Area 51

Dreamland
Fifty Years of Secret Flight Testing in Nevada
by **Peter W. Merlin**

May 2005 marks the 50th anniversary of flight test activities at Groom Lake, Nevada, best known to the public as DREAMLAND or Area 51. For half a century this remote desert outpost has served as a breeding ground for aircraft on the cutting edge of technology. It served as an important national asset during the Cold War and numerous conflicts throughout the globe.

Dreamland continues to support the warfighter and keep America on the cutting edge of aerospace technology.

Humble Beginnings

The Central Intelligence Agency (CIA) established the Groom Lake test facility during Project AQUATONE, through which the Lockheed U-2 spy plane was developed. Capable of flying at high altitude while carrying sophisticated cameras and sensors, the U-2 was equipped with a single jet engine and long, tapered straight wings.

For security reasons, CIA officials did not believe that the new airplane should be flown at Edwards Air Force Base, California. At the request of U-2 designer Clarence L. "Kelly" Johnson of the Lockheed Advanced Development Projects division (better known as the Skunk Works), project pilot Tony LeVier was dispatched to scout locations around the southwestern United States for a more remote test site.

Richard M. Bissell Jr., director of the AQUATONE program, reviewed dozens of potential test sites with his Air Force liaison, Col. Osmond J. "Ozzie" Ritland. None seemed to meet the program's stringent security requirements. Ritland, however, recalled "a little X-shaped field" in southern Nevada that he had flown over many times during his involvement with the nuclear weapons test program. The airstrip, called Nellis Auxiliary Field No.1, was located just off the eastern side of Groom Dry Lake, about 100 miles north of Las Vegas. It was also just outside the Atomic Energy Commission's (AEC) nuclear proving ground at Yucca Flat.

In April 1955, LeVier, Johnson, Bissell, and Ritland flew to Nevada on a two-day survey of the most promising lakebeds. After examining Groom Lake, it was obvious that this would be an ideal location for the test site, with its excellent flying weather and unparalleled remoteness. The abandoned airfield that Ritland remembered was overgrown and unusable, but the lakebed was excellent. Bissell later described the playa as "a perfect natural landing field...as smooth as a billiard table without anything being done to it."

Kelly Johnson originally opposed the choice of Groom Lake because it was farther from Burbank than he would have liked, and because of its proximity to the Nevada Proving Ground (later renamed Nevada Test Site). Johnson was understandably concerned about conducting a flight test program adjacent to an active nuclear test site. In fact, Groom Lake lay directly in the primary downwind path of radioactive fallout from atomic blasts.

Groom Lake was actually Johnson's second choice for the test location. He had already designed a base around his primary lakebed, dubbed Site I, which would have been a small, temporary camp with only the most rudimentary accommodations. Johnson estimated construction costs for such a facility at $200,000 to $225,000.

Base requirements soon changed, however, calling for a permanent facility nearly 300% larger than Johnson's original design. Johnson estimated construction of a larger facility at Site I would cost $450,000. His estimate for building the same facility at Site II (Groom Lake) was $832,000. Johnson ultimately accepted Ritland's recommendation, largely because AEC restrictions would help shield the operation from public view.

Bissell secured a presidential action adding the Groom Lake area to the AEC proving ground. Ritland wrote three memos to Air Force Headquarters, the AEC, and the Air Force Training Command that administered the gunnery range. Assistant Air Force Secretary for Research and Development Trevor Gardner signed the memos, this ensuring that range activities would not impinge on the new test site.

Security for project AQUATONE was now assured.

During the last week of April 1955, Johnson met with CIA officials in Washington, D.C. and discussed progress on the base and the AQUATONE program. His proposal to name the base "Paradise Ranch" was accepted. It was an ironic choice that, he later admitted was "a dirty trick to lure workers to the program." The AQUATONE, officially designated U-2 became known as "The Angel from Paradise Ranch." The base itself was usually just called "The Ranch" by those who worked there.

On 4 May 1955, LeVier, Kammerer, and Johnson returned to Groom Lake in Lockheed's Bonanza. Using a compass and surveying equipment, they defined a 5,000-foot, north-south runway on the southwest corner of the lakebed and designated a site for the camp.

On 18 May 1955, Seth R. Woodruff Jr., manager of the AEC Las Vegas Field Office, announced that he had "instructed the Reynolds Electrical and Engineering Co., Inc. [REECo] to begin preliminary work on a small, satellite Nevada Test Site installation." He noted that work was already underway at the location "a few miles northeast of Yucca Flat and within the Las Vegas Bombing and Gunnery Range."

Woodruff said that the installation would include "a runway, dormitories, and a few other buildings for housing equipment." The facility was described as "essentially temporary." The press release was distributed to 18 media outlets in Nevada and Utah including a dozen newspapers, four radio stations, and two television stations.

This, in effect, constituted Area 51's birth announcement.

Watertown Operations

LeVier and fellow Lockheed test pilot Bob Matye spent nearly a month removing surface debris from the playa. Levier also drew up a proposal to mark four three-mile-long runways on the lakebed at a cost of $450.00. Johnson, however, refused to approve the expense, citing a lack of funds. Drilling resulted in discovery of a limited water supply, but trouble with the well soon developed.

Top priorities for the test site included hangars, a road, offices, living accommodations, and various support facilities. Since Lockheed did not have a license to build on the nuclear proving ground, they gave their drawings to a contractor who did: Silas Mason Construction Company. The Lockheed group hid their identity behind the fictional company name "CLJ", using Johnson's initials.

The fledgling base consisted of a single, paved 5,000-foot runway, three hangars, a control tower, and rudimentary accommodations for test personnel. The base's few amenities included a movie theatre and volleyball court. Additionally, there was a mess hall, several water wells, and fuel storage tanks. CIA, Air Force, and Lockheed personnel began arriving in July 1955 and Richard Newton of the CIA was assigned as base commander. The test site

soon acquired a new name: Watertown. According to some accounts, the site was named after CIA director Allen Dulles' birthplace in Watertown, New York. It is still listed as a member of Alamo Township in Lincoln County.

The first U-2 was transported, disassembled, to Watertown in an Air Force C-124 cargo plane. It had no serial number and was designated Article 341. Tony LeVier made the unofficial first flight in the U-2 during a taxi test on 29 July. He piloted the first planned test flight on 4 August.

After completing Phase I (contractor) testing LeVier was replaced by Lockheed test pilots Bob Matye and Ray Goudey who expanded the airplane's altitude envelope to its operational limits. By November 1955, the test group also included Robert Sieker and Robert Schumacher.

On 17 November 1955, tragedy struck the AQUATONE project. An Air Force C-54M (44-9068) transporting personnel to the secret base crashed near the top of Mt. Charleston, about 20 miles west of Las Vegas. Nine civilians and five military personnel were killed. There were no survivors. After the accident, Lockheed assumed responsibility for transporting personnel to Watertown. A company-owned C-47 was used to ferry pilots, technicians, and special visitors to the test site.

