

many of the other programs such as Atlas II and Titan, but initially there will be an overlap in the launches of each program. The Space X is a commercial program which will launch small payloads into low earth orbit. There is also a variety of small missiles, several types of interceptor and target vehicles, and fixed-wing aircrafts that are launched from VAFB.

Atlas IIAS

The Atlas IIAS is launched from Space Launch Complex (SLC) 3E on south VAFB, approximately 9.9 km (6.2 mi) from the Rocky Point harbor seal haul-out area and 11.1 km (6.9 mi) from the Spur Road haul-out site. The Atlas IIAS is a medium-sized (up to 48m, 157.5 ft, tall) launch vehicle with approximately 724,800 lbs of thrust. Two Atlas IIAS launch vehicles have been launched from SLC 3E (the Atlas IIAS AC-141 Terra launched on 18 December 1999 and the Atlas IIAS MLV-10 launched on 8 September 2001).

The received sound level at south VAFB from the Atlas IIAS launches was relatively quiet, due to the great amount of attenuation from the 9.9 km (6.2 mi) distance between the measurement site and SLC-3E. Measurements at the south VAFB haul-out site were similar to those measured at the north base Spur Road monitoring site, but slightly higher. The A-weighted sound exposure levels (ASEL), measured at the south haul-out site for the two launches, were 87.3 and 88.5 dB, the unweighted SELs were measured at 124.2 and 118.0 dB and the C-weighted SEL were measured to be 113.6 and 112.1 dB. The launch noise reached a maximum fast sound level (Lmax) of 76.4 and 80.8 dB.

The launch noise measured at the north VAFB Spur Road acoustic monitoring site was slightly quieter than at the south VAFB monitoring locations, due to the greater distance between the site and the launch pad. The launch noise at this site was unsubstantial. The A-weighted SELs for both launches were measured to be 86.1 dB, and the Terra launch had an unweighted SEL of 117.2 dB, and a C-weighted SEL of 110.0 dB. The launch noise reached Lmax levels of 75.2 and 79.7 dB. A sonic boom was measured for the launch of the Atlas IIAS MLV-10 on SMI. The peak overpressure was 0.75 psf (125.1 dB) and the rise time was relatively slow at 2.6 milliseconds. This relatively slow rise time reduces the higher frequency content of the boom and tends to produce a sound more resembling distant thunder than the more familiar sharp crack of a distinct sonic boom.

Delta II

The Delta II is launched from SLC-2 on north VAFB, approximately 2.0 km (1.2 mi) from the Spur Road harbor seal haul-out site. The Delta II is a medium-sized launch vehicle approximately 38 m (124.7 ft) tall. The Delta II uses a Rocketdyne RS-27A main liquid propellant engine and additional solid rocket strap-on graphite epoxy motors (GEMs) during liftoff. A total of 3, 4 or 9 GEMs can be attached for added boost during liftoff. When 9 GEMs are used, 6 are ignited at liftoff and 3 are ignited once the rocket is airborne. When 3 or 4 GEMs are used, they are all ignited at liftoff. The number of GEMs attached to each vehicle will determine the amount of launch noise produced by the vehicle.

Six Delta II launches have been acoustically quantified near the Spur Road harbor seal haul-out site. The noise at the Spur Road site from the Delta II launches is relatively loud, primarily due to the close proximity of the launch pad. The Delta II is the second loudest of the launch vehicles at the Spur Road haul-out site with unweighted SEL measurements ranging from 126.5 to 128.8 dB and averaging of 127.4 dB (as measured by the digital audio tape [DAT] recorder). The C-weighted SEL ranged from 124.3 to 126.7 dB with an average of 125.4 dB (DAT). The A-weighted SEL measurements from both a sound level meter (SLM) and the DAT were similar and ranged from 111.8 to 118.2 dB and had an average of 114.5 dB (DAT). The seal-weighted SELs were considerably reduced to range from 74.2 to 79.7 dB and averaged 76.9 dB. The Lmax values ranged from 104.2 to 112.5 and averaged 109.5 dB. Sonic booms have been measured on SMI from two Delta II launches, the Iridium MS-12 and EO-1. The Iridium MS-12 had two small sonic booms impact the Point Bennett area of SMI with peak overpressures of 0.47 and 0.64 psf and rise times of 18 and 91 ms. The Delta II EO-1 sonic boom had a peak overpressure of 0.4 psf and rise time of 41 microseconds (μ s).

Minotaur

The Minotaur launch vehicle is launched from the California Spaceport on south VAFB, near SLC-6 and is approximately 2.3 km (1.4 mi) from the south VAFB pinniped haul-out sites. The Minotaur launch vehicle is made up of modified Minuteman II Stage I and Stage II segments mated with Pegasus upper stages. The Minotaur is a small vehicle, approximately 19.2 m (63.0 ft) tall with approximately 215,000

lbs of thrust. Although the Minotaur produces less thrust than other larger launch vehicles, due to its close proximity to the south VAFB haul-out sites, it is one of the loudest vehicles at this site. Two Minotaur launch vehicles have been launched from VAFB (26 January 2000 and 19 July 2000).

The launch noise measured near the south VAFB haul-out sites was moderately loud, primarily due to the close proximity to the launch pad. The unweighted SEL measurements varied by 3.5 dB between the two launches and were measured to be 119.4 and 122.9 dB. The C-weighted SELs varied less and were measured at 116.6 and 117.9 dB. From the DAT and SLM measurements, the A-weighted SEL ranged from 104.9 to 107.0 dB. The launch noise reached an Lmax level of 101.7 and 103.4 dB.

Taurus

The Taurus space launch vehicle is launched from 576-E on north VAFB, approximately 0.5 km (0.3 mi) from the Spur Road harbor seal haul-out site. There have been 6 Taurus rockets launched from 576-E. The standard Taurus is a small launch vehicle, at approximately 24.7 m (81.0 ft) tall and is launched in two different configurations: Defense Advanced Research Projects Agency (DARPA) and standard, with different first stages providing 500 or 400 kilopounds of thrust, respectively.

The launch noise from 4 Taurus launches has been measured near the Spur Road haul-out site. The noise arriving at the Spur Road monitoring site, near the harbor seal haul-out, was substantial due to the close proximity of the launch pad. At 0.5 km to SLC-576, the Taurus is the loudest of the launch vehicles at the Spur Road haul-out site. The unweighted SEL measurements from all the measured Taurus vehicles ranged from 135.8 to 136.8 and averaged 136.4 dB. The C-weighted SEL measurements were slightly lower as expected, ranging from 133.8 to 134.8 dB and averaged 134.5 dB. The A-weighted SEL measurements ranged from 123.5 to 128.9 dB with an average of 126.6 dB (SLM). The harbor seal-weighted SELs ranged from 88.0 to 91.3 dB and averaged 90.2 dB. The Lmax values were measured to range from 118.3 to 122.9 dB and averaged 120.9 dB (SLM).

Titan II

The Titan II space launch vehicle is launched from SLC-4W, which is approximately 8.5 km (5.3 mi) north of the south VAFB pinniped haul-out sites.