

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings _____
Review Code _____ Reviewer _____ Date _____

Page 1 of 18 *Resource Name or #: Objects Associated with Tranquility Base

P1. Other Identifier: Apollo 11 Lunar Landing Site on the Moon

*P2. Location: Not for Publication Unrestricted

*a. County N/A and (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.) See Continuation Sheet

*b. USGS 7.5' Quad _____ Date _____ T __; R __; __ of __ of Sec __; B.M.

c. Address _____ City _____ Zip _____

d. UTM: (Give more than one for large and/or linear resources) Zone __, ____ mE/ ____ mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

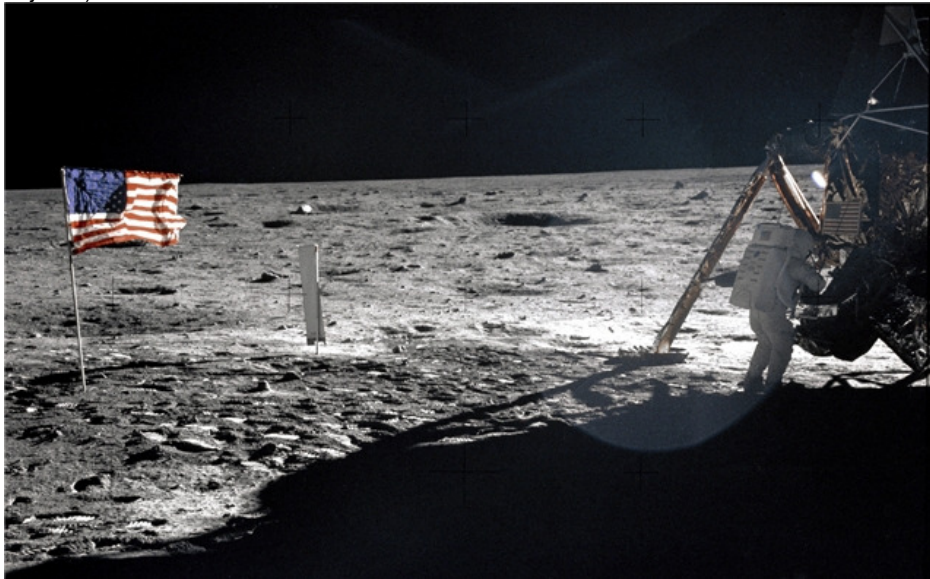
*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This resource consists of approximately 106 objects associated with the first human landing on the Moon by the crew of Apollo 11 on July 20, 1969. All objects (see Building, Structure, and Object Records) rest within the boundaries of the maximum extent of lunar surface exploration by the Apollo 11 crew.

The property is situated in the Mare Tranquillitatis region of the Moon. The boundary of the property is inclusive of the areas noted on the Sketch Map and in the Continuation Sheet and measures approximately 60 meters northwest/southeast by approximately 60 meters southwest/northeast. The boundaries are established based on the maximum extent of lunar surface exploration by Apollo 11 and its crew and the approach (ascent and descent pathways) [http://history.nasa.gov/SP-4029/Apollo_11a_Summary.htm]. The boundary does not encompass natural unmodified lunar features, such as craters, nor does it include the objects left behind by subsequent Apollo missions.

*P3b. Resource Attributes: HP39

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)



*P4. Resources Present: Building
 Structure Objects Site
District Element of District Other
(Isolates, etc.)

P5b. Description of Photo: (view, date, accession #) Neil Armstrong at Tranquility Base; 7/20/1969

*P6. Date Constructed/Age and Source: Historic Prehistoric
 Both

1969 by NASA

*P7. Owner and Address:
National Aeronautics and Space Administration (NASA)
300 E St. SW
Washington, D.C.

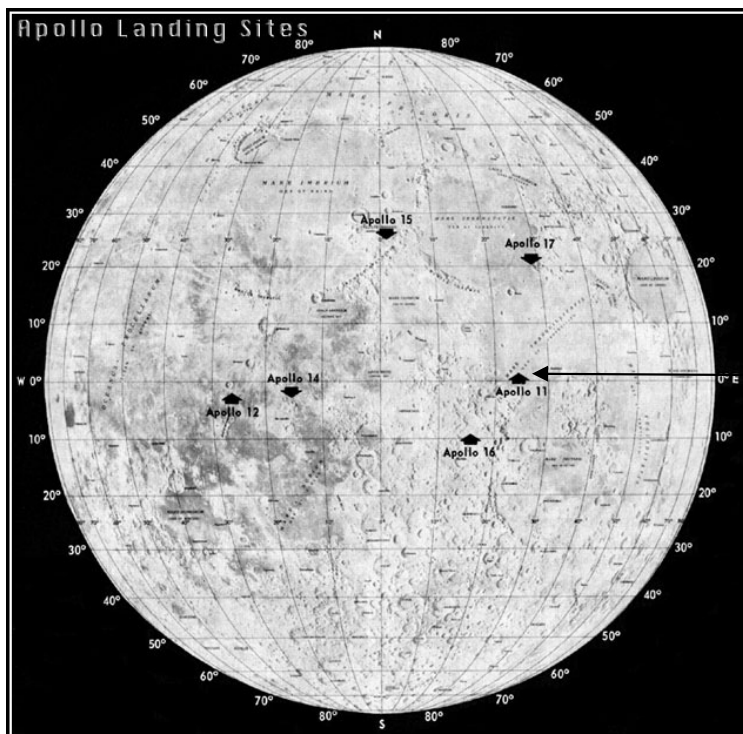
*P8. Recorded by: (Name, affiliation, and address) Lisa Westwood (ECORP Consulting, Inc./California State University-Chico), Ralph Gibson (Placer County Museums), Dr. Beth O'Leary (New Mexico State University), and John Versluis (Texas Heritage Museum, Hill College)

*P9. Date Recorded: October 26, 2009

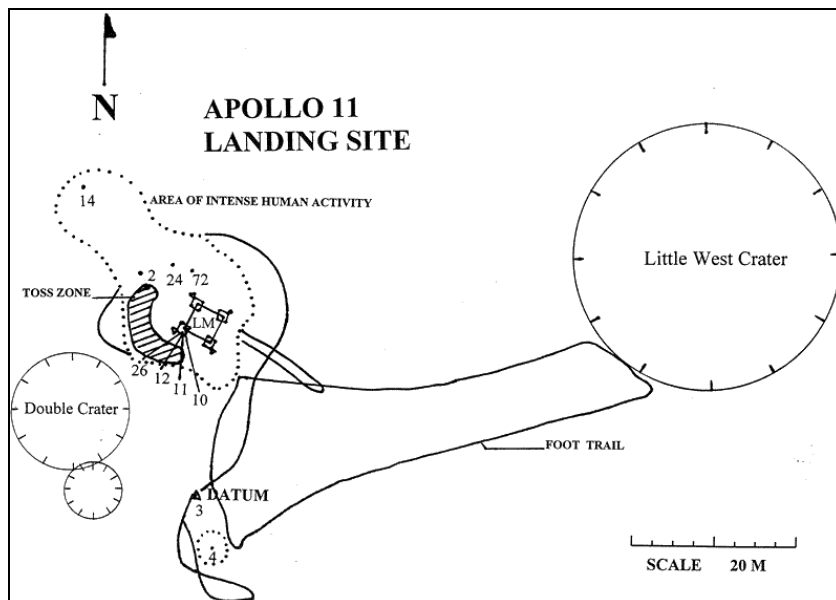
*P10. Survey Type: (Describe) Inventoried through archival research only

*P11. Report Citation: (Cite survey report and other sources, or enter "none.") Gibson, Ralph D. (2001) "Lunar Archaeology: the Application of Federal Historic Preservation Law to the Site Where Humans First Set Foot Upon the Moon." Master's Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

*Attachments: NONE Location Map Continuation Sheet Building, Structure, and Object Record
 Archaeological Record District Record Linear Feature Record Milling Station Record Rock Art Record
 Artifact Record Photograph Record Other (List): Sketch Map