By the beginning of 1956, four U-2 aircraft had been delivered to the Groom Lake test site. By the end of March the fleet consisted of nine aircraft, and six CIA pilots were undergoing flight training at the site. Four experienced instructor pilots trained three classes in ground school, followed by landing practice in a T-33 and, eventually, solo flights in the U-2. The second class underwent training at Groom between May and August 1956. It included Francis Gary Powers, who would later win dubious fame after being shot down and captured while flying a U-2 over the Soviet Union. The third training class was conducted in late 1956.

Several U-2 airplanes were lost in accidents including the prototype. Two CIA pilots were killed and one escaped without injury. Lockheed test pilot Robert Sieker perished in Article 341.

Atomic Blasts

Nuclear weapons testing at nearby Yucca Flat affected test and training activities at Watertown. During the first two years of the Watertown operation, the atomic proving ground had been quiet as all full-scale testing was taking place at Bikini and Eniwetok atolls in the Pacific Ocean. That changed in the summer of 1957 with Operation Plumbbob.

Because Groom Lake was downwind of the proving ground, Watertown personnel were required to evacuate the base prior to each detonation. The AEC, in turn, tried to ensure that expected fallout from any given shot would be limited so as to permit re-entry of personnel within three to four weeks. Evacuation plans included notification procedures, adequate security for classified areas, means to inform evacuees when they might return, and radiation monitoring. If a nuclear test was postponed, which occurred frequently, Watertown personnel were required to evacuate prior to each new shot date.

All personnel at the base were required to wear radiation badges to measure their exposure to fallout. AEC Radiological Safety (Rad-Safe) officers briefed Watertown personnel on nuclear testing activities and radiation safety, and presented a film called Atomic Tests In Nevada. They also made arrangements for radiation monitors to visit the airbase whenever fallout was anticipated in the Watertown area.

Project 57, the first shot of the new series, took place on Watertown's doorstep. On 24 April 1957, the AEC conducted a safety experiment with an XW-25 warhead just five miles northwest of Groom Lake in Area 13. Only the bottom detonator of the device was fired, simulating an accident not involving a nuclear detonation. The test was designed to disperse a known quantity of plutonium over a defined area to develop effective monitoring and decontamination procedures.

Following several delays, full-scale nuclear detonations began on 28 May. Shot BOLTZMANN, a 12-kiloton blast, was fired from a 500-foot tower on northern Yucca Flat. After more delays, two minor blasts, FRANKLIN and LASSEN, were fired during the first week of June. These tests came near the intended end of Watertown's existence as an active installation.

The base had always been considered a temporary facility. As U-2 testing began to wind down and CIA pilot classes finished their training, Watertown became a virtual ghost town. By mid-June 1957, the U-2 test operation had moved to Edwards and operational U-2 aircraft were assigned to the 4028th Strategic Reconnaissance Squadron at Laughlin, Texas.

On 18 June 1957, a test code-named WILSON deposited fallout on Watertown. The AEC measured radiation exposure inside the evacuated buildings and vehicles at the base to study the effectiveness of various materials in shielding against fallout. In effect, Watertown served as a laboratory to determine the shielding qualities of typical building materials that might be found in any American town. WILSON was followed by the 37-kiloton PRISCILLA shot at Frenchman Flat on 24 June.

HOOD, the sixth nuclear shot of Plumbbob, was truly spectacular. It also caused substantial damage to the Groom Lake airbase. The device was lofted by balloon to a height of 1,500 feet over Yucca Flat, about 14 miles southwest of Watertown. On 5 July 1957, HOOD exploded with a yield of 74 kilotons. It was the most powerful airburst ever detonated within the continental United States. HOOD's shockwave shattered windows on two buildings at Watertown, and broke a ventilator panel on one of the dormitories. A maintenance building on the west side of the base and the supply warehouse west of the hangars suffered serious damage as their metal roll-up doors buckled.

Despite the end of U-2 operations and the near constant rain of fallout, security at the Watertown facility remained tight. On 28 July 1957, a civilian pilot was detained after making an emergency landing at Watertown airstrip. Edward K. Current Jr., an employee of Douglas Aircraft Company, had been on a cross-country training flight when he became lost, ran low on fuel, and decided to land at Groom Lake. He was held overnight and questioned before being released.

On 20 June 1958, 38,400 acres of land encompassing the Watertown base was officially withdrawn from public access under Public Land Order 1662. This rectangular addition to the Nevada Test Site was designated Area 51. Shortly after this, the National Aeronautics and Space Administration (**NASA**) secured permission to designate Groom Lake as a contingency landing site for the X-15 rocket plane. It was, however, never needed for this purpose.

For two years following the departure of the U-2 fleet from Watertown, the base was fairly quiet.

New Lease on Life

Dramatic changes came to Area 51 with the advent of Project OXCART, through which Lockheed's proposed successor to the U-2 was developed. The OXCART aircraft was a sleek, powerful looking aircraft with a long tapered forward fuselage with blended chines. A rounded delta wing supported two turbo-ramjet engines capable of boosting the aircraft to Mach 3.2 at altitudes in excess of 90,000 feet.

Twin, inwardly canted tails and a sawtooth internal structure in the wing edges contributed to a low overall RCS. The airframe was constructed mostly of titanium, with asbestos-fiberglass and phenyl silane composites in the leading and trailing edges, chines, and tails for RCS reduction. The final designation for the OXCART aircraft was A-12, with the "A" standing for "Archangel."

The Skunk Works team in Burbank built a full-scale mock-up of the A-12 during the spring of

1959 for RCS tests to be performed by Edgerton, Germeshausen & Grier (EG&G) of Las Vegas. On 10 September, EG&G agreed to move its radar test facility from Indian Springs, Nevada, to Groom Lake for security reasons. A special pylon was constructed on a paved loop road on the west side of the lakebed.

The A-12 mock-up was moved from Burbank to the test site on a specially designed trailer truck. By 18 November, the model was in place. It took 18 months of testing and adjustment before the A-12 achieved a satisfactory RCS.

Naturally, a secret location was needed for testing the triple-sonic A-12. Ten U.S. Air Force bases programmed for closure were considered, but none provided adequate security, and annual operating costs were prohibitive for most. Groom Lake was selected although it lacked personnel accommodations, fuel storage, and an adequate runway.

Lockheed planners estimated cost requirements for monthly fuel consumption, hangars, maintenance facilities, housing, and runway specifications. The CIA then produced a plan for construction and engineering. A CIA cover story stated that the facilities were being prepared for radar studies to be conducted by an engineering firm with USAF support. Construction at the site, referred to as Project 51, was performed by Reynolds Electrical and Engineering Company (REECo).

Base construction began on 1 September 1960 and continued on a double-shift schedule until 1 June 1964. Workers were ferried in from Burbank and Las Vegas on C-54 aircraft. Since the existing 5,000-foot runway was incapable of supporting the weight of the A-12, a new airstrip (runway 14/32) was constructed between 7 September and 15 November 1960.

The A-12 required a runway at least 8,500 feet long. About 25,000 cubic yards of concrete were poured to make the airstrip. A 10,000-foot asphalt extension, for emergency use, cut diagonally across the southwest corner of the lakebed. An Archimedes curve approximately two miles across was marked on the dry lake so that an A-12 pilot approaching the end of the overrun could abort to the playa instead of plunging the aircraft into the sagebrush. Area 51 pilots called it "The Hook." For crosswind landings two unpaved airstrips (runways 9/27 and 03/21) were marked on the dry lakebed.

