquid oxygen and liquid methane, as described in the 2019 WR. The Starship Mk 1 and Mk 2 test vehicle are similar to the previous test vehicle (Starhopper) but are approximately 164 feet tall (100 feet taller than Starhopper).

Table 1. Original Proposed Phases of the Experimental Test Program

Phase	Test	Total # of Events ^a	Description
1	Wet Dress	5–10	Verify ground systems and spacecraft by fueling the vehicle.
	Static Fire	5	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the vehicle's engines.
	Small Hops	3	Verify engine ignition and thrust to lift the vehicle a few centimeters off the ground.
2	Small Hops	3	Engine ignition and thrust to lift the vehicle over 30 cm and up to 150 m.
	Medium Hops	3	Engine ignition and thrust to lift the vehicle over 30 cm and up to 3 km.
3	Suborbital Space Flight	3	Launch up to 100 km, flip the vehicle at high altitude, and conduct a reentry and landing.
Total Tests:		17	

Notes:

^a The total number events are for the entire test program (2–3 years) and do not represent a number of monthly or annual operations.

cm = centimeter; m = meter; km = kilometer; 1 cm = 0.40 inches; 1 m = 3.28 feet; 1 km = 0.62 miles

Table 2. Revised Proposed Phases of the Experimental Test Program

Phase	Test	Total # of Events ^a	Description
1 [Starhopper] (complete)	Wet Dress	5–10	Verify ground systems and spacecraft by fueling the vehicle.
	Static Fire	2	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the vehicle's engines.
	Small Hops	1	Verify engine ignition and thrust to lift the vehicle a few centimeters off the ground.
	Small Hops	2	Engine ignition and thrust to lift the vehicle over 30 cm and up to 150 m.
2 [Mk1]	Static Fire	2	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the vehicle's engines.
	Medium Hops	3	Engine ignition and thrust to lift the vehicle over 30 cm and up to 30 km.
3 [Mk2]	Static Fire	2	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the vehicle's engines.
	Medium Hops	3	Engine ignition and thrust to lift the vehicle over 30 cm and up to 30 km.
Total Tests:		17	

Notes:

^a The total number events are for the entire test program (2–3 years) and do not represent a number of monthly or annual operations.

cm = centimeter; m = meter; km = kilometer; 1 cm = 0.40 inches; 1 m = 3.28 feet; 1 km = 0.62 miles

Affected Environment

The existing conditions for the environmental impact categories analyzed in the 2014 EIS are unchanged except with regard to the test schedules identified in the 2019 WR.

Re-evaluation of Environmental Consequences

The re-evaluation of environmental consequences focuses on SpaceX's proposed changes to Phase 2 and 3 of the Starship experimental test program, specifically the change in altitude of the hops. As analyzed in the 2019 WR, Phase 2 included three small hops and three medium hops (a total of 6 launches) and three large hops during Phase 3. SpaceX is now proposing three medium hops in Phase 2 and three medium hops in Phase 3 (a total of 6 launches). The change in altitude for the medium hop from 3 km to 30 km would not change the expected environmental consequences as presented in the 2019 WR. Although the flight would be higher, the total amount of air emissions that could affect local air quality conditions would be the same, since there would be the same number of launches and the majority of air emissions are released above the mixing height (3,000 feet). Additionally, SpaceX has informed the FAA that 30 kilometers is their limit in order to not generate a sonic boom during the vehicle's descent. Therefore, there would be no increase in the amount of noise experienced by noise sensitive areas during the course of Phase 2. In summary, no impacts beyond those discussed in the 2019 WR are expected.

Conclusion

The 2014 EIS examined the potential for significant environmental impacts and defined the regulatory setting for impacts associated with the FAA issuing launch licenses and/or experimental permits to SpaceX that would allow SpaceX to conduct launches of the Falcon 9 and Falcon Heavy orbital vertical launch vehicles and a variety of reusable suborbital launch vehicles from a private launch site on privately owned property in Cameron County, Texas. The 2014 EIS included constructing a launch site and launching reusable suborbital vehicles. The 2019 WR evaluated SpaceX's proposed changes to launch operations at the launch site as analyzed in the 2014 EIS, specifically conducting experimental test launches of the Starship test vehicle. The 2019 WR concluded that issuance of launch licenses and/or experimental permits to SpaceX to conduct Phase 1 and Phase 2 launch operations did not require preparation of a new or supplemental environmental document.

Based on the above review and in conformity with FAA Order 1050.1F, Paragraph 9-2.c, the FAA has concluded that the issuance of launch licenses and/or experimental permits to SpaceX to conduct reusable launch vehicle experimental tests (up to three 30-kilometer flights) conforms to the prior environmental documentation, that the data contained in the 2014 EIS remain substantially valid, that there are no significant environmental changes, and that all pertinent conditions and requirements of the prior approval have been met or will be met in the current action. Therefore, the preparation of a supplemental or new environmental document is not necessary to support the FAA's action.

Responsible FAA Official:



Location and Date Issued:

Washington DC 11/06/2019