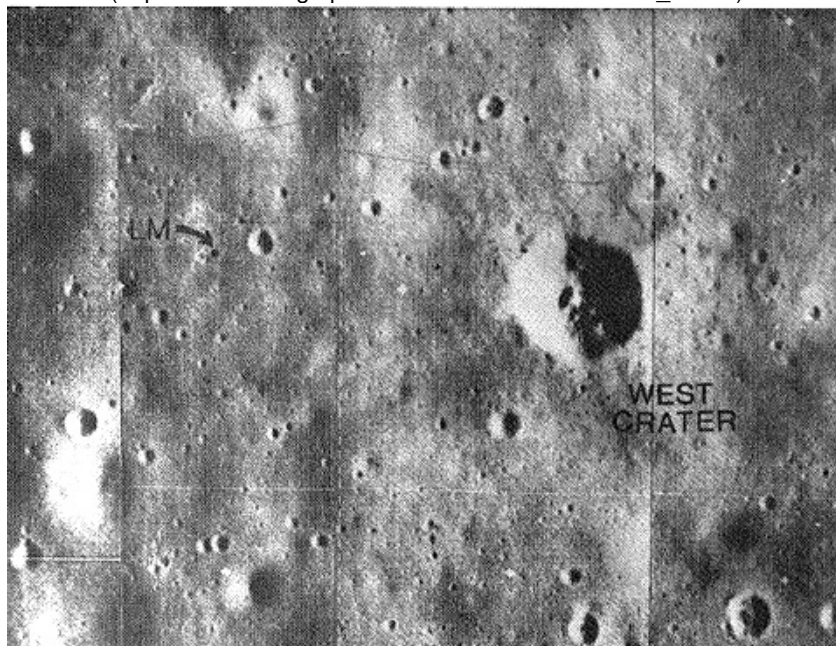


Source: <http://www.nasm.si.edu/collections/imagery/Apollo/FIGURES/LandingSitesMaps.jpg> and USGS



Top: Source: <http://spacegrant.nmsu.edu/lunarlegacies/archeologicalsitemap.html>, based on U.S. Geological Survey Apollo II Traverse Map (http://www.lpi.usra.edu/expmoon/Apollo11/A11_surfops.html)

Bottom: touchdown point at Apollo 11 plotted on this Lunar Orbiter photomap (http://www.fas.org/irp/imint/docs/rst/Sect19/Sect19_6.html)



Sketch Map Legend:

- LM Apollo 11 Lunar Module Descent Stage (1)
- 2 U.S. 3' x 5' Flag (1)

- 3 Laser Ranging Retroreflector (LRRR) (1)
- 4 Passive Seismic Experiment (PSE) (1)
- 10 A Silicon Disc Carrying Statements from Presidents Nixon, Johnson, Kennedy, Eisenhower, and from Leaders of 73 Other Nations (1)
- 11 A Gold Replica of an Olive Branch, Traditional Symbol of Peace (1)
- 12 Mission Patch from Apollo I of Virgil I. Grissom, Edward H. White 11, and Roger B. Chaffee (1)
- 14 TV Camera (1)
- 24 Solar Wind Composition Staff (1)
- 26 Medals Commemorating Two Dead Cosmonauts (2)
- 27 Document Sample Box Seal (1)
- 72 Apollo Lunar Surface Close-up Camera (1)
- Area of human activity
- _____ Foot trail
- ///// Toss zone (artifact concentration)
- . # Artifact (as numbered)
- TTT Crater (as labeled)

Sketch map scale is approximate, based on aerial photo interpretation

Not mapped:

- 5. Neil Armstrong's Apollo Portable Life Support System (PLSS), Model A7L (1)
- 6. Neil Armstrong's Apollo Space Boots, Model A7L (2)
- 7. Edwin (Buzz) Aldrin Jr.'s Apollo Portable Life Support System (PLSS), Model A7L (1)
- 8. Edwin (Buzz) Aldrin Jr.'s Apollo Space Boots, Model A7L (2)
- 9. Empty Food Bags (2+)
- 13. Commemorative Plaque attached to the Lunar Module Descent
Leg. "Here men from the planet Earth first set foot upon the Moon. July 1969, A.D. We came in peace for all mankind." The plaque is signed by the Apollo 11 crew and President Richard M. Nixon. (1)
- 15. Spring Scales (2)
- 16. Tongs (1)
- 17. Small Scoop (1)
- 18. Scongs (1)
- 19. Bulk Sample Scoop (1)
- 20. Trenching Tool (1)
- 21. Camera (Hasselblad El Data) (1)
- 22. Armrests (4)
- 23. Mesa Bracket (1)
- 25. Handle of Contingency Lunar Sample Return Container (1)
- 28. Storage container (empty) (1)
- 29. Hasselblad pack (1)
- 30. Film Magazines (2+)
- 31. Filter, Polarizing (1)
- 32. Remote Control Unit (PLSS) (2)
- 33. Defecation Collection Device (4)
- 34. Overshoes, Lunar (2)
- 35. Covers, Pga Gas Connector (2)
- 36. Kit, Electric waist, Tether (1)
- 37. Bag Assy, Lunar Equip.conveyor & waist tether (1)
- 38. Conveyor assy, Lunar Equipment (1)
- 39. Bag, Deployment, Life line (1)
- 40. Bag, Deployment, Lunar equipment conveyor (1)
- 41. Life line, Lt. wt. (1)
- 42. Tether, Waist, EVA (4)
- 43. Food Assembly, LM (4 man days) (1)
- 44. TV subsystem, Lunar (1)
- 45. Lens, TV wide angle (1)
- 46. Lens, TV lunar day (1)
- 47. Cable assembly, TV (100 ft.) (1)
- 48. Adapter, SRC/OPS (2)
- 49. Cannister, ECS LIOH (2)
- 50. Urine collection assembly, small (2)
- 51. Urine collection assembly, large (2)
- 52. Bag, Emesis (4)
- 53. Container assembly, Disposal (1)
- 54. Filter, oxygen bacterial (1)
- 55. Container, PLSS Condensate (1)
- 56. Antenna, S-Band (1)
- 57. Cable,S-Band antenna (1)
- 58. Bag, Lunar Equipment Transfer (1)
- 59. Pallet assembly #1 (1)
- 60. Central Station (1)
- 61. Pallet Assembly #2 (1)
- 62. Primary structure assembly (1)
- 63. Hammer (1)
- 64. Gnomon (Excludes mount) (1)
- 65. Tripod (1)
- 66. Handle/cable assembly (cord for tv camera) (1)
- 67. York mesh packing material (1)
- 68. SWC bag (extra) (1)
- 69. Core tube bits (2)
- 70. SRC seal protectors (2)
- 71. Environmental sample containers "O" rings (2+)
- 73. Lunar equipment conveyor (1)
- 74. ECS canister (1)
- 75. ESC bracket (1)
- 76. OPS brackets (2+)
- 77. Left hand side stowage compartment (1)
- 78. Footprint (not included in this nomination)
- 79. Extension Handle
- 80. Stainless steel cover (9 x 7 5/8 inches x 1/16 inch thick)
- 81. Plastic covering for Flag
- 82. 8 foot aluminum tube
- 83. 2 + retaining pins for flag and staff storage
- 84. Insulating blanket
- 85. Small aluminum capsule

Total: 106+ items left on the lunar surface

P2a. Location (continued):

Moon; Mare Tranquillitatis (Sea of Tranquility); 0.67 N, 23.47 E

The landing site is located approximately 400 meters west of West crater and 20km south-southwest of the Sabine D crater in the southwestern portion of Mare Tranquillitatis. It is also situated 41.5 km north-northeast of the western promontory of the Kant Plateau. The Surveyor 5 spacecraft is approximately 25 km north-northwest of the landing site, and the impact crater formed by Ranger 8 is 69 km northeast of the landing site. (Source: Apollo 11 Preliminary Science Report, cited in <http://www.nasm.si.edu/collections/imagery/Apollo/AS11/a11.htm>). The boundaries of the site include the approach of Apollo 11.

Historic Context Statement:

The objects placed on, and remaining on, the lunar surface are significant within the context of lunar exploration and California's role in the research, development, and manufacture of the objects.