Kelly Johnson had been reluctant to construct a standard Air Force runway, with expansion joints every 25-feet, because he feared the joints would set up undesirable vibrations in the OXCART aircraft. At his suggestion, the 150-foot-wide runway was constructed in segments, each made up of six 25-foot-wide longitudinal sections. The sections were 150 feet long and staggered. This layout put most of the expansion joints parallel to the direction of aircraft roll, and reduced the frequency of the joints.

Essential facilities were completed by August 1961. Three surplus U.S. Navy hangars were obtained, dismantled, and erected on the base's north side. They were designated as Hangar 4, 5, and 6. A fourth, Hangar 7, was built new. More than 130 U.S. Navy surplus Babbitt duplex housing units were transported to the base and made ready for occupancy. The original U-2 hangars were converted to maintenance and machine shops. Facilities in the main cantonment area included workshops and buildings for storage and administration, a commissary, control tower, fire station, and housing.

It was determined that 500,000 gallons of JP-7 fuel would be needed monthly to support the OXCART program. By early 1962 a fuel farm, including seven tanks 1,320,000-gallon capacity was complete. Older buildings were repaired, and additional facilities were constructed as necessary. A reservoir pond, surrounded by trees, served as a recreational area one mile north of the base. Other recreational facilities included a gymnasium, movie theatre, and a baseball diamond.

On 15 November 1961, USAF Col. Robert J. Holbury was named commander of the secret base, with the CIA's Werner Weiss as his deputy. The base was still a CIA facility, and would remain so for another 18 years.

OXCART and the Roadrunners

Support aircraft began arriving in the spring of 1962. These included eight McDonnell F-101B/F Voodoos for training and chase, a Lockheed C-130 Hercules for cargo transport, U-8A for administrative use, Cessna 180 for liaison use, and Kaman HH-43 helicopter for search and rescue. A Lockheed F-104A/G (56-0801) was supplied as a chase plane during the OXCART flight test period.

In January 1962, the Federal Aviation Administration (FAA) expanded the restricted airspace in the vicinity of Groom Lake. The lakebed became the center of a 600-square-mile addition to restricted area R-4808N. Restricted continuously at all altitudes, the airspace occupies the center of the Nellis Air Force Range.

The prototype A-12 (60-6924) made its unofficial first flight on 25 April 1962 with Louis W. Schalk at the controls. He flew the aircraft less than two miles at an altitude of about 20 feet. The following day, Schalk made a 40-minute flight. An official "first flight" on 30 April was witnessed by a number of dignitaries including Richard Bissell (even though he had resigned from the CIA in February) and FAA chief Najeeb Halaby.

OXCART pilot Jack Weeks nicknamed the A-12 Cygnus after the constellation of the swan. Initially, all 15 A-12 aircraft were based at Groom Lake and operated by the 1129th Special Activities Squadron Roadrunners, commanded by Col. Hugh "Slip" Slater. A-12 test aircraft (60-6924, 60-6925, 60-6928), and the TA-12 trainer (60-6927) were housed in hangars at the north end of the flightline. Operational aircraft were kept in Hangars 9 through 16 at the southern end of the base. Security was paramount. Even the existence of the A-12 was a closely guarded secret.

With the assistance of the CIA, the U.S. Air Force entered into an agreement with Lockheed to build three prototypes of an interceptor version of the A-12 under project KEDLOCK. Known as the AF-12 (later changed to YF-12A), the design included a second crew position, air-to-air missiles, and fire-control radar in the nose. The first YF-12A (60-6934) made its maiden flight on 7 August 1963 with James Eastham at the controls.

After President Lyndon B. Johnson announced the existence of the aircraft in March 1964, the YF-12A test was program moved to Edwards.

Dreamland

Construction of the Area 51 facility was completed in 1965. The site population had grown to 1,835, and contractors were working three shifts a day. Lockheed-owned Constellation and C-47 aircraft made several flights a day ferrying personnel from Burbank and Las Vegas to Groom Lake. Hughes and Honeywell had facilities on site, and Pratt & Whitney operated an engine test stand. Perkin-Elmer set up a special building in which to work on the equipment bays in the nose of the A-12.

During the course of the OXCART program, Kelly Johnson developed an unmanned reconnaissance drone that could be launched from a modified version of the A-12. Codenamed TAGBOARD, the drone was a ramjet-powered vehicle capable of reaching 90,000 feet at Mach 3.3. Two OXCART-type aircraft (60-6940 and 60-6941) were purpose-built to launch TAGBOARD. Each was equipped with a rear seat for a Launch Systems Operator (LSO), and a dorsal launch pylon.

The TAGBOARD was designated D-21 and the launch aircraft were given the unusual designation M-21. The first D-21 was launched 5 March 1966.

Unfortunately, the second M-21 was lost during the fourth TAGBOARD launch, when the

drone collided with the launch aircraft. Pilot Bill Park ejected safely and was rescued 150 miles off Point Mugu, California. His LSO Ray Torick ejected but drowned before he could be rescued. The tragic loss of an aircraft and crewmember ended the use of OXCART as a launch aircraft, but it did not spell the end of TAGBOARD.

In 1967, the D-21 received a new lease on life. Under the SENIOR BOWL program, the drone was reconfigured for launch from a B-52 and redesignated D-21B. It was reconfigured for launch from inboard wing pylons and propelled to ramjet-ignition speed by a rocket booster. Two B-52H aircraft (60-0036 and 61-0021) from the 4200th Support Squadron at Beale Air Force Base, California, were sent to Groom Lake for the test program.

The unofficial first flight occurred on 28 September 1967, when a D-21B was accidentally dropped due to a mechanical failure. The first actual launch attempt took place 6 November. Flight-testing continued through July 1969. The program was terminated in 1971 after only four operational flights.

At some point during the late 1960s, Area 51 gained a new nickname: DREAMLAND. This purportedly was derived from DREAM-LAND, a poem by Edgar Allan Poe. It describes lakes that "endlessly outspread" with waters "lone and dead." More to the point, Poe admonishes that "the traveler, traveling through it, may not-dare not openly view it; Never its mysteries are exposed, to the weak human eye unclosed." Coincidence or not, it is certainly an apt description of Area 51.

Several A-12 airplanes were deployed from Area 51 to Kadena, Japan, for Operation Black Shield reconnaissance flights over Southeast Asia in 1967. One of the airplanes was lost during a training mission and the pilot presumed killed. Four A-12s had been lost in accidents at or near Area 51, but only one of these was fatal. The surviving airframes were retired in June 1968 and placed in storage at a Lockheed facility in Palmdale.

The A-12 remained unknown to the public for 12 more years while the YF-12A and later SR-71 became some of the most famous airplanes in the world.

Red Hats

Beginning in the late 1960s, and for several decades, DREAMLAND played host to a motley assortment of Soviet-built aircraft. The first such program, in 1968, involved technical and tactical evaluations of a MiG-21F-13 that the Israeli Defense Forces had acquired from an Iraqi defector. Called HAVE DOUGHNUT, the project was a joint effort of the U.S. Air Force Systems Command, Tactical Air Command, and the U.S. Navy's Air Test and Evaluation Squadron Four (VX-4).

