

# **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) 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**

During a small hop test in July 2019, a brush fire occurred near the launch pad. The fire was an unexpected incident and the SpaceX operations team notified the Brownsville Fire Department to assist with the incident. Given the pre-established safety zone for the hop test, there were no public safety concerns. The 2014 EIS characterized the potential for wildfires as low, but did state fires could occur from an explosion on the pad or an unplanned anomaly. SpaceX has implemented fire mitigation measures to reduce the risk of another wildfire. These mitigation measures are described in SpaceX's draft *Fire Mitigation and Response Plan* (Fire Plan; August 2019; attached). The FAA distributed the draft Fire Plan to the Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service (USFWS) on August 14, 2019 for review and comment.

The 2019 WR stated that SpaceX would use methane and liquid oxygen as propellants for the reusable launch vehicle, but did not specify the amount of methane remaining in the launch vehicle or what happens to the residual methane after a test operation is completed. After a test operation is completed, up to three tons of methane would be remaining in the test vehicle. The residual methane would be either transferred to the flare, transferred back into the methane tanks, or vented to the atmosphere, depending on the configuration of the test vehicle. When the test vehicle is still connected to the ground systems, the methane would be transferred back to the methane tanks. If the vehicle is connected to the ground systems and tests are performed without engine ignition, the methane would be transferred to the flare. When the vehicle has been disconnected from the ground systems, such as during a static fire or test launch, methane would be vented to the

atmosphere. Due to risks to personnel, SpaceX is unable to reconnect the vehicle to ground systems when methane remains on the vehicle. SpaceX is currently working to design a safe method to transfer the methane back to the tanks and reduce the amount of methane released.

The 2014 EIS stated that the majority of operations would be conducted between the hours of 7:00 a.m. and 7:00 p.m., but there could be one nighttime launch of a Falcon 9 or Falcon Heavy. The 2019 WR stated that test launches would not occur at night. SpaceX has informed the FAA that they never plan to conduct a static fire or launch (i.e., an operation that involves engine ignition) at night. However, due to 1) resolving issues leading up to a test operation during the day and 2) attempting to avoid closing the beach another day, SpaceX has conducted nighttime launch operations. Since starting test operations, SpaceX has conducted three operations at night (one static fire and two small hops). To avoid or minimize the chance of another nighttime test operation, SpaceX will now start pre-test preparations the day prior to a planned test. The nominal T-0 for any test that involves engine ignition is 1400.

## **Affected Environment**

The existing conditions for the environmental impact categories analyzed in the 2014 EIS are unchanged except with regard to the construction of the Phase 1 and Phase 2 facilities identified in the 2019 WR.

## **Re-evaluation of Environmental Consequences**

The re-evaluation of environmental consequences focuses on the three updates to operations: potential wildfire, amount and handling of residual methane, and nighttime operations (static fire or launch). Due to this limited scope, the following environmental impact categories are not included in the re-evaluation because no impacts beyond those discussed in the 2019 WR are expected: air quality; coastal resources; Department of Transportation Act Section 4(f); farmlands; hazardous materials, solid waste, and pollution prevention; historical, architectural, archeological, and cultural resources; land use; natural resources and energy supply; socioeconomic, environmental justice, and children's environmental health and safety risks; water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers); and cumulative impacts.

## **Biological Resources**

Based on previous test operations, the potential for a wildfire exists, which could result in a temporary loss of habitat. SpaceX developed a Fire Plan to avoid or reduce the potential for another wildfire. Because much of the vegetation around the launch pad was consumed during the wildfire (i.e., there is a reduction in fuel load around the pad), the potential for another wildfire in the near term (i.e., until the vegetation is re-established) in the same location has been reduced. SpaceX plans to maintain bare ground within their fence line to avoid or minimize the potential of a wildfire starting within their fence line. In addition to SpaceX's measures identified in the Fire Plan, the USFWS is in the process of identifying prescribed fire units around the launch site. This would keep fuel loads under control and reduce the potential for a wildfire. The FAA is not aware of any take of a species listed under the Endangered Species Act or critical habitat as a result of the wildfire.

As noted in the 2019 WR, potential impacts on species from nighttime lighting would be reduced by complying with the Facility Design and Lighting Management Plan, which was reviewed and approved by the USFWS. During sea turtle nesting season, SpaceX installs lighting in a downward configuration, unless operationally constrained, and directed away from the coastline to avoid or minimize light exposure to local wildlife. Up lighting and side lighting will only be used in the event that a mission critical operational need arises. Extendable pole lights will be reduced as much as possible.