The site at Tranquility Base was created on July 20, 1969 when astronauts Neil Armstrong and Edwin (Buzz) Aldrin landed the Lunar Module *Eagle* on the surface of the moon. Two hours after landing, Neil Armstrong took humankind's first steps on another celestial body. Armstrong and Aldrin collected rock and soil samples; set up experiments; planted the United States flag; and performed ceremonial duties such as unveiling a plaque on one of the legs of the lunar module. They placed a container that concealed a silicon disc etched with goodwill messages from most of the world's leaders, the Apollo 1 Mission patch commemorating astronauts Gus Grissom, Ed White, and Roger Chaffee who were killed during a test on the launch pad a year and a half earlier, and medals commemorating Soviet Cosmonauts who had been killed during space missions. In all, Armstrong and Aldrin spent about 90 minutes walking on the surface of the moon. After they climbed back into the ascent stage of the Lunar Module, they ejected many items onto the lunar surface to make room for the rocks and soil samples they collected. They launched off the moon, leaving behind the descent stage of the lunar module and an array of objects that remain at the site in much the same condition in which they were deposited. Moreover, these objects not only memorialize an historic event in human history, but represent the culmination of decades of research, development, and testing carried out in several states across the country, including California.

The journey from the earth to the moon and back to earth encompassed over half a million miles. The men who made the voyage had to be protected from extreme temperatures, from deadly solar radiation, and from the vacuum of space. The technological sophistication necessary for the endeavor was not yet achieved when President Kennedy announced this national goal in 1961 (Burrows 1998). Eight years later, humankind's first steps on the lunar surface were witnessed by one fifth of the world's population (Burrows 1998). Set within the context of history, the drama of that moment becomes even more significant.

The objects at Tranquility Base, the *Apollo 11* landing site, were created on earth and placed on the moon during a period of great social and international turmoil. In 1969, the United States was at war against communism in Vietnam (Walker 1993). The United States was also at war with itself as battles between races, sexes, and even generations fought for their rights and liberation (Bailey and Kennedy 1994). But these national battles played a background role to the true motive behind the Apollo missions: the Cold War.

Without the research and development in California and without the Cold War, the Apollo program would not have happened. The Cold War was a global conflict between the democratic nations in the West and the communist nations in the East (Walker 1993; Friedman 2000). Leading the charge for both sides were the world's two superpowers: the United States and the Soviet Union. *Apollo 8* Commander Frank Borman commented on the significance of the Cold War to the Apollo program in an interview conducted on January 23, 2001: "...people often times think of this as a great voyage of exploration like something – it really wasn't. It was a battle in the Cold War. You could have never funded this politically if you hadn't had the Cold War aspect to it."

When the Soviet Union launched the first successful satellite *Sputnik* on October 4, 1957, and then launched the world's first man into space, Yuri Gagarin, on April 12, 1961, it was incorrectly assumed by the American public that the Soviet Union had a dismaying lead in the development and production of Intercontinental Ballistic Missiles (ICBMs) (Freidman 2000). ICBMs were just beginning to replace long-range bombers as the chief platform on which a nuclear bomb could be delivered (Burrows 1998). ICBMs were also impossible to stop once they were launched. Fear, then, as well as national pride, was one of the motivating factors behind the American public's support of the space program. But the public's support for the U.S. space program is much more complex than fear or pride. This odd mix of emotions was not only cultivated by presidential candidate John F. Kennedy during the 1960 election, who knew no such missile gap existed, but infused with a determination and focus that had not been seen in this country since World War II (Friedman 2000).

On May 25, 1961, President John F. Kennedy delivered a *Special Message to the Congress on Urgent National Needs* to a joint session of Congress. The speech acknowledged the notion of the Space Race and called upon the United States to step up to the challenge of being the first to land a human on the moon. With this speech, President Kennedy firmly set the national goal of landing a man on the moon and returning him safely to the earth before the end of the decade. With the backdrop of the fear of the nuclear arms race, and a swelling national pride, the successes of the Soviet Union in space exploration were a concern. Therefore, when the Soviets launched *Sputnik I*, the U.S. immediately became the technological underdog in a contest that would eventually be defined as a race to the moon.

In 1961, NASA held a NASA-Industry Apollo Technical Conference in Washington, DC in which fourteen firms were invited to participate (Gray 1992). These companies were competing for the huge cash prize of being awarded the contract of building the Apollo command and service modules (Gray 1992). North American Aviation won the contract (Gray 1992). North American Aviation was also awarded the contract for building the Saturn V's second stage (Von Braun's team in Huntsville Alabama built the powerful first stage) (Gray 1992). North American won the contract for the command and service modules with a bid of \$400 million, a number that would climb to \$4.4 billion by 1970 (Gray 1992). Similarly, Grumman Aircraft and Engineering, which won the award to build the Lunar Module, found cost over-runs to be enormously underestimated (Burrows 1998). But this came as no surprise to many engineers (Gray 1992). No one had ever built such ships before. The U.S. was not only in a race with the Soviet Union, but also in a race with itself. Design and construction had to be accelerated to a high rate if the ships that would take men to the moon and back had to be completed before the end of the decade.

The U.S. completed the successful Mercury program with the May 15, 1963 launch of Gordon Cooper (Scheffer 1999). The Soviets launched the first woman into space, Valentina Tereshkova, into space on June 16, 1963. On August 30, 1963, the "Hot Line", which directly connected the White House and the Kremlin, became operational (Pike 1998). On November 22, 1963, President John F. Kennedy was assassinated in Dallas, Texas. This national tragedy may have cemented the goal of landing a man on the moon before the decade was out. Subsequently, both the Russians and the Americans had experienced success in their respective space programs, such as the landing of the *Ranger IV* on the moon by the US on February 2, 1964 and the first human space walk on March 18, 1965 by Russian cosmonaut Alexei Leonov. Also in 1965, the U.S. began its Gemini program with the successful launches of Geminis 3, 4, 5, 6, and 7 (Geminis 1 and 2 were ground-based tests) (Scheffer 1999).

In 1966, the Soviets enjoyed an advantage in the number and sophistication of their space probes as they soft-landed *Luna 9* on the moon on February 3rd and landed *Venera 3* on Venus on March 1st. The U.S. propelled itself into the manned-flight lead with the successful launches of Geminis 8, 9, 10, 11, and 12 (Scheffer 1999). The U.S. also landed *Surveyor I* on the moon on June 2nd (Pike 1998). The U.S. involvement in Vietnam escalated even further with some 362,000 troops deployed there by December (Pike 1998). On the same day that the crewmembers of Apollo 1 lost their lives, the U.S. and Soviet Union signed the "Outer Space Treaty" which, among other aspects, limited the military uses of space (United Nations 1967; Pike 1998).

In 1968, the Soviets began to fall behind the U.S. in the moon race. Although they successfully launched *Zond 5* on September 15th, which became the first man-made object to orbit the moon and return to the earth, they were having many problems with their new N-1 rocket. This rocket was designed to transport the necessary payload for a manned lunar mission, but they dared not attempt to put a human life in jeopardy until the problems could be fixed (Harford 1997). The U.S. successfully began its Apollo program with the launches of Apollo 7 on October 22nd and Apollo 8 on December 21st, which became the first manned mission to orbit the moon and return to earth (Chaikin 1994; Scheffer 1999).

In 1969, the Soviets chances of winning the moon race fell to the ground with two failed test launches of their mighty N-1 rocket (Harford 1997). The U.S. launched Apollo 9 into earth orbit on March 3rd. This mission successfully flight tested the Lunar Module (LM) (Burrows 1998). On May 18th, Apollo 10 took astronauts Tom Stafford, John Young, and Gene Cernan to the moon where they tested the LM in lunar orbit and scouted potential landing sites for the next mission, Apollo 11 (Burrows 1998).

On July 20, 1969, while in orbit around the moon, Neil Armstrong and Buzz Aldrin climbed into the LM *Eagle* and closed the hatch that separated them from Michael Collins in the Command Module *Columbia*. At 4:17 p.m. Eastern Daylight Time (EDT) the *Eagle* landed on the surface of the moon (Chaikin 1994). At 10:30 p.m. EDT, Neil Armstrong took the first human steps on another world (Chaikin 1994). Over 600 million people watched the event worldwide, almost one-fifth of the world's population at the time (Burrows 1998). What had begun as a race against a foe, a death-defying fear-fed program in the middle of a decade wrought with turmoil and revolution in a country that still seemed to be searching for its identity, ended with two men standing on the surface of the moon – a moment indelibly burned into the hearts and minds of those who witnessed it. The objects left at Tranquility Base belie one of the most profound historic events in the history of mankind.

Importance to California:

It can be reasonably argued that the success of the Apollo 11 mission, which produced the Tranquility Base site, would not have occurred were it not for the contributions of the research, development, and testing, and the mission operations, that occurred in the State of California.