The MiG-21 was flown against nearly all U.S. combat aircraft types, allowing Air Force and Navy pilots to develop improved tactics for combating Eastern bloc aircraft.

A similar evaluation program in 1969, called HAVE DRILL/HAVE FERRY, involved two Syrian MiG-17F fighters. As in the earlier program, a small group of Air Force and Navy pilots conducted mock dogfights with the MiG-17. Selected instructors from the Navy's Top Gun school at NAS Miramar, California, were chosen to fly against the MiGs for familiarization purposes.

Testing of foreign technology aircraft continued and expanded throughout the 1970s and 1980s. Additional MiG-17, MiG-21, MiG-23, Su-7B, Su-22 and other aircraft underwent intensive evaluations. The 6513th Test Squadron Red Hats from the Air Force Flight Test Center (AFFTC) at Edwards conducted technical evaluation sorties. The 4477th Test and Evaluation Squadron Red Eagles, headquartered at Nellis Air Force Base, Nevada, performed tactical evaluations. In April 1984 Lt. Gen. Robert M. Bond, Vice Commander of Air Force Systems Command, lost his life in the crash of a MiG-23 during an orientation flight.

Area 51 also hosted another foreign materiel evaluation program called HAVE GLIB. This involved testing Soviet tracking and missile control radar systems. A complex of actual and replica Soviet-type threat systems began to grow around "Slater Lake" (the pond, which had been named after the former Roadrunners commander), a mile northwest of the main base. They were arranged to simulate a Soviet-style air defense complex.

The Air Force began funding improvements to Area 51 in 1977 under project SCORE EVENT. In 1979, the CIA transferred control of the test site to the AFFTC at Edwards.

It was now a remote operating location of the Center, and was designated Detachment 3, AFFTC. Sam Mitchell, the last CIA commander of Area 51, relinquished command to Lt. Col. Larry D. McClain.

Pioneers of Stealth

In November 1977, a C-5 arrived at Groom Lake carrying the Lockheed HAVE BLUE prototype. HAVE BLUE was the first airplane designed to be virtually invisible to radar. The single-seat jet looked like a faceted arrowhead with two inwardly canted tail fins. Its boxy, angular fuselage and wings contributed to its low RCS. It was eventually covered with radar absorbent material (RAM).

Such shaping and material treatments rendered the airplane "low observable" or "stealthy."

The first HAVE BLUE vehicle, Article 1001, was flown to demonstrate handling characteristics. The second was scheduled to carry out tests of the low observable (L.O.) characteristics. After arriving at the test site, Article 1001 underwent a few weeks of flight control, engine, and taxi tests. Every time HAVE BLUE was rolled out of its hangar, uncleared personnel at the base were sequestered to prevent them from seeing the aircraft.

HAVE BLUE first flew on 1 December 1977 with Lockheed test pilot Bill Park at the controls. Skunkworks chief Ben Rich, his predecessor "Kelly" Johnson, and Ken Perko of the Advanced Research Projects Agency were on hand to witness the event. The flight was also monitored by the White House Situation Room and Tactical Air Command Headquarters at Langley Air Force Base, Virginia. Article 1001 completed 36 flights before being lost in a non-fatal accident.

Article 1002, the low observables technology demonstrator, made its first flight on 20 July 1978 piloted by Lt. Col. Norman "Ken" Dyson. It made 52 flights against sophisticated U.S. and Soviet ground-based radars, and the E-3 Airborne Warning And Control System (AWACS). Article 1002 was lost on 11 July 1979 due to an engine fire.

At the time of the accident only one final test flight had been scheduled for the HAVE BLUE program.

In October 1978, Lockheed conducted the first test of its stealth cruise missile, code named SENIOR PROM. Six prototypes were built. They somewhat resembled a subscale, unmanned version of the HAVE BLUE, but with outwardly-canted tails, narrow wings, and a single jet intake located where the cockpit would have been. The demonstrator models were launched from a DC-130. Thirteen test flights were made, and all six vehicles recovered. The recovery method involved deploying a ballistic parachute and inflating a ventral landing bag. Although the SENIOR PROM tests were successful, the contract for production of a stealthy Advanced Cruise Missile (ACM) went to the less expensive General Dynamics AGM-129A. SENIOR PROM was cancelled in 1981.

On 17 January 1981 the Lockheed test team at Groom Lake accepted delivery of the first SENIOR TREND Full Scale Development (FSD) prototype, Ship 780, designated YF-117A. Like the HAVE BLUE, it too resembled a faceted arrowhead, except that the tails were canted outward in a "V" shape. Ship 780 first flew on 18 June 1981 with Lockheed test pilot Hal

Farley at the controls.

By early 1982, four more YF-117A airplanes were operating out of the southern end of the base, known as the "Southend" or "Baja Groom Lake." After finding a large scorpion in their offices, the test team adopted it as their mascot and dubbed themselves the "Baja Scorpions."

As the Baja Scorpions tested the FSD airframes, production F-117A aircraft were shipped to DREAMLAND for acceptance testing. Following functional check flights and L.O. verification, the operational airplanes were deployed to the 4450th Tactical Group at Tonopah Test Range, in the northwest corner of the Nellis Range.

While HAVE BLUE and SENIOR TREND were being put through their paces in Nevada, the Air Force, Defense Advanced Research Projects Agency, and Northrop Aircraft Corporation teamed up to develop a new aircraft. Code-named TACIT BLUE, it was originally designed as a technology demonstrator for a low-observable surveillance aircraft with a low-probability-of-intercept radar, and other sensors, that could operate close to the front line of battle with a high degree of survivability.

Although plans for a stealthy surveillance aircraft were abandoned, TACIT BLUE provided important data that aided in the development of several other weapons systems. These included the B-2 advanced technology bomber, the AGM-137 Tri-Service Standoff Attack Missile (TSSAM), and the PAVE MOVER program (which led to the development of the E-8 Joint-STARS aircraft). TACIT BLUE was the first aircraft to demonstrate a low RCS using curved surfaces.

Only one complete TACIT BLUE prototype was constructed. A second, partially completed, shell was built as a back up. The aircraft featured a curved upper surface with a flush dorsal intake. Twin turbofan engines gave it a cruising speed of about 260 miles per hour. TACIT BLUE sported tapered straight wings and two square fins in a widely spaced V-tail configuration. Flat, squared "platypus bills" on the nose and tail gave it a nearly rectangular planform.

From the side, TACIT BLUE resembled a whale, complete with a blowhole. In fact, the TACIT BLUE team members nicknamed it "The Whale," and referred to themselves as "Whalers."

The nearly complete TACIT BLUE aircraft was trucked to the test site in several large crates for final assembly in Hangar 8. Northrop test pilot Richard G. Thomas, made the first flight of TACIT BLUE on 5 February 1982. TACIT BLUE made a total of 135 sorties, flown by a team of one contractor and four Air Force pilots. Thomas made 70 of the flights, including the 100th sortie on 27 April 1984. The final flight took place on 14 February 1985. Following a highly successful test program, the one-of-a-kind aircraft was stored in the Area 51 "boneyard."