SpaceX has performed nighttime surveys of the launch pad from the beach, and no lights were visible (see attachment). According to Sea Turtle Inc., as of August 2019, all sea turtle eggs have hatched or been recovered by Sea Turtle Inc. No additional nesting activity (or associated sea turtle beach surveys) are anticipated until 2020. The FAA is not aware of any take of a sea turtle as a result of SpaceX's operations. Although SpaceX will attempt to avoid nighttime launches for the rest of 2019, in the event a nighttime operation occurs, no adverse impacts to sea turtles (nesting females or hatchlings) are expected because females are done nesting and there are no known eggs remaining in the area. In 2020, SpaceX will comply with the terms and conditions stated in the USFWS Biological Opinion and the Lighting Management Plan, both of which are intended to avoid or minimize the risk of take of sea turtles.

Accordingly, the data and analyses contained in the 2014 EIS remain substantially valid, and the Proposed Action would not result in a significant impact on biological resources.

## Climate

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. The primary GHGs of concern are carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These emissions occur from natural processes and human activities. Each GHG is assigned a global warming potential. The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO<sub>2</sub>, which has a value of one. For example, methane has a global warming potential of 21, which means that it has a global warming effect 21 times greater than CO<sub>2</sub>, on an equal-mass basis. The equivalent CO<sub>2</sub> rate is calculated by multiplying the emission of each GHG by its global warming potential and adding the results together to produce a single, combined emission rate representing all GHGs, and this value is represented by "CO<sub>2</sub>e," which is defined as the carbon dioxide equivalent.

The 2014 EIS (Appendix L) estimated that construction and operations at the Texas Launch Site would emit 9,206 tons of CO<sub>2</sub>e emissions per year. In the event methane is not transferred back to the methane storage tanks or the flare, up to three tons of methane would be released to the atmosphere per test operation. The CO<sub>2</sub>e of three tons of methane is approximately 63 tons of CO<sub>2</sub>. The 2019 WR assessed a total of 24 operations that involve fueling the launch vehicle (wet dress rehearsals, static fires, small hops, and medium hops). As a conservative estimate, assuming that all of these operations release three tons of methane into the atmosphere, up to 1,512 tons of CO<sub>2</sub>e would be emitted. This is well below the 9,206 tons of CO<sub>2</sub>e emissions considered in the 2014 EIS. Accordingly, the data and analyses contained in the 2014 EIS remain substantially valid, and the Proposed Action would not result in significant climate-related impacts.

## **Noise and Noise-Compatible Land Use**

The 2014 EIS concluded that significant noise impacts would occur in Boca Chica Village during a nighttime launch of the Falcon 9 or Falcon Heavy. As noted above, SpaceX will implement operational controls to limit testing activities to daylight hours to the greatest extent possible. In the event a nighttime operations occurs, the launch vehicle would generate noise levels less than those levels noted in the 2014 EIS for Falcon 9 and Falcon Heavy (refer to the 2019 WR, Table 5). The predicted maximum overall sound pressure level at the nearest house location generated during a test vehicle launch is 91 A-weighted decibels (dBA). This is less the corresponding noise level for a Falcon 9 or Falcon Heavy. Accordingly, the noise levels generated during a test launch would be within the scope of the 2014 EIS. SpaceX is currently notifying the public in advance of launch operations to help minimize noise impacts on nearby residents.

## **Visual Effects (including Light Emissions)**

As noted in the 2019 WR, potential impacts on the landscape from nighttime lighting would be reduced by complying with the Facility Design and Lighting Management Plan, which was reviewed and approved by the USFWS, National Park Service, and other agencies involved in the project. SpaceX has performed nighttime surveys of the launch pad from the beach, and no lights were visible (see attachment). In the event a nighttime static fire or launch occurs, the operation would result in considerably higher levels of light emissions than those currently present from Boca Chica Village. For some launch operations (e.g., small or medium hops), residents of Boca Chica might be evacuated (depending on the FAA's calculated hazard area). In that case, the light emissions would not affect residents. Given the low frequency of expected nighttime launch operations, the Proposed Action is not expected to result in significant visual effects.

## **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.

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 (wet dress rehearsals, static engine fires, small hops, and medium hops) 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 , August 21, 2019