Astronauts

Neil A. Armstrong, Apollo 11 Commander

Born August 5, 1930 in Wapakoneta, Ohio, Neil Armstrong earned a Bachelor of Science degree in aeronautical engineering from Purdue University and a Master of Science degree in aerospace engineering from **University of Southern California**. Armstrong first joined NACA, (National Advisory Committee for Aeronautics), NASA's predecessor, as a research pilot at the Lewis Laboratory in Cleveland. Later, he transferred to the NACA High Speed Flight Station at **Edwards Air Force Base in California**. In 1962, Armstrong was transferred to astronaut status. He served as command pilot for the Gemini 8 mission, launched March 16, 1966, and performed the first successful docking of two vehicles in space. In 1969, Armstrong was commander of Apollo 11, as the first civilian to command two missions. He gained the distinction of being the first man to land a craft on the Moon and the first man to step on its surface. Armstrong subsequently held the position of Deputy Associate Administrator for Aeronautics, NASA Headquarters Office of Advanced Research and Technology, from 1970 to 1971. He resigned from NASA in 1971 (<http://www.solcomhouse.com/apollo11.htm> and http://history.nasa.gov/SP-4029/Apollo_11a_Summary.htm).

Buzz Aldrin, Col., USAF, Apollo 11 Lunar Module Pilot

Born Edwin Eugene Aldrin, Jr. on January 20, 1930 in Montclair, New Jersey, Buzz Aldrin earned a B.S. from the United States Military Academy at West Point, New York in 1951 and a Ph.D. in astronautics from the Massachusetts Institute of Technology in 1963. He served as backup pilot for Gemini 9, pilot on Gemini 12, backup command module pilot for Apollo 8, and lunar module pilot for Apollo 11. In 1971, following his resignation from NASA, Aldrin became Commandant of the Aerospace Research Pilot's School at **Edwards Air Force Base in California**. He retired from the Air Force in 1972 and became a consultant for the **Comprehensive Care Corporation, Newport Beach, California**. As of 2005, he **resided in southern California** and lectured and consulted on space sciences with Starcraft Enterprises (<http://www.hq.nasa.gov/alsj/a11/a11.crew.html>).

Michael Collins (BGEN, USAF, Ret.), Apollo 11 Command Module Pilot

Michael Collins was born in Rome, Italy, on October 31, 1930. He received a Bachelor of Science degree from the United States Military Academy at West Point, New York, in 1952 and entered the Air Force, where he served as an experimental flight test officer at the Air Force Flight Test Center, **Edwards Air Force Base in California**. There, he tested performance and stability and control characteristics of Air Force aircraft, primarily jet fighters. Collins was one of the third group of astronauts named by NASA in October 1963. He served as backup pilot for the Gemini VII mission and pilot on the Gemini X mission in 1966 before serving as command module pilot on Apollo 11. After retiring from NASA, he became the Director of the National Air and Space Museum at the Smithsonian Institution in April 1971 and was promoted to Under Secretary of the Smithsonian in April 1978 (<http://www.hq.nasa.gov/alsj/a11/a11.crew.html>).

Research and Development

Jet Propulsion Laboratory*

The history of the Jet Propulsion Laboratory (JPL) dates back to the 1930s, when **California Institute of Technology** (Caltech) professor Theodore von Kármán (1881-1963) oversaw pioneering work in rocket propulsion. According to the JPL (JPL 2009), the Hungarian-American engineer and physicist von Kármán was head of Caltech's Guggenheim Aeronautical Laboratory and scientific adviser to the U.S. Army Air Corps. Several of his graduate students and assistants tested a primitive rocket engine in a dry riverbed wilderness area in the Arroyo Seco, a dry canyon wash north of the Rose Bowl in **Pasadena, California**. Their first rocket firing took place there on October 31, 1936 (JPL 2009).

After several successful rocket experiments, von Kármán persuaded the Army to fund development of strap-on rockets (called "jet-assisted take-off") to help overloaded Army airplanes to take off from short runways. Subsequently, under pressure from increasing demands of World War II, the Army helped Caltech acquire the land in the Arroyo Seco for test pits and temporary workshops. Airplane tests at **nearby air bases** proved the concept and tested the designs (JPL 2009).

Pleased by the results of the jet-assisted takeoff rockets, the Army Air Corps next asked von Kármán for a technical analysis of the German V-2 program just discovered by Allied intelligence. He and his research team then proposed a U.S. research project to understand, duplicate and reach beyond the guided missiles beginning to bombard England. In the proposal, the von Kármán referred to their organization for the first time as "the Jet Propulsion Laboratory" (JPL 2009).

Funded by Army Ordnance, the JPL's early efforts eventually involved technologies beyond those of aerodynamics and propellant chemistry into tools for space flight, secure communications, spacecraft navigation and control, and planetary exploration. About 100 rocket engineers began testing in the **California desert** of small unguided missiles (named "Private") that reached a range of nearly 11 miles. They experimented with radio telemetry from missiles, and began planning for ground radar and radio sets. By 1945, with a staff approaching 300, the group had begun to launch test vehicles from White Sands, New Mexico to an altitude of 200,000 feet, monitoring performance by radio. Control of the guided missile was the next step, requiring two-way radio as well as radar and a primitive computer (using radio tubes) at the ground station. The result was JPL's answer to the German V-2 missile, named Corporal. Ironically, Corporal was first launched in May 1947, about two years after the end of war with Germany. From there, JPL's research and development grew into developing a missile that would fly and survive under vibration and other stresses. Towards this end, the team developed a supersonic wind tunnel and an array of environmental test technologies, all of which had wider use and came to support outside customers. Developing so complex a device as a missile to fly unaided and beyond reach of repair meant a new degree of quality, new test techniques and a new discipline called "system engineering." Subsequent Army work further sharpened the technologies of communications and control, of design and test and performance analysis. This made it possible for JPL to develop the flight and ground systems and finally to fly the first successful U.S. space mission, Explorer 1. The entire three-month effort began in November 1957 and culminated with the successful launch on January 31, 1958. On December 3, 1958, two months after NASA was created by Congress, JPL was transferred from Army jurisdiction to that of the new civilian space agency. It brought to the new agency experience in building and flying spacecraft, an extensive background in solid and liquid rocket propulsion systems, guidance, control, systems integration, broad testing capability, and expertise in telecommunications using low-power spacecraft transmitters and very sensitive Earth-based antennas and receivers.

The Laboratory now covers 177 acres adjacent to the site of von Kármán's early rocket experiments. Jet propulsion is no longer the focus of JPL's work, but the world-renowned name remains the same.

*Adapted or quoted directly from the Jet Propulsion Laboratory website (JPL 2009).

JPL

2009 JPL Fact Sheet, Internet Site http://www.jpl.nasa.gov/news/fact_sheets/jpl.pdf, accessed November 2009.

Aerojet

Von Kármán was also one of the founders of Aerojet Engineering Corporation, a company founded in **Azusa, California** in 1942 by Frank Malina, von Kármán, Parsons, Forman, Martin Summerfield, and Andrew Haley (Bluth 2000). The new company formed as a result of a 1936 meeting hosted by von Kármán at his house during his tenure as director of Guggenheim Aeronautical Laboratory at the **California Institute of Technology**. A number of other Caltech professors and students were in attendance, including rocket scientist and astrophysicist, Fritz Zwicky, as well as self-taught explosives expert Jack Parsons, all of whom were interested in the topic of spaceflight (Wikipedia 2009).

According to Aerojet (2009), dramatic growth in new products and technologies in the 1950s and 1960s led the company to build what, at the time, was the free world's largest site for rocket engine development, testing, and production at a facility near **Sacramento, California**. The era of space exploration in the 1960s was a time of intense activity and excitement at Aerojet, with Aerojet engines propelling Gemini missions into space and Aerojet's Apollo Space Propulsion System placing astronauts in orbit around the moon and bringing them home again (Aerojet 2009).

In the 1970s and 1980s, Aerojet emerged as an innovator in the field of space electronics, including satellite sensors for weather forecasting and missile detection. Meanwhile, Aerojet continued to design and build innovative and highly reliable propulsion systems such as the Space Shuttle Orbital Maneuvering System engines, which have performed with a 100 percent success rate on every Shuttle flight (Aerojet 2009).

