



U.S. Department
of Transportation
**Federal Aviation
Administration**

Commercial Space Transportation

800 Independence Ave., S.W., Rm 331
Washington, D.C. 20591

July 30, 2018

Mr. David Weil
SpaceIL
30 Haim Levanon Street
Engineering School, Tel Aviv University
P.O. Box 39040
Tel Aviv, 6139001
Israel

Dear Mr. Weil:

On February 20, 2018, we received your request for a Payload Review and Determination for your SpaceIL Lunar Lander and informed you by letter on February 22, 2018, that we were initiating our review. In accordance with 14 CFR § 415.51, the Federal Aviation Administration (FAA) reviewed the payload to determine whether it would jeopardize public health and safety, safety of property, U.S. national security or foreign policy interests, or international obligations of the United States.

SpaceIL provided the following information:

Payload Name

SpaceIL Lunar Lander

Payload Classes

The SpaceIL Lunar Lander is a spacecraft/lander capable of transfer from Earth orbit to the Moon, soft landing on the lunar surface, and performing post-landing relocations through propulsive "hops."

Physical Dimensions

Dimension	Metric	Imperial
Height	1535 [mm]*	5.04 [ft]
Max Diameter	2288 [mm]	7.51 [ft]
Weight (wet)	575 [kg]	1268 [lb]
Weight (dry)	<148 [kg]	326.5 [lb]

*Height with landing gear deployed. Height when on the launcher is 1651 [mm] / 5.42 [ft].

Payload Owner/Operator

The payload owner is SpaceIL. The spacecraft will be operated out of the Israel Aerospace Industries (IAI) mission operation center.

Orbital Parameters for Parking, Transfer, and Final Orbits

The spacecraft will be launched from Cape Canaveral by a SpaceX Falcon-9 vehicle and will be inserted to the following orbital parameters:

Orbital Parameters	Value
Perigee Altitude (km)	>200
Apogee Altitude (km)	60,000 +/- 840
Inclination (deg)	27.6 +/- 0.1
Argument of Perigee (deg)	180 +/- TBD

From this orbit, the spacecraft will continue its journey to the moon, using its own propulsion system. A phasing loop strategy has been chosen, with a plan to perform several Apogee Raising Maneuvers (ARM's).

Hazardous Materials

Hazardous materials contained onboard the spacecraft:

1. One battery composed of rechargeable lithium-ion cells with a total weight of 2.3 kg. Per 49 CFR 172.101 the quantity is below the limitation of 35 kg gross weight.
2. The propulsion system is a bi-propellant system, using:
 - a. MMH (UN# 1244) as a fuel with a total weight of 160 kg.
 - b. MON-3UL (UN# 1067) as an oxidizer with a total weight of 264 kg.
3. AGHP (axially grooved heat pipe) made from aluminum alloy 6063 with sealed ammonia (UN# 1005) as working fluid. Fluid quantity is approximately 20 grams.
4. Pressurized helium (MEOP 8000 PSI) - (UN# 1046), quantity of 1.26 kg.

Intended payload operations during the life of the payload

Intended mission of the payload is to perform a soft landing on the moon surface. Following the soft landing, the spacecraft will then perform a hop maneuver to an approximate distance of 500 meters and then come to a rest at the final landing position.

The spacecraft's payloads will include high definition camera and video capturing devices to capture video and images. The obtained images and videos are then transmitted back to earth.

The lunar lander will include a Lunar Magnetometer (SILMAG) to perform magnetic measurements during descent and landing on the lunar surface.

Data transmit to ground control will be performed via a transceiver onboard the spacecraft.

Delivery point in flight at which the payload will no longer be under the licensee's control

Upon landing on the lunar surface, the spacecraft is expected to remain operational for approximately 3 Earth days during which it will continue to transmit data acquired by onboard sensors and cameras.

Following the hop maneuver, no additional movement of the spacecraft is expected.

Additional Information

SpaceIL identified in its application that the mission is classed as a Mission Category II in accordance with the NASA Planetary Protection Mission Categories document. SpaceIL stated that it would provide documents upon need to FAA/AST, NASA, or other regulation bodies based on NPR 8020.109A as may be requested during the payload review process.

In its initial application, SpaceIL stated that the proposed landing sites do not include and are not in the vicinity of any other former lander locations including any of the Apollo heritage sites. It amended its application to provide the planned landing location on the northern part of the Mare Serenitatis, specifically at 32.6N, 17.5E. SpaceIL confirmed in its application that it will report the initial landing location and final resting location of the SpaceIL spacecraft on the Moon in an End of Mission report. In the case of an off-nominal impact on the lunar surface, the SpaceIL Mission will document the final impact location (to the resolution it is known).

Additionally, in an email on April 10, 2018, SpaceIL indicated that it agrees to define, as part of the mission protocol, to refrain from activation of any of the on-board cameras until the spacecraft is at least 1,000 km past geostationary altitude.

Determination

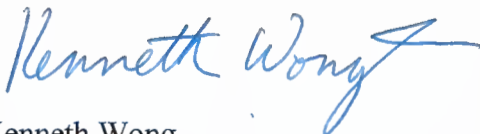
Based on the information you provided in your application and your supplemental responses to our requests for clarifications and additional information, we are pleased to inform you that we have made a favorable payload determination for the SpaceIL Lunar Lander. As long as none of the information that you have provided to us changes in a material manner or we do not become aware of any issues that our review did not consider that could affect this determination, we shall not reopen this payload determination. In other words, if a launch operator applies to the FAA for a license to launch a vehicle carrying the SpaceIL Lunar Lander payload, the favorable payload determination will be incorporated in our review of the license application. However, as required by 14 C.F.R. § 415.63, any change in information provided under § 415.59 must be reported in accordance with § 413.17 to ensure the continuing accuracy and completeness of the information you provided in your application. The FAA determines whether a favorable payload determination remains valid in light of reported changes and may conduct an additional payload review. Furthermore, we fully intend to require payload approvals, as appropriate, for secondary payloads that may be hosted by SpaceIL.

The FAA's enforceability of an applicant's representations in the course of the payload review is found in Chapter 509 of Title 51 and the FAA's regulations. Under 51 U.S.C.

§ 50917(a), no person, including a payload operator, may violate the FAA's regulations. The FAA plans to monitor SpaceIL's activities prior to launch through inspection or other verification of the execution of contamination control measures. The FAA will evaluate post-launch and end-of-mission reports that SpaceIL has committed to submit to determine consistency with the representations made in its application for this payload determination.

Should you have any questions, please contact me at (202) 267-8465 or by email at ken.wong@faa.gov.

Sincerely,

A handwritten signature in blue ink that reads "Kenneth Wong". The signature is fluid and cursive, with a long horizontal stroke at the end.

Kenneth Wong
Manager
Licensing and Evaluation Division