In April 1996, it was declassified and delivered to the U.S. Air Force Museum in Dayton, Ohio for permanent display.

Expansion and Acquisition

Because Groom Lake's site population had grown substantially, the C-54 aircraft had become inadequate to transport all the personnel. The Air Force contracted EG&G Special Projects, McCarran Operations, in Las Vegas to transport commuters to DREAMLAND in a fleet of six Boeing 737-200s. These flights, using the call sign JANET, carried personnel and freight daily from Las Vegas, Palmdale, and Burbank to Groom Lake, and later Tonopah Test Range.

Beginning in 1979, the Air Force began actively discouraging, and at times preventing, any public or private entry to the Groom Mountains, north of Groom Lake. Air Force personnel claimed it was "in the interest of public safety and national defense." This was about the time the Air Force took control of the Groom Lake facility from the CIA.

Not only were hunters and hikers excluded from the mountains north of Groom Lake, but also citizens with mining claims in the area. In 1981, the Air Force discreetly requested that 89,600 acres of land encompassing the range be legally withdrawn from public use. The process of approving this request took several years. It also resulted in a battle between the government, citizens, and various special interest groups (such as the Sierra Club). In the end, the government won.

By March 1984, government security personnel prohibited travel and controlled access along the Groom Lake road northeast of the lakebed. In August, the Groom Mountains withdrawal was approved subject to an environmental impact statement (EIS) and public hearings. Congress officially authorized the withdrawal in 1987, and the following year President Ronald Reagan signed legislation making the Groom Mountains part of the Nellis Air Force Range until 2003. None of the documentation (EIS, archeological surveys, etc.) mentioned Area 51 or the Groom Lake test facility.

As public access became increasingly restricted, facilities in the DREAMLAND complex increased dramatically in number and size. During the mid-1980s new dormitories were constructed to replace the Babbitt housing. Several large water tanks were added to supply the base. Hangar 18 was built near the south ramp.

Four "Rubber Duck" temporary aircraft shelters were erected near the Southend for use by TAC personnel during F-117A acceptance tests. Many new facilities were built and, by the end of the decade the "Rubber Duck" shelters were replaced with metal hangars (Hangars 20 through 23). Recreational facilities expanded to include the softball diamond and movie theatre, as well as a swimming pool and tennis courts. The latter are located adjacent to Sam's Place, the local saloon and recreation center.

Runway 14/32 was extended 4,600 feet further southeast of the lakebed because the north end was subject to flooding during the rainy season. The runway now consisted of a 13,530-foot strip of concrete, 150 feet wide. The 10,000-foot hard asphalt extension and lakebed abort curve remained, but fell into disuse. The cost of maintaining the concrete runway became increasingly prohibitive.

AFFTC leadership determined that the most cost effective solution would be to keep the southern half of the airstrip open until a new, parallel paved strip (runway 14L/32R) could be completed. The new concrete strip was constructed in 1991. It does not extend out onto the lakebed, but a lead-in line to the abort curve was marked on the lakebed. The northern half of the original runway (14R/32L) was closed, reducing its length to about 10,000 feet. It was finally closed along its entire length. In 2001 the South Delta Taxiway was marked as runway 12/30. It is approximately 5,420-feet-long and 150-feet-wide, with convenient access to the Southend ramp.

A new central taxiway was constructed in 2003 to support runway 14L/32R.

The Groom Lake base received some unwanted publicity in 1994 when a number of former workers from the site sued the government. They claimed their health had been damaged by inhaling toxic fumes from the burning of waste materials in open trenches near the main base. For four months after the suit was filed, the government determinedly denied the existence of the base itself. Finally, however, it was forced to acknowledge that there was "an operating location at Groom Lake," but refused to provide a legal name for it citing "national security" concerns.

Air Force secretary Sheila Widnall declared that the facility "has no actual operating name per se." This was partially true. Since the Air Force had taken control of the facility in 1979 they had not used the name "Area 51," but instead simply referred to the operating location as DET 3, AFFTC,. Attorney Jonathan Turley tried on behalf of the plaintiffs to get the government to provide a legal name for the site, but was stymied at every turn.

The lawsuit forced the government to formally acknowledge the Groom Lake facility in order to keep its secrets.

On 29 September 1995, President Bill Clinton signed Presidential Determination No. 95-45, which stated in part:
"I find that it is in the paramount interest of the United States to exempt the United States Air Force's operating location near Groom Lake, Nevada from any applicable requirement for the disclosure to unauthorized persons of classified information concerning that operating location."

Space Invaders

Area 51's secret nature has bred rumor and speculation among fringe groups that believe the U.S. government is hiding captured extraterrestrial spacecraft, or even aliens (dead or alive) at the site. Such stories have been circulating since at least the late 1970s. Starting in 1989, groups of UFO believers began to camp out near the Nellis Range boundaries near Groom Lake to watch for "flying saucers."

As the news media caught wind of these "saucer base expeditions," print and television publicity was met with stony silence and terse denials from Air Force officials. This further fueled public speculation, spawned new rumors, and attracted still more publicity. Camera crews from around the world descended on the remote and forbidding Nevada desert. Local entrepreneurs capitalized on the situation by selling all manner of Area 51 souvenirs, videos, and visitor's guides.

The DET 3 security force, comprised of Air Force and civilian contractor personnel, worked overtime to intercept the "alien" invaders. A few civilians discovered that some nearby hilltops with a bird's-eye view of the secret base had been overlooked in the government's Groom Range land grab. Word quickly spread. Tourists sometimes camped on the hilltops 24 hours a day for days at a time. Flight test operations and even ground activities had to be postponed or cancelled.

In April 1995, the Air Force seized 5,000 more acres of public land to prevent civilians from viewing the base.

Out of the Black, Into the Blue

While many current and historic programs at Dreamland remain classified, some information has been released to the public. Formal announcements, published technical papers, and official personnel biographies often reveal details of previously "black" projects. In the absence of official information, rumors abound.

The Northrop B-2 Spirit Advanced Technology Bomber has frequently been seen over DREAMLAND. Prototypes from the B-2 Combined Test Force at Edwards AFB and operational aircraft from a detachment of the 509th Bomb Wing at Whiteman AFB, Missouri have flown against Soviet-type radar systems and the Dynamic Coherent Measurement System (DYCOMS). Known on-site as Project 100, this airborne RCS range has been used to measure the L.O. characteristics of all U.S. stealth aircraft from the F-117A to the F/A-22A.

Project HAVE GLASS was undertaken in 1982 to significantly reduce the RCS of the General Dynamics F-16 Fighting Falcon. A series of modifications included RAM coatings and fillings, reflective materials, and component shape changes. The results were verified using the DYCOMS.

In 1983 AeroVironment received CIA sponsorship to build a proof-of-concept high-altitude, solar-powered, radio-controlled UAV called HALSOL. It was essentially a rectangular flying wing made from lightweight materials. Initial test flights were powered by eight electric motors

using silver-zinc batteries. HALSOL made nine test flights.

Maj. Frank T. Birk piloted the first flight of a "classified technology demonstrator" at Groom Lake in 1985. For his work on the project, the Society of Experimental Test Pilots gave Birk the Lieutenant General Bobby Bond Memorial Aviator Award that "recognizes an AFSC military rated crew member for outstanding contribution to AFSC's test and evaluation mission while participating in aerial duties."