After divesting its space electronics division in 2001, Aerojet acquired General Dynamics' Space Systems in Redmond, Washington, a leading developer and manufacturer of spacecraft propulsion, electric propulsion, fire suppression technologies, and Missile Defense applications. It also acquired the propulsion business of Atlantic Research Corporation in Gainesville, Virginia, a leading developer and manufacturer of advanced solid rocket propulsion systems, gas generators and auxiliary rocket motors for both space and defense applications. Today, the aerospace company that was founded **in southern California** now has manufacturing sites across the country — in Washington, **California**, New Mexico, Arkansas, Utah, Virginia, and Tennessee — and continues its role as a leader in the U.S. propulsion industry. It maintains four facilities in California: **Headquarters in Sacramento, and facilities in Edwards Air Force Base, Woodland Hills, and Vernon, California**.

Today's Aerojet boasts in-space propulsion on every NASA Discovery mission, a significant role in the nation's missile defense program and strongholds in the tactical defense propulsion and launch-vehicle propulsion markets. Aerojet is long recognized for its decades of experience supplying liquid engines for the workhorse U.S. launch vehicles Titan and Delta, and it now has a

significant market in tactical missile propulsion and a successful air-breathing propulsion program.

Aerojet

2009 Internet site <http://www.aerojet.com/about/history.php>, accessed November 2009.

John Bluth

2000 "Malina, Frank Joseph." <http://www.anb.org/articles/13/13-02215.html>; American National Biography Online Feb. 2000. Accessed November 2009. Copyright © 2000 American Council of Learned Societies. Published by Oxford University Press.

Wikipedia

2009 Aerojet. <http://en.wikipedia.org/wiki/Aerojet>, accessed November 2009.

NASA's Ames Research Center

The Ames Research Center (ARC) is located in ***Mountain View, California***. It was founded as an aeronautics research laboratory in 1939 adjacent to a military base later named ***Moffett Field***. The base was closed in 1994 and its facilities and runways turned over to ARC. The center conducts research in astrobiology (the origin, evolution, distribution, and destiny of life in the universe), air traffic management, supercomputing, artificial intelligence, nanotechnology, and other areas of importance to space exploration. It also conducts wind tunnel testing and flight simulations (NASA 2009a).

The ARC played an important role in the Apollo missions. Research to understand and conquer the heating problem for Apollo was carried out at ARC in facilities like the Combined Radiative-Convective Heating Simulator. While convective heating is important for entering satellites, radiative heating grows more serious at higher speeds. Hence, NASA scientists have devised a research implement in which both kinds of heating can be directed upon a test model at the same time. Intense radiation is generated by an electrical arc of the kind used in theater-type motion picture projectors. At the same, an air stream charged with energy from a separate electric arc source is driven over the test specimen. The intense radiation which results is apparent in the photograph. Through their ability to vary each type of heating independently, NASA scientists are better equipped to obtain fundamental knowledge of heating vital to the success of manned missions into space (NASA 2009b).

NASA

2009a Space Organizations Part 1: NASA - NASA's Organization And Facilities. Internet site <http://www.libraryindex.com/pages/986/Space-Organizations-Part-1-NASA-NASA-S-ORGANIZATION-FACILITIES.html>, accessed November 2009.

2009b Ames Research Center. Internet site <http://www.nasa.gov/centers/ames/news/releases/2004/moon/moon.html>, accessed November 2009.

NASA'S Dryden Flight Research Center

The Dryden Flight Research Center (DFRC) is located at ***Edwards Air Force Base in Edwards, California***. The base was the site of joint NACA military testing of high-speed experimental aircraft during the late 1940s. In 1959 the high-speed flight station at the base was designated a NASA flight research center. DFRC is NASA's primary installation for flight research. It also serves as a back-up landing site for the space shuttle. DFRC is a center of excellence for atmospheric flight operations (NASA 2009).

NASA

2009 Space Organizations Part 1: NASA - NASA's Organization And Facilities. Internet site <http://www.libraryindex.com/pages/986/Space-Organizations-Part-1-NASA-NASA-S-ORGANIZATION-FACILITIES.html>, accessed November 2009.

Evaluation of Significance:

The assemblage of Objects Associated with Tranquility Base (OATB) is significant to the history of California and meets all four of the California Register of Historical Resources eligibility criteria. The OATB are:

(1) associated with events that have made a significant contribution to the broad patterns of American and human history because, consistent with California's role as a leader in technological innovation, the research, development, and testing of the technology that was used in the Apollo 11 mission was largely carried out in the State of California. Moreover, the aerospace research industry and military research were crucial in the economic development of portions of the state, including the areas surrounding Pasadena (Jet Propulsion Laboratory) and Edwards Air Force Base.

(2) associated with the lives of persons significant in our past because each of the three astronauts of Apollo 11 (Neil Armstrong, Buzz Aldrin, and Michael Collins).

(3) embody a distinctive type of engineering technology unique to the early aerospace industry because the technology used for Apollo 11 represents the earliest ground-breaking sophisticated technology of its kind, from which all subsequent and current

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary #
HRI #
Trinomial

Page 10 of 26

aerospace technology is based, and which was developed largely in facilities located in the State of California.

(4) can provide important information on the early development of space technology.

The Period of Significance is the year 1969. The Date of Significance is July 20, 1969. All of the 106+ objects within the boundaries are considered contributing elements to the significance of the site. Based on the relative lack of atmosphere and no known return visit to Tranquility Base, the property is assumed to retain integrity.

Recording of Tranquility Base as an Historical Resource:

No humans have since returned to Tranquility Base following the departure of the Apollo 11 crew in 1969 to document the current conditions of the site. Under a \$23,000 research enhancement grant from NASA through the New Mexico Space Grant Consortium, the artifacts and features left behind by Neil Armstrong and Edwin Aldrin, Jr. were documented, inventoried, and mapped through archival research (Gibson 2001). Research was carried out at the Johnson Space Center and Lunar Planetary Institute in Houston, Texas and at the Smithsonian's National Air and Space Museum, National Archives, and NASA Headquarters in Washington D.C. Subsequently, under a \$20,000 Federal grant from the National Space Grant Consortium, an educational website (<http://spacegrant.nmsu.edu/lunarlegacies/index.html>) was published and is continually maintained (Gibson 2001).

Based on the extensive federally-funded research (Gibson 2001), Tranquility Base has been recognized as an historical resource with significance on the national and state level. While a nomination to the National Register of Historic Places and World Heritage Site programs is planned, the current level of recording is focused on the important role of the State of California and most of the objects have a connection to California. Therefore, these DPR 523 forms document Tranquility Base as a significant cultural resource and is hereby nominated to the California Register of Historical Resources. No other state has previously listed Tranquility Base on its state register.

Bibliography:

Allison, Graham T.

1994 *The Secret Cuban Missile Crisis Documents*. Brassey's, New York, NY.

Ashcroft, Bruce and Rob Young

2001 *A Brief History of Air Force Scientific and Technical Intelligence*. National Air Intelligence Center. <http://www.wpafb.af.mil/naic/history/sandthist.html>

Bailey, Thomas and David M. Kennedy

1994 *The American Pageant, Vol. II* D.C. Heath and Company, Lexington, MA

Borman, Frank

2001 *Interview with Apollo 8 Astronaut Frank Borman*. Interviewed by Ralph Gibson and Dr. Beth O'Leary in the office of Gene Price & Co., January 23, 2001.

Burrows, William

1998 *This New Ocean*. Random House, New York, NY.

Chaikin, Andrew

1994 *A Man on the Moon*. Penguin Group, New York, NY.

Friedman, Norman

2000 *The Fifty Year War: Conflict and Strategy in the Cold War*. Naval Institute Press, Annapolis, MD.

Gray, Mike

1992 *Angle of Attack: Harrison Storms and the Race to the Moon*. W.W. Norton and Company, New York, NY.

Grinter, Kay

2001 *Apollo 11*. Kennedy Space Center Archives. <http://www.pao.ksc.nasa.gov/kscpao/history/apollo/apollo-11/apollo-11.htm>

Harford, James

1997 *Korolev*. John Wiley and Sons, New York, NY.

Kennedy, John F.

1961 *Special Message to the Congress on Urgent National Needs*. Speech delivered to a joint session of Congress. Washington, DC.

Nathan, James A.

2001 *Anatomy of the Cuban Missile Crisis*. Greenwood Press, Westport, CT.

