Commercial Space Transportation License

License Number: LSO 04-009 (Rev. 1)

Mojave Air & Space Port

is authorized, subject to the provisions of 51 USC Subtitle V, ch. 509, and the orders, rules, and regulations issued under it, to operate a launch site.

General. The licensee is authorized, as defined herein, to operate a launch site at Mojave Air & Space Port in Mojave, California.

This license is granted subject to the terms, conditions, and limitations set forth in licensing order A , and any subsequent orders issued by the Office of Commercial Space Transportation.

The licensee shall at all times conduct its operations in accordance with the regulations prescribed by the Office of Commercial Space Transportation for the activities authorized by this license.

US Department
of Transportation
Federal Aviation Administration

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

Original Issued On: June 17, 2004
Revision 1 Issued On: June 13, 2014
Revision 1 Effective On: June 17, 2014

Kenneth Wong

Manager, Licensing and Evaluation Division

Revision 1 - Issued June 13, 2014

1) Due to the recodification of the Commercial Space Launch Act in the federal code, redesignated Authority to read: "51 U.S.C. Subtitle V, Ch. 509."

2) The licensee has been changed from "East Kern Airport District" to "Mojave Air & Space Port" due to name change.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION

LICENSE ORDER REGARDING OPERATION OF A LAUNCH SITE

AUTHORIZED BY LICENSE NO. LSO 04-009 ISSUED TO

MOJAVE AIR & SPACE PORT

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1. Authority: This Order is issued to Mojave Air & Space Port under 51 U.S.C. Subtitle V, Ch. 509, and 14 C.F.R. Ch. III.

2. Purpose: This Order modifies License No. LSO 04-009, originally issued on June 17, 2004, by the Federal Aviation Administration's Office of Commercial Space Transportation (FAA/AST), authorizing Mojave Air & Space Port to operate certain portions of the Mojave Air & Space Port as a launch site at Mojave, California, and prescribes as conditions to License No. LSO 04-009 certain additional requirements applicable to the authorization to operate a launch site at Mojave Air & Space Port.

3. Authorization: Mojave Air & Space Port is authorized to operate a launch site:

   (a) consisting of runways 8-26 and 12-30, and an area with a 1250 foot radius centered at 35° 04′ 21.44″ North latitude and 118° 09′19.44″ West longitude

   (b) to support suborbital reusable launch vehicle missions authorized by an FAA license or permit to take-off at Mojave Air & Space Port.

4. Explosive Siting Requirements : Mojave Air & Space Port must comply with the following requirements within the launch site boundary:

   (a) for any explosive hazard facility where handling of incompatible energetic liquids occurs, Mojave Air & Space Port may have no more than 30,000 pounds in TNT equivalent weight of the energetic liquids at each explosive hazard facility.

(b) for any explosive hazard facility where handling of incompatible energetic liquids occurs and the quantity of liquids is more than 450 pounds of TNT equivalent weight, Mojave Air & Space Port shall restrict public foot traffic to a radius of not less than 1250 feet and public vehicular traffic to a radius of not less than 750 feet during handling of incompatible energetic liquids. Handling of incompatible energetic liquids includes engine test firing.

(c) for any explosive hazard facility where handling of incompatible energetic liquids occurs and the quantity of liquids is 450 pounds of TNT equivalent weight or less, Mojave Air & Space Port may establish a distance of less than 1250 feet in accordance with Table C9.T2 and C9.4.1.2.1.1.1 of DOD 6055.9 - STD, Oct. 5, 2004, as the distance within which members of the public may not enter.

(d) for the storage of LOX, kerosene and isopropyl alcohol, Mojave Air & Space Port must comply with National Fire Protection Association (NFPA) standards #55 (2005 edition) and #30 (2008 edition) for separation distance and spill containment requirements. For the storage and handling of other energetic liquids, including nitrous oxide, Mojave Air & Space Port must provide FAA/AST a plan for the safe storage and handling of these materials.

(e) for all handling and storage of energetic liquids, Mojave Air & Space Port must maintain the appropriate intraline distance. This distance must account for all quantities of energetic liquids to ensure appropriate minimum separation is maintained between the source of the explosive hazard and each public area, including each public road. Mojave Air & Space Port must use DOD 6055.9-STD of Oct. 5, 2004 or Appendix A to calculate the TNT equivalent weight of the energetic liquids. Mojave Air & Space Port must also use DOD 6055.9-STD of Oct. 5, 2004, to determine the intraline and public area distances for a given TNT equivalent weight.

5. Any hazardous launch vehicle processing, including propellant loading, installation of linear shaped charges, installation and activation of pyrotechnic devices, installation of solid rocket boosters, or other operations that could present a hazard to the public must be conducted within the launch site boundary in accordance with appropriate public area distances.

6. All vehicles, including aircraft, not participating in the licensed or permitted activities must be separated from launch vehicle ground operations at a distance equal to the public area distance.