On 2 October 1992, the 413th Flight Test Squadron was activated at Edwards to provide test and evaluation capability for electronic warfare (EW) systems. This change supported a consolidation of all Air Force electronic combat assets in the western United States.

The mission of the 413th included planning, providing for, and organizing worldwide ground and flight tests of EW systems and equipment. A detachment of the 413th FLTS conducted EW testing at Groom Lake. In May 2004 the 413th Flight Test Squadron was inactivated as part of another consolidation and realignment of EW assets that were then absorbed by the EW Directorate at Edwards.

In the early 1990s Dennis F. "Bones" Sager was handpicked to lead a "classified prototype aircraft" called the YF-113G from design to first flight. As a fighter pilot and experimental test pilot, Sager accumulated over 2,900 flight hours in 54 aircraft types including Soviet fighters at Groom Lake. He was first Air Force pilot to fly the YF-113G.

On October 18, 2002, Boeing uncloaked its secret Bird of Prey technology demonstrator that was used to pioneer revolutionary advances in low-observables, aircraft design, and rapid prototyping.

The project, initiated in 1992, remained highly classified even after its conclusion in 1999. A Boeing spokesman announced that it had been declassified "because the technologies and capabilities developed [during the program] have become industry standards, and it is no longer necessary to conceal the aircraft's existence." Phantom Works chief test pilot Rudy Haug piloted the maiden flight of Bird of Prey in the fall of 1996. After McDonnell Douglas merged with Boeing on August 1, 1997, The Boeing Company continued to fund the project. Three pilots flew only 38 missions between 1996 and 1999.

Doug Benjamin, assigned to the Special Projects Flight Test Squadron, was the only Air Force pilot to fly the Bird of Prey. He flew 21 test flights including envelope expansion, mission utility, and tactical applications sorties. Following Benjamin's retirement from the military service in 2000, it was revealed that he had flown three other classified aircraft.

Daniel R. Vanderhorst has flown at least seven classified aircraft including TACIT BLUE. Many of his flights have involved one-of-a-kind technology demonstrators. In one such aircraft he tested modified landing gear and conducted initial tests of internal weapons bays, and weapon separation tests. He holds the altitude record in this still-classified aircraft.

There have also been reports of Advanced Concept Technology Demonstrator (ACTD) projects undergoing flight tests at Groom Lake.

Other projects at the site may include stealth helicopters, weapons development, unmanned aerial vehicles, and avionics testing.

Silent Service

For half a century, the Groom Lake test site has been a valuable asset for the development of aerospace vehicles and weapon systems. There, workers toil in relative isolation and inhospitable conditions to prove revolutionary technologies and enhance the readiness of today's warfighter and support national requirements.

Most non-permanent base residents commute to Groom Lake an Mondays, and often stay at the base until Thursday or Friday. Because of the sensitive nature of their work, they can't share their accomplishments with friends and family.

Former base commander Col. Larry McClain summarized this burden of silence:
"For it is the lot of some men to be assigned duties about which they may not speak. Such work is not for every man. But those who accept the burdens implicit in this silent labor realize a camaraderie and sense of value known to few. These memories cannot be stolen. They will last always, untarnished, ever better."
In his poem, "A Tribute to All the Whalers," J. E. Coleman describes DREAMLAND in this way:
AMERICA'S STRENGTH THROUGH TECHNOLOGY
IS WHAT IS KEEPING FREE MEN FREE
SO IF YOU EVER HEAR ABOUT THIS PLACE
PLEASE HOPE IT EXISTS IN TIME AND SPACE
FOR WHAT THEY DO THERE CAN'T BE TOLD
BUT FREEDOM'S LIGHT THEY THERE UPHOLD
Many projects tested at Groom Lake over the last five decades are still classified. The full story of this unique national asset may never be known. Nevertheless, DREAMLAND is beginning to yield its secrets at last.

Dreamland Timeline

The following is a general timeline of events at the Groom Lake, Nevada, test facility.

It covers half a century of history involving a unique national asset.

Early 1955

A secure test site was needed for the Central Intelligence Agency's Project AQUATONE (Lockheed U-2). U-2 designer Clarence L. "Kelly" Johnson sent project pilot Tony LeVier and Lockheed Skunk Works chief foreman Dorsey Kammerer on a two-week survey mission to scout locations for a new base in an unmarked Beechcraft V-35 Bonanza.

Richard M. Bissell Jr., "special assistant" to CIA director Allen Dulles, and director of the AQUATONE program reviewed fifty potential sites with his Air Force liaison, Col. Osmond J. "Ozzie" Ritland. None of the sites seemed to meet the stringent security requirements of the program. They rejected Johnson's proposed Site I (possibly Mud Lake) because it was too close to populated areas. Ritland, however, recalled "a little X-shaped field" just off the eastern side of Groom Dry Lake, about 100 miles north of Las Vegas, Nevada, just outside the Atomic Energy Commission's (AEC) nuclear proving ground at Yucca Flat.

April 1955

LeVier, Johnson, Bissell, and Ritland flew out to Nevada on a two-day survey of the most promising lakebeds, including Groom Lake. The abandoned airfield that Ritland had remembered was sandy, overgrown and unusable, but the three-mile-wide dry lakebed was perfect.

Bissell secured a Presidential action adding the Groom Lake area to the AEC proving ground. Ritland wrote three memos to the Air Force, AEC, and the Training Command that administered the gunnery range. Signed by Assistant Air Secretary for Research and Development Trevor Gardner, they insured that range activities would not impinge on the new test site. Security for the project was now assured.

Johnson met with CIA officials in Washington, D.C. and discussed progress on the base and the AQUATONE program. His proposal to name the base "Paradise Ranch" was accepted. It was an ironic choice which, he later admitted was "a dirty trick to lure workers to the program."

May 1955
LeVier, Kammerer, and Johnson returned to Groom Lake in Lockheed's Bonanza. Using a compass and surveying equipment, they laid out a place for a 5,000-foot, north-south runway on the southwest corner of the lakebed. They also staked out the general layout of the base.

Herb Miller of CIA Development Projects Staff issued $800,000 in contracts for construction of the base. Through the AEC, Miller organized a team of construction crews.

Seth Woodruff Jr., Manager of the AEC Las Vegas Field Office, announced to the news media that he had "instructed the Reynolds Electrical and Engineering Co., Inc. [REECo] to begin preliminary work on a small, satellite Nevada Test Site installation." He noted that work was already underway at the location "a few miles northeast of Yucca Flat and within the Las Vegas Bombing and Gunnery Range." Woodruff said that the installation would include "a runway, dormitories, and a few other buildings for housing equipment." The facility was described as "essentially temporary." The press release was distributed to 18 media outlets in Nevada and Utah including a dozen newspapers, four radio stations, and two television stations.

LeVier and fellow Lockheed test pilot Bob Matye spent nearly a month removing surface debris from Groom Lake (the area had been used for gunnery practice during World War II). LeVier also drew up a proposal for four three-mile-long runways to be marked on the hard-packed clay. Johnson, however, refused to approve the $450.00 expense, citing a lack of funds. Drilling resulted in discovery of a limited water supply, but trouble with the well soon developed and water had to be trucked in.