Pike, John

1998 *Cold War Timeline*. Federation of American Scientists Military Analysis Network. http://www.fas.org/man/dod-101/ops/cold_war.htm

Schefter, James

1998 *The Race*. Doubleday, New York, NY.

United Nations

1967 *Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*. New York, NY.

Walker, Martin

1993 *The Cold War*. Henry Holt and Company, New York, NY.

BUILDING, STRUCTURE, AND OBJECT RECORD

*Resource Name or # (Assigned by recorder) Objects Associated with Tranquility Base

- B1. Historic Name: Lunar Module Descent Stage
- B2. Common Name: Eagle
- B3. Original Use: Descent stage for the Lunar Module Eagle
- B4. Present Use: Served as launch platform for Lunar Module Ascent Stage

*B5. Architectural Style: N/A

*B6. Construction History: Building upon technological research and development carried out at the Jet Propulsion Laboratory in Pasadena, California, Aerojet in Sacramento, California, and Edwards Air Force Base, California, the Lunar Module *Eagle* was constructed and completed in 1969 by the Grumman Aircraft and Engineering in Long Island, New York. A plaque commemorating the historic moon landing was added to a landing strut in 1969. The plaque reads: "Here men from the planet Earth first set foot upon the moon. July 1969 A.D. We came in Peace for all mankind." Below the inscription is an etching of earth's two hemispheres and the signatures of Apollo 11 astoranuts Neil Armstrong, Buzz Aldrin, Michael Collins, and President Richard M. Nixon.

*B7. Moved? No Yes Unknown Date: Original Location:

*B8. Related Features: Approximately 106 artifacts

B9a. Architect: Tom Kelley, Grumman Aircraft Engineering

b. Builder: Grumman Aircraft Engineering for NASA

*B10. Significance: Theme: Space Exploration and Technology

Area: Pasedena, California; Long Island, New York

Period of Significance: 1961-1969

Property Type: Object

Applicable Criteria: 1, 2, 3, 4 (see

Continuation Sheets for evaluation of significance)

The Lunar Module is associated with the first landing of humans on the moon, and is associated with Neil Armstrong, Buzz Aldrin, Michael Collins, and Presidents John F. Kennedy and Richard M. Nixon. It represents design and construction that embodies a specific type of space vehicle that has never been reproduced for flight since the Apollo program ended. In fact, only ten fully functionally LMs were built between 1968 and 1976. The technology used in designing and constructing the structure is indicative of a specific period in technological advancement. Detailed information regarding the construction and components of the LM have been lost. After the Apollo program ended, NASA engineers and companies who constructed ships and components destroyed or disposed of valuable documents pertaining to the program. Because no humans have since visited the location, integrity is unknown.



Left: Neil Armstrong takes a photo of the LM from a distance
<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5961.jpg>

B11. Additional Resource Attributes: (List attributes and codes)
A11. Engineering Structure

*B12. References:

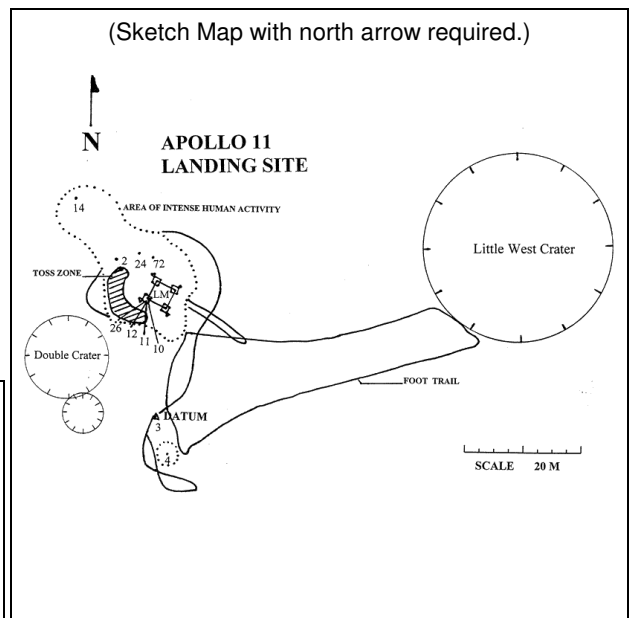
Gibson, Ralph (2001) "Lunar Archaeology: the Application of Federal Historic Preservation Law to the Site Where Humans First Set Foot Upon the Moon." Master's Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

B13. Remarks:

*B14. Evaluator: Ralph Gibson, Lisa Westwood, Beth O'Leary, and John Versluis

*Date of Evaluation: October 26, 2009

(This space reserved for official comments.)



BUILDING, STRUCTURE, AND OBJECT RECORD

*Resource Name or # (Assigned by recorder) Objects Associated with Tranquility Base

- B1. Historic Name: Apollo 11 mission ceremonial objects
- B2. Common Name: Ceremonial and Commemorative objects
- B3. Original Use: To exemplify the world's attention to this historic achievement and to commemorate fallen astronauts and cosmonauts.
- B4. Present Use: Deposited in situ during the Apollo 11 mission.

*B5. Architectural Style: N/A

*B6. Construction History: Most of the objects were constructed by NASA through the use of several sub-contractors between 1967-1969. The medals commemorating fallen cosmonauts Vladimir Komarov and Yuri Gagarin were constructed the the Soviet Union. These objects include:

Artifact Number	Description
2	U.S. 3' x 5' Flag (1)
10	A Silicon Disc Carrying Statements from Presidents Nixon, Johnson, Kennedy, Eisenhower, and from Leaders of 73 Other Nations (1)
11	A Gold Replica of an Olive Branch, Traditional Symbol of Peace (1)
12	Mission Patch from Apollo I of Virgil I. Grissom, Edward H. White 11, and Roger B. Chaffee. (1)
13	Commemorative Plaque attached to the Lunar Module Descent Leg. "Here men from the planet Earth first set foot upon the Moon. July 1969, A.D. We came in peace for all mankind." The plaque is signed by the Apollo 11 crew and President Richard M. Nixon (1)
26	Medals Commemorating Two Dead Cosmonauts (2)



Left: Commemorative Plaque attached to the Lunar Module Descent Leg (<http://spacegrant.nmsu.edu/lunarlegacies/artifactlist.html>)

*B7. Moved? No Yes Unknown Date: Original Location:

*B8. Related Features: Approximately 106 artifacts

- B9a. Architect: Unknown
- b. NASA

*B10. Significance: Theme: Space Exploration and Technology
Area:

Period of Significance: 1961 - 1969

Property Type: Objects

Applicable Criteria: 1, 2, 3, 4 (see Continuation Sheets for evaluation of significance)

These objects are associated with the first presence of humans on the moon, which represents a technological achievement for humankind. The objects are also associated with Neil Armstrong and Edwin Aldrin, the first men on the moon, who interacted with the artifacts on the surface of the moon. The objects are also associated with former President Richard Nixon, as well as fallen astronauts Gus Grisson (the second American in space), Ed White (the first American to space walk), and Roger Chaffee. Two of the objects are associated with Yuri Gagarin (the first human in space) and Vladimir Komarov. The objects were designed to be used in the vacuum of space, exposed to extremem temperatures not found on earth. The design is also reflective of the technological level of the 1960s. Finally, these objects provide detailed information regarding the construction of the objects that may have been lost. After the Apollo program ended, NASA engineers and companies who constructed ships and components destroyed or disposed of valuable documents pertaining to the program. Because no humans have since visited the location, integrity is unknown.

B11. Additional Resource Attributes: (List attributes and codes)
HP 26. Monument

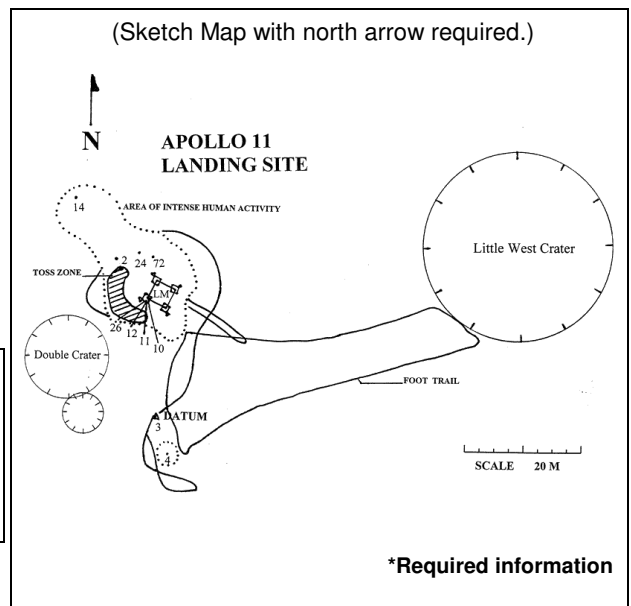
*B12. References:

Gibson, Ralph (2001) "Lunar Archaeology: the Application of Federal Historic Preservation Law to the Site Where Humans First Set Foot Upon the Moon." Master's Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

B13. Remarks:

*B14. Evaluator: Ralph Gibson, Lisa Westwood, Beth O'Leary, and John Versluis *Date of Evaluation: October 26, 2009

(This space reserved for official comments.)