7. License Term: The term of License No. LSO 04-009 (Rev 1) authorizing Mojave Air & Space Port to operate a launch site at Mojave Air and Space Port is five (5) years from June 17, 2014, the effective date of the renewal.

OFFICE OF COMMERCIAL SPACE TRANSPORTATIO
FEDERAL AVIATION ADMINISTRATION

By: Kenneth Wong

Kenneth Wong, Manager
Licensing and Evaluation Division

Issued: June 13, 2014

Effective: June 17, 2014

Revision History:

Original License Order - Issued June 17, 2004

Revision 1 - Issued December 20, 2007
1) Eliminates paragraphs 3, 5, 7, 8, 9, 10 and 11 because they repeat what 14 CFR part 420 already requires, and renumbers paragraph 12 as paragraph 5.

2) Changes paragraph 4 to paragraph 3 and revises as follows:

Authorization: EKAD is authorized to operate a launch site at Mojave Air and Space Port:

(a) consisting of runways 8-26 and 12-30, and those facilities involved in preparation of a launch vehicle for flight, including
i) the hangars used by Scaled Composites, LLC and XCOR Aerospace; and
ii) an area with a 1250 foot radius centered on the test site at 35° 04' 21.44" North latitude and 118° 09'19.44" West longitude.

(b) to support suborbital reusable launch vehicle missions authorized by an FAA license or permit to take-off at Mojave Air and Space Port.

3) Replaces in its totality paragraph 6 with paragraph 4 as follows:

Explosive Siting Requirements: EKAD must comply with the following requirements:

(a) for any explosive hazard facility where handling of incompatible energetic liquids occurs within the launch site boundary, EKAD may have no more than 30,000 pounds in net explosive weight of the energetic liquids at each explosive hazard facility.

(b) for any explosive hazard facility where handling of incompatible energetic liquids occurs within the launch site boundary, EKAD shall restrict foot traffic of all members of the public to a radius of 1250 feet and vehicular traffic to a radius of 750 feet during handling of energetic liquids. Handling of incompatible energetic liquids includes engine test firing.

(c) for any explosive hazard facility where the quantity of energetic liquids is 450 pounds of net explosive weight or less, EKAD may establish a distance of less than 1250 feet in accordance with Table C9.T2 and C9.4.1.2.1.1.1 of DOD 6055.9 - STD, Oct. 5, 2004, as the distance within which members of the public may not enter.

(d) for the storage of LOX, kerosene and isopropyl alcohol within the launch site boundaries, EKAD must comply with National Fire Protection Association (NFPA) standards #55 (2005 edition) and #30 (2008 edition) for separation distance and spill containment requirements.

(e) for all energetic liquids within the launch site boundaries, regardless of whether those energetic liquids are used for an aircraft or a launch vehicle, EKAD must maintain an intraline distance or EKAD must account for all quantities of energetic liquids to determine the distance for separating the explosive hazard facility from each public area, including each public road. EKAD must use DOD 6055.9-STD of Oct. 5, 2004, to determine the intraline and public area distances.

Revision 2 - Issued September 25, 2008
1) Revises paragraph 3(a) as follows:

(a) consisting of runways 8-26 and 12-30, and an area with a 1250 foot radius centered at 35° 04′ 21.44″ North latitude and 118° 09′19.44″ West longitude

2) Revises paragraph 4 as follows:

Explosive Siting Requirements : EKAD must comply with the following requirements within the launch site boundary:

(a) for any explosive hazard facility where handling of incompatible energetic liquids occurs, EKAD may have no more than 30,000 pounds in TNT equivalent weight of the energetic liquids at each explosive hazard facility.

(b) for any explosive hazard facility where handling of incompatible energetic liquids occurs and the quantity of liquids is more than 450 pounds of TNT equivalent weight, EKAD shall restrict public foot traffic to a radius of not less than 1250 feet and public

vehicular traffic to a radius of not less than 750 feet during handling of incompatible energetic liquids. Handling of incompatible energetic liquids includes engine test firing.

(c) for any explosive hazard facility where handling of incompatible energetic liquids occurs and the quantity of liquids is 450 pounds of TNT equivalent weight or less, EKAD may establish a distance of less than 1250 feet in accordance with Table C9.T2 and C9.4.1.2.1.1.1 of DOD 6055.9 - STD, Oct. 5, 2004, as the distance within which members of the public may not enter.

(d) for the storage of LOX, kerosene and isopropyl alcohol, EKAD must comply with National Fire Protection Association (NFPA) standards #55 (2005 edition) and #30 (2008 edition) for separation distance and spill containment requirements. For the storage and handling of other energetic liquids, including nitrous oxide, EKAD must provide FAA/AST a plan for the safe storage and handling of these materials.