July 1955
Construction of the base was completed. It consisted of a single paved 5,000-foot runway, three hangars, a control tower, and rudimentary accommodations for test personnel. The base's few amenities included a movie theatre and volleyball court. Additionally, there was a mess hall, and several water wells and fuel storage tanks.

CIA, Air Force, and Lockheed personnel began arriving at the Groom Lake test site.

The test site was officially and legally named Watertown after CIA Director Allen Dulles' birthplace: Watertown, New York. It is still listed as a member of Alamo Township in Lincoln County, Nevada.

Richard Newton of the CIA assigned as base commander.

The first U-2 (Article 341), disassembled, was flown to "The Ranch" in an Air Force C-124 cargo plane. Base commander Richard Newton expressed his doubts to Kelly Johnson that the new asphalt runway would support the weight of the loaded C-124.

Tony LeVier piloted the unofficial maiden flight in Article 341 during a taxi test.

August 1955
Levier, with the callsign ANGEL 1, made the first real flight in Article 341. Bob Matye flew chase in a C-47 with "Kelly" Johnson on board as an observer.

September 1955
LeVier completed Phase I (contractor) testing. His accomplishments included taking the U-2 to 50,000 feet, achieving the maximum design speed of Mach 0.84, and making a successful dead-stick landing.

LeVier was replaced by Lockheed test pilots Bob Matye and Ray Goudey, who expanded the altitude envelope to 74,500 feet.

The second U-2 (Article 342) was delivered to Watertown.

October 1955
Test pilots Robert Sieker and Robert Schumacher joined the U-2 test team.

Pursuant to a request by the Las Vegas Review Journal the previous month, the AEC released a statement regarding progress on the "Watertown Project." It stated that "construction at the Nevada Test Site installation a few miles north of Yucca Flat which was announced last spring is continuing. Data secured to date has indicated a need for limited additional facilities and modifications of the existing installation. The additional work which will not be completed until sometime in 1956 is being done by the Reynolds electrical and Engineering Company, Incorporated under the direction of the Atomic Energy Commission's Las Vegas branch office."

November 1955
U.S. Air Force C-54M (44-9068) transporting personnel to Watertown crashed near the top of Mt. Charleston, about 20 miles west of Las Vegas. Nine civilians and five military personnel were killed. There were no survivors.

After the accident, Lockheed took on the responsibility of transporting personnel to the test site. A C-47, owned by Lockheed, was used to bring in pilots, technicians, and special visitors.

December 1955
Defense Secretary Charles Wilson visited Watertown for a briefing on the U-2 operation.

January 1956
By the beginning of 1956, four U-2 aircraft had been delivered to the Groom Lake test site.

March 1956
The fleet consisted of nine aircraft, and six CIA pilots were undergoing flight training at the site.
Col. Landon McConnell was assigned as base commander at Watertown.
CIA Director Allen Dulles visited Watertown to personally meet the first training class.

May 1956
As Wilburn S. Rose took off on a training flight in U-2A (56-6678), one of the wing pogo wheels failed to separate. Rose flew low over the field, trying to shake it loose. The aircraft, heavy with fuel, stalled and crashed, killing Rose.

The second class arrived at Watertown. It included Francis G. "Frank" Powers, who would later win dubious fame after being shot down and captured while flying a U-2 over the Soviet Union.

While Powers' class underwent training, a group of four Greek and one Polish pilot also came to Groom for familiarization in the U-2. The Greek pilots all washed out during training, and the Polish pilot was never allowed to fly the U-2.

August 1956
The second U-2 class completed their training.
The third U-2 training class arrived at Watertown. Among others, it included Frank G. Grace Jr. and Bob Ericson.

Grace was killed during a night training flight while flying U-2A (56-6687). He became disoriented by lights near the end of the runway, and flew into a telephone pole.

December 1956
Bob Ericson was flying U-2A (56-6690) at 35,000 feet when he suffered an oxygen failure. As he began to pass out, the aircraft went out of control. Ericson managed to open the canopy, and parachute to a safe landing on the Navajo Indian Reservation in Arizona.

Article 341 was modified for a series of radar cross section (RCS) tests called Project RAINBOW. Lockheed attempted to reduce the RCS of the U-2 using radar-absorbent materials.

Another U-2, Article 344, was strung with piano wire of varying dipole lengths between the nose and wings of the aircraft to reduce the radar signature. These methods created extra drag with a resultant penalty in range and altitude. The U-2 aircraft modified under Project RAINBOW were known as "dirty birds" because they were not aerodynamically "clean."

April 1957
During a Project RAINBOW test flight, Article 341 suffered a flameout at 72,000 feet due to airframe heat build-up. Pilot Robert Sieker's pressure suit inflated, but his helmet faceplate failed and he lost consciousness. The aircraft stalled at 65,000 feet and entered a flat spin. Sieker revived at low altitude and attempted to bail out. Without an ejection seat, or enough altitude for a safe manual egress, Sieker was killed. His body was found near the wreck, with his parachute partially deployed. More information here.

An AEC information booklet called "Background Information on Nevada Nuclear Tests" published in 1957) gave a cover story for the Watertown operation. It stated that the National Advisory Committee for Aeronautics (NACA) was operating U-2 aircraft at the Groom Lake site "with logistical and technical support [from] the Air Weather Service of the U.S. Air Force to make weather observations at heights that cannot be attained by most aircraft." At that time, the aircraft were unpainted except for fictitious NACA markings in the event that one of them was lost off-site.

The AEC conducted a safety experiment with an XW-25 warhead just five miles northwest of Groom Lake in Area 13. Called Project 57, the test was part of Operation Plumbbob. The device, with a design yield of one to two kilotons, was involved in a simulated accident without a nuclear detonation. The test spread plutonium over 895 acres. More information here.

May 1957
AEC Radiological Safety Officer Charles Weaver, Oliver R. Placak, and Melvin W. Carter participated in two meetings held at Watertown. The film Atomic Tests In Nevada was shown and discussed during two meetings. Watertown personnel were briefed on nuclear testing activities, radiation safety, and the possibility of radiation hazards from the Operation Plumbbob test series. Before leaving Watertown, the AEC men met with two Air Force officers, Col. Jack Nole and a Col. Schilling, and Richard Newton to discuss arrangements for radiation monitors to visit the airbase whenever fallout was anticipated in the Watertown area.

Shot BOLTZMANN, a 12 kiloton blast, was fired from a 500-foot tower on northern Yucca Flat. Watertown personnel were required to evacuate the secret base to avoid fallout.

June 1957
Two minor atomic blasts, FRANKLIN and LASSEN, were fired at Yucca Flat.
CIA pilot classes finished training.
The U-2 test operation moved to North Base at Edwards AFB, California.
Operational U-2 aircraft were assigned to the 4028th Strategic Reconnaissance Squadron.
4028th SRS commander Col. Nole led the first of two three-ship U-2 formations from

Watertown to their new home at Laughlin, Texas.
Watertown became a virtual ghost town. The base was apparently in caretaker status with a site manager, security, and minimal complement of personnel present.