*Required information

BUILDING, STRUCTURE, AND OBJECT RECORD

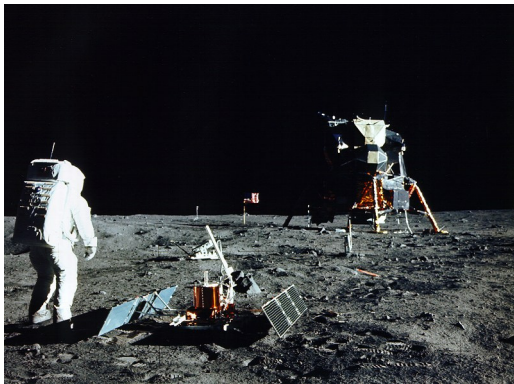
*Resource Name or # (Assigned by recorder) Objects Associated with Tranquility Base

- B1. Historic Name: Apollo 11 mission experiment components
- B2. Common Name: Experiment components
- B3. Original Use: To detect seismic activity, measure the distance from the earth to the moon, collect potential evidence of solar winds.
- B4. Present Use: Deposited in situ during the Apollo 11 mission.

*B5. Architectural Style: N/A

*B6. Construction History: All of the artifacts were constructed by NASA through the use of several sub-contractors between 1967-1969. Objects include:

Artifact Number	Description
3	Laser Ranging Retroreflector (LRRR) (1)
4	Passive Seismic Experiment (PSE) (1)
24	Solar Wind Composition Staff (1)



Left: Passive Seismic Experiment (PSE) in foreground; lunar module in background (<http://spacegrant.nmsu.edu/lunarlegacies/artifactlist.html>)

*B7. Moved? No Yes Unknown Date:

Original Location:

*B8. Related Features: Approximately 106 artifacts

- B9a. Architect: Unknown
- b. NASA

*B10. Significance: Theme: Space Exploration and Technology Area:
Period of Significance: 1961-1969 Property Type: Objects
Applicable Criteria: 1, 2, 3, 4 (see Continuation Sheets for evaluation of significance)

These objects are associated with the first presence of humans on the moon, which represents a technological achievement for humankind. The objects are also associated with Neil Armstrong and Edwin Aldrin, the first men on the moon, who interacted with the artifacts on the surface of the moon. The objects were designed to be used in the vacuum of space, exposed to extremem temperatures not found on earth. The design is also reflective of the technological level of the 1960s. Finally, these objects provide detailed information regarding the construction of the objects that may have been lost. After the Apollo program ended, NASA engineers and companies who constructed ships and components destroyed or disposed of valuable documents pertaining to the program. Because no humans have since visited the location, integrity is unknown.

B11. Additional Resource Attributes: (List attributes and codes)

*B12. References:

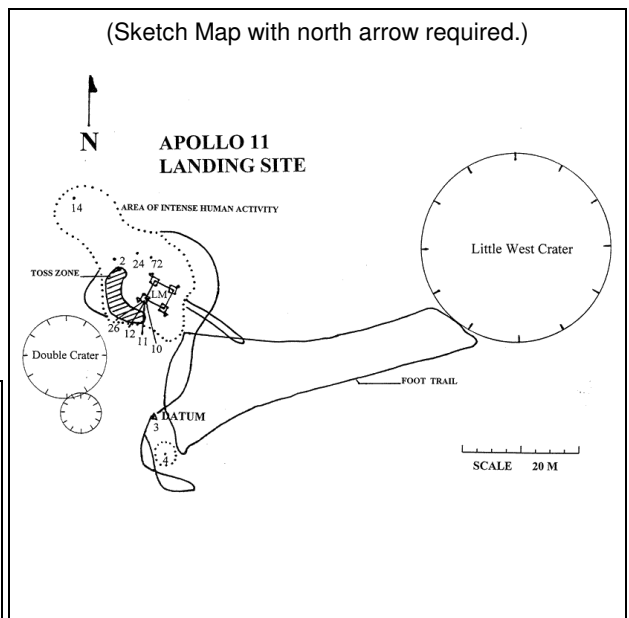
Gibson, Ralph (2001) "Lunar Archaeology: the Application of Federal Historic Preservation Law to the Site Where Humans First Set Foot Upon the Moon." Master's Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

B13. Remarks:

*B14. Evaluator: Ralph Gibson, Lisa Westwood, Beth O'Leary, John Versluis

*Date of Evaluation: October 26, 2009

(This space reserved for official comments.)



BUILDING, STRUCTURE, AND OBJECT RECORD

*Resource Name or # (Assigned by recorder) Objects Associated with Tranquility Base

- B1. Historic Name: Apollo 11 mission tools and astronaut gear
- B2. Common Name: tools and astronaut gear
- B3. Original Use: To help collect soil and rock samples from the lunar surface, set up experiments, protect astronauts from the vacuum of space.
- B4. Present Use: Deposited in situ during the Apollo 11 mission.

*B5. Architectural Style: N/A

*B6. Construction History: All of the artifacts were constructed by NASA through the use of several sub-contractors between 1967-1969. Objects include (listed according to artifact number):

- | | | |
|--|---|--|
| 5. Neil Armstrong's Apollo Portable Life Support System (PLSS), Model A7L (1) | 34. Overshoes, Lunar (2) | 61. Pallet Assembly #2 (1) |
| 6. Neil Armstrong's Apollo Space Boots, Model A7L (2) | 35. Covers, Pga Gas Connector (2) | 62. Primary structure assembly (1) |
| 7. Edwin (Buzz) Aldrin Jr.'s Apollo Portable Life Support System (PLSS), Model A7L (1) | 36. Kit, Electric waist, Tether (1) | 63. Hammer (1) |
| 8. Edwin (Buzz) Aldrin Jr.'s Apollo Space Boots, Model A7L (2) | 37. Bag Assy, Lunar Equip.conveyor & waist tether (1) | 64. Gnomon (Excludes mount) (1) |
| 14. TV Camera (1) | 38. Conveyor assy, Lunar Equipment (1) | 65. Tripod (1) |
| 15. Spring Scales (2) | 39. Bag, Deployment, Life line (1) | 66. Handle/cable assembly (cord for tv camera) (1) |
| 16. Tongs (1) | 40. Bag, Deployment, Lunar equipment conveyor (1) | 68. SWC bag (extra) (1) |
| 17. Small Scoop (1) | 41. Life line, Lt. wt. (1) | 69. Core tube bits (2) |
| 18. Scongs (1) | 42. Tether, Waist, EVA (4) | 70.SRC seal protectors (2) |
| 19. Bulk Sample Scoop (1) | 43. Food Assembly, LM (4 man days) (1) | 71. Environmental sample containers "O" rings (2+) |
| 20. Trenching Tool (1) | 44. TV subsystem, Lunar (1) | 72. Apollo Lunar Surface Close-up Camera (1) |
| 21. Camera (Hasselblad EI Data) (1) | 45. Lens, TV wide angle (1) | 73. Lunar equipment conveyor (1) |
| 22. Armrests (4) | 46. Lens, TV lunar day (1) | 74. ECS canister (1) |
| 23. Mesa Bracket (1) | 47. Cable assembly, TV (100 ft.) (1) | 75. ESC bracket (1) |
| 25. Handle of Contingency Lunar Sample Return Container (1) | 48. Adapter, SRC/OPS (2) | 76. OPS brackets (2+) |
| 27. Document Sample Box Seal (1) | 49. Cannister, ECS LIOH (2) | 77. Left hand side stowage compartment (1) |
| 28. Storage container (empty) (1) | 52. Bag, Emesis (4) | 79. Extension Handle |
| 29. Hasselblad pack (1) | 53. Container assembly, Disposal (1) | 80. Stainless steel cover (9 x 7 5/8 inches x 1/16 inch thick) |
| 30. Film Magazines (2+) | 54. Filter, oxygen bacterial (1) | 82. 8 foot aluminum tube |
| 31. Filter, Polarizing (1) | 55. Container, PLSS Condensate (1) | 83. 2 + retaining pins for flag and staff storage |
| 32. Remote Control Unit (PLSS) (2) | 56. Antenna, S-Band (1) | 84. Insulating blanket |
| | 57. Cable,S-Band antenna (1) | 85. Small aluminum capsule |
| | 58. Bag, Lunar Equipment Transfer (1) | |
| | 59. Pallet assembly #1 (1) | |
| | 60. Central Station (1) | |