(e) for all handling and storage of energetic liquids EKAD must maintain the appropriate intraline distance. This distance must account for all quantities of energetic liquids to ensure appropriate minimum separation is maintained between the source of the explosive hazard and each public area, including each public road. EKAD must use DOD 6055.9-STD of Oct. 5, 2004 or Appendix A to calculate the TNT equivalent weight of the energetic liquids. EKAD must also use DOD 6055.9-STD of Oct. 5, 2004, to determine the intraline and public area distances for a given TNT equivalent weight.

3) Replaces paragraph 5 with the following and renumbers paragraph 5 as paragraph 7.

Any hazardous launch vehicle processing, including propellant loading, installation of linear shaped charges, installation and activation of pyrotechnic devices, installation of solid rocket boosters, or other operations that could present a hazard to the public must be conducted within the launch site boundaries in accordance with appropriate public *area distances.*

4) Adds paragraph 6 as follows:

All vehicles, including aircraft, not participating in the licensed or permitted activities must be separated from launch vehicle ground operations at a distance equal to the public area distance.

Revision 3 - Issued May 5, 2009
1) In paragraph 7, change the term of the authorization from originating on the effective date of the original license to "from June 17, 2009, the effective date of the renewal".

Revision 4 - Issued June 13, 2014
1) In multiple location Replaced "East Kern Airport District" with "Mojave Air & Space Port" to reflect a name change.
2) In paragraph 1, replaced 49 U.S.C. §§70101-70121 with 51 U.S.C. Subtitle V, Ch. 509 due to a redesignation.

3) In paragraph 7, changed the license term from "five (5) years from June 17, 2009" to "five (5) years from June 17, 2014."
4) Changed the issued date "from "May 5, 2009" to "June 13, 2014" and the effective date from "June 17, 2009" to "June 17, 2014."

Appendix A

GUIDE TO CALCULATION OF TNT EQUIVALENT WEIGHT

1. Determine total weight of incompatible energetic liquids as described below. For converting volume to weight, use density factors of Table C9.T17 of DoD 6055.9-STD, 5 October 2004.

2. Use Table 1 to calculate TNT equivalent weight.

3. In calculating the weight used in determining the TNT equivalent weight, include all propellants present in the launch vehicle, or, if no launch vehicle is present, the total weight in test stand run tankage and piping for which there are no positive means to prevent mixing in credible mishaps.

4. If a vehicle or aircraft is participating in the licensed or permitted activities and is operated within the intraline distance from the launch vehicle or test stand the launch site operator will perform a hazard analysis or maximum credible event analysis to establish the minimum distance to public areas. This analysis will follow industry best practices and be available for inspection prior to such operations.

5. For small launch vehicles containing hydrogen peroxide > 60% as a monopropellant, or similar pressure vessels that provide heavy confinement (burst pressure greater than 100 psi), use 800 ft for intraline, public road, and public area distances.

Table 1. Energetic Liquid Explosive Equivalents[1,2,3,4]

Energetic Liquids	TNT Equivalence	TNT Equivalence
	Static Test Stands	Range Launch
LO_2/LH_2	See Note 3	See Note 3
LO_2/LH_2 + LO_2/RP-1	Sum of (see Note 3 for LO_2/LH_2) + (10% for LO_2/RP1)	Sum of (see Note 3 for LO_2/LH_2) + (20% for LO_2/RP1)
LO_2/RP-1	10%	20% up to 500,000 lbs Plus 10% over 500,000 lbs
IRFNA/UDMH [4]	10%	10%
N_2O_4/UDMH + N_2H_4[4]	5%	10%
N_2O_4 liquid oxidizer + PBAN solid fuel (Hybrid propellants)	15%	15%

[1] The percentage factors given in the table are to be used to determine equivalencies of energetic liquids mixture at static test stands and launch pads when such energetic liquids are located aboveground and are unconfined except for tankage. Other configurations shall be considered on an individual basis to determine equivalencies.

[2] The equivalencies apply also for the following substitutions:
Alcohols (e.g. methanol, ethanol) or other hydrocarbons (e.g. methane, propane, kerosene) for RP-1

H_2O_2 for LO_2 (only when LO_2 is in combination with RP-1 or equivalent hydrocarbon fuel)
MMH for N_2H_4, UDMH, or combinations of the two.

[3] For siting launch vehicles and static test stands, TNT equivalent weight is the larger of:
(a) The weight equal to $8W^{2/3}$ where W is the weight of LO_2/LH_2; or
(b) 14 percent of the LO_2/LH_2 weight.

[4] These are hypergolic combinations.

Maximum Credible Event (MCE): In hazard evaluation, the MCE from a hypothesized accident explosion, fire, or agent release is the worst single event that is likely to occur from a given quantity and disposition of explosives, chemical agents, or reactive material. The event must be realistic with reasonable probability of occurrence considering the explosion propagation, burning rate characteristics, and physical protection given to the items involved