

NEVADA SPACE PROVING GROUNDS AT THE NEVADA NATIONAL SECURITY SITE: CAPABILITIES, CHALLENGES, AND OPPORTUNITIES WITH A MISSION-SCALE, HEAVILY CRATERED TESTBED

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From 1965 to 1972, Apollo astronauts trained repeatedly in the craters of the Nevada Test Site (NTS) before traveling to the Moon. The natural and man-made features of the NTS made such an impression on astronauts that it was specifically referenced by them while on lunar EVA.

In 2020, NASA visited the Nevada National Security Site (NNSS, fka NTS) to explore opportunities to train Artemis astronauts, and in 2023 the NNSS and NASA executed a series of EVAs across 5 large nuclear subsidence craters. Additionally, a 50m-tall nuclear emplacement tower (“Icecap Tower”) was utilized as an analog for HLS Starship.

This 2023 execution represented the inaugural exercise at the recently created Nevada Space Proving Grounds (NSPG) at NNSS. The NSPG includes the following infrastructure:

- Hundreds of craters ranging in size from tens of meters to hundreds of meters diameter
- 50m tall, 9m diameter Icecap tower; same dimensions as HLS Starship
- Over 1,000 secondary impact craters surrounding the Schooner excavation crater
- High resolution remote sensing datasets of all testbeds
- Experienced field geology team
- Thousands of feet of subsurface core representative of crater ejecta
- FAA-exempt airspace
- On-site emergency response
- On-site lodging, food, power, and network connectivity
- Extensive underground facilities
- Deep bench of scientific and construction expertise to support landscape modification and project execution

The Nevada Space Proving Ground represents one end-member of analog testing: that of kilometer-scale EVAs across lunar-scale craters with the integration of a full-scale lander analog. Utilization of NSPG facilities by NASA and NASA’s commercial, academic, and national lab partners is a critical step in de-risking our return to the moon and beyond. The NSPG, in addition to containing critical space exploration training infrastructure, presents a unique platform for interagency and commercial partner collaboration.