*B7. Moved? No Yes Unknown Date:

Original Location:

*B8. Related Features: Approximately 106 objects

b. NASA

B9a. Architect: Unknown

*B10. Significance: Theme: Space Exploration and Technology

Area:

Period of Significance: 1961-1969

Property Type: Objects

Applicable Criteria: 1,2,3,4

(see Continuation Sheets for evaluation of significance)

These objects are associated with the first presence of humans on the moon, which represents a technological achievement for humankind. The objects are also associated with Neil Armstrong and Edwin Aldrin, the first men on the moon, who interacted with the artifacts on the surface of the moon. The objects were designed to be used in the vacuum of space, exposed to extremem temperatures not found on earth. The design is also reflective of the technological level of the 1960s. Finally, these objects provide detailed information regarding the construction of the objects that may have been lost. After the Apollo program ended, NASA engineers and companies who constructed ships and components destroyed or disposed of valuable documents pertaining to the program. Because no humans have since visited the location, integrity is unknown.

B11. Additional Resource Attributes: (List attributes and codes)

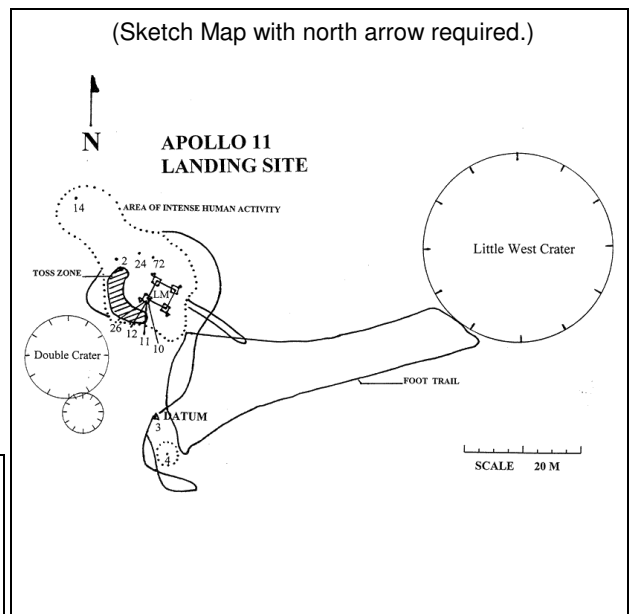
*B12. References:

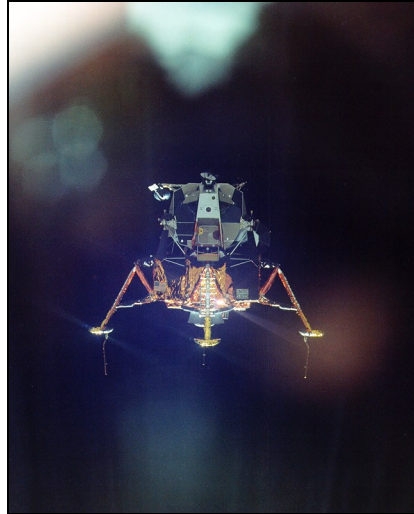
Gibson, Ralph (2001) "Lunar Archaeology: the Application of Federal Historic Preservation Law to the Site Where Humans First Set Foot Upon the Moon." Master's Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

B13. Remarks:

*B14. Evaluator: Ralph Gibson, Lisa Westwood, Beth O'Leary, John Versluis *Date of Evaluation: October 26, 2009

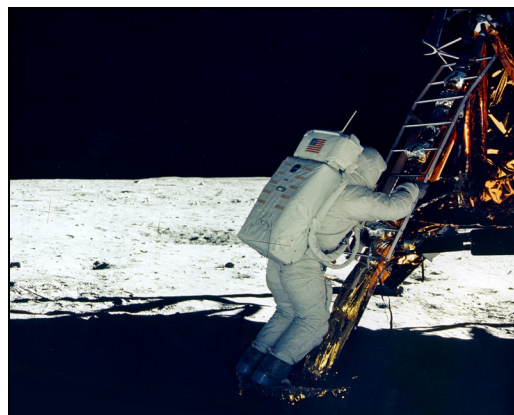
(This space reserved for official comments.)





1. Lunar Module Inspection After Undocking

<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/6598.jpg>



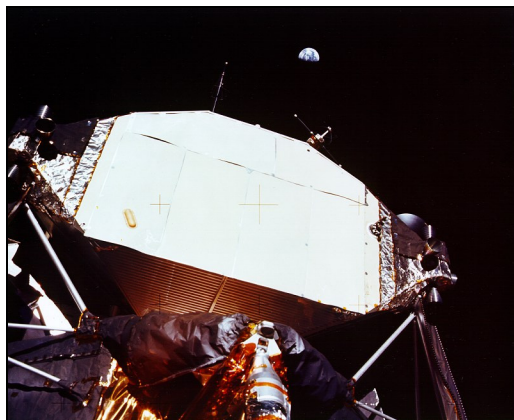
2. Buzz Aldrin on the LM footpad

<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5869.jpg>



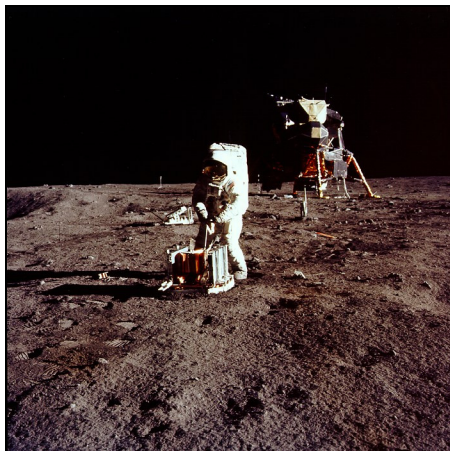
3. Buzz Aldrin salutes the U.S. Flag

<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5875.jpg>



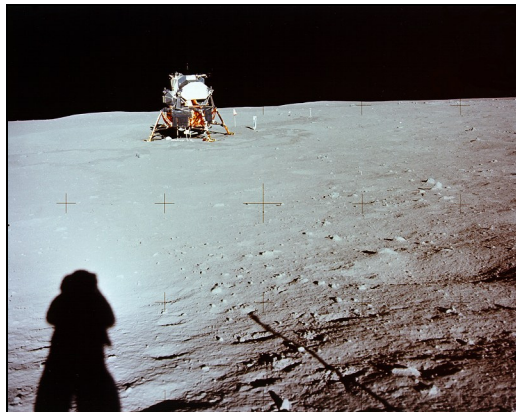
4. The Earth rising over the top of the LM

<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5924.jpg>

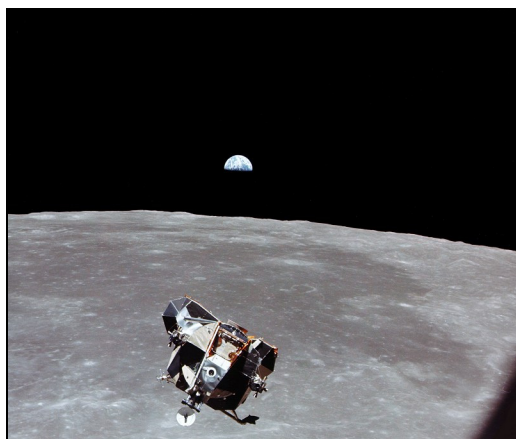


5. Buzz Aldrin assembles the seismic experiment

<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5946.jpg>



6. Neil Armstrong takes a photo of the LM from a distance
<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/5961.jpg>



7. LM approaches the CSM for docking
<http://www.hq.nasa.gov/office/pao/History/ap11ann/kippsphotos/6642.jpg>