An atomic test code-named WILSON deposited fallout on Watertown. The AEC measured radiation exposure inside the evacuated buildings and vehicles at the base to study the ability of various materials to shield against fallout. In effect, Watertown served as a laboratory to determine the shielding qualities of typical building materials that might be found in any average American small town.

The 37-kiloton PRISCILLA shot was detonated at Frenchman Flat.

HOOD, the sixth nuclear shot of Operation Plumbbob, caused substantial damage to the Watertown airbase. The device was lofted by balloon to a height of 1,500 feet over Yucca Flat, about 14 miles southwest of Watertown. On 5 July 1957, HOOD exploded with a yield of 74 kilotons. HOOD's shockwave shattered windows on two buildings at Watertown, and broke a ventilator panel on one of the dormitories.

A maintenance building on the west side of the base had its west and east doors buckled, and the south door of the supply warehouse west of the hangars was also buckled.

July 1957
A civilian pilot was detained when he made an emergency landing at the Watertown airstrip. Edward K. Current Jr., a Douglas Aircraft Company employee, had been on a cross country training flight when he became lost, ran low on fuel, and decided to land at Groom Lake. He was held overnight and questioned.

Nevada Test Organization (NTO) security officials reported the incident to the Civil Aeronautics Administration (CAA), which administered the air closure over the Test Site. The following day, the NTO Office of Test Information issued a press release to the news media, describing the incident. The statement noted that the "Watertown landing strip is in the Groom lake area at the northeast corner of the Nevada Test Site."

August 1957
Operation Plumbbob nuclear testing continued. Five additional safety experiments and 18 more full-scale detonations were conducted. Several shots dropped significant fallout on Watertown.

They included DIABLO, DOPPLER, SMOKY, and WHITNEY. SMOKY had a yield of 44 kilotons. It was fired on top of a 700-foot tower in Area 8, about 14 miles southwest of Groom Lake. The mushroom cloud was extremely dirty, and spread radioactive debris over the Groom Lake area.

June 1958
An area comprised of 38,400 acres of land surrounding the Watertown base was officially withdrawn from public access under Public Land Order 1662. This rectangular addition to the Nevada Test Site was designated "Area 51."

July 1959
USAF personnel from Edwards AFB embarked on a two-day survey trip in an L-28 to investigate potential emergency landing sites for the X-15 rocket plane. The L-28 received clearance to land on Groom Lake, the fifth stop on the trip. The crew tested the hardness of the lakebed surface by dropping a 10lb. steel ball from a height of six feet and measuring the diameter of the resulting imprint.

The survey report described Groom Lake as follows: "The surface is very smooth and extremely hard. All approaches are good, and runways can be used in any direction with just over three miles of lake available. This lake is considered excellent for emergency use." Groom Lake was designated as a contingency landing site for eleven X-15 missions, but none of the flights had to abort to the secret base.

September 1959
EG&G agreed to move its radar test facility to Groom Lake for security reasons. A special pylon was constructed on a paved loop road on the western side of the lakebed.
Aerial photos of Groom Lake were taken for construction contractor Holmes & Narver, Inc. (H&N).

November 1959
The AEC issued a press release regarding construction of a butler-type building for "Project 51" at Groom Lake. The statement indicated that the building would be used to "house data reduction equipment for use by Edgerton, Germeshausen, and Grier [EG&G, Inc.] in an Air Force Program." The construction project led to a labor dispute. REECo obtained a court order to force the union to provide half a dozen sheet metal workers for the project, then agreed to arbitration of the dispute prior to an injunction hearing in district court.

A full-scale mock-up of the A-12 was shipped to Area 51 for radar signature testing by EG&G.

December 1959
Joe Vensel, Forrest Petersen, and Jim McKay flew from the NASA Flight Research Center (FRC) at Edwards to Nevada in a NASA R4D-5 (17136) to re-survey X-15 landing sites. They landed on the northern end of Groom Lake, just outside the restricted area and tested the lakebed surface by taxiing the aircraft across the hard-packed clay.

They soon saw jeeps approaching from Watertown, but the R4D took off before the jeeps arrived.

An Air Force crew attempted a survey following a winter storm. Air Traffic controllers at Area 51 denied landing clearance to the survey aircraft, so it just made a fly-by. The crew noted that there was water on the east half of the lakebed.

Project High Range was completed to track the X-15. It was a High-Altitude Continuous Tracking Radar range over 400 miles long, and stretching from California to Utah. It included radar facilities and microwave relay units. One of the latter, MRU-4, was placed on top of Bald Mountain, 14 miles north of Groom Lake.

September 1960
Base construction began at Area 51 to build facilities to support Project OXCART, the Lockheed A-12. Since the existing 5,000-foot runway (built for the U-2) was incapable of supporting the weight of the A-12, a new airstrip (Runway 14/32) was constructed.

NASA and AFFTC personnel discussed the idea of using the airspace over Groom as a launch site for the X-15. They determined that Groom had advantages over Mud Lake, near Tonopah, since there were more intermediate contingency landing sites available between Groom and Edwards. The Use of Groom Lake also meant a reduction in AFFTC support requirements since there was already an airfield with emergency equipment and personnel at the site. Ultimately, they agreed to remove Groom from consideration as a launch site due to difficulty obtaining clearance into the area.

November 1960
Runway 14/32 was completed. The A-12 required a runway at least 8,500 feet long and 150-feet-wide. A 10,000-foot hard asphalt extension, with a concrete turnaround pad in the middle, cut diagonally across the southwest corner of the lakebed. A semicircle (called "The Hook") approximately two miles in diameter was marked on the dry lake so that an A-12 pilot approaching the end of the overrun could abort to the hard-packed playa instead of running his aircraft into the sagebrush.

An unpaved airstrip (Runway 09/27) crossed the lakebed from southwest to northeast. Another strip (Runway 03/21) was laid out as a crosswind runway.

August 1961
The essential facilities at Area 51 were completed. Three surplus U.S. Navy hangars were obtained, dismantled, and erected on the north side of the base, just north of the three original hangars. They were designated as Hangars 4, 5, and 6. A fourth, Hangar 7, was also built.

One hundred and forty surplus U.S. Navy housing units were transported to the base and made ready for occupancy. The original U-2 hangars now served as maintenance and machine shops. Facilities in the main cantonment area included workshops and buildings for storage and administration, a commissary, control tower, fire station, and housing.

The airspace over Groom Lake became part of a new Restricted Area called R-4808N (replacing the former Prohibited Area P-275), that covered both the Nevada Test Site and Area 51. It prohibited overflights below 60,000 feet.

September 1961
CIA Inspector General Lyman B. Kirkpatrick arrived at Area 51 for a three-day visit. Afterward, he had some critical comments regarding Area 51 security and OXCART project management.

In his preliminary summary report Kirkpatrick stated: "The 'Area' in my opinion appears to be extremely vulnerable in its present security provisions against unauthorized observation. The high and rugged northeast perimeter of the immediate operating area, which I visited in order to see for myself, is not under government ownership. It is subject to a score or more of mineral claims, at least one of which is visited periodically by its owner. Several claims are sites of unoccupied buildings or cellars which together with the terrain in general afford excellent opportunity for successful penetration by a skilled and determined opposition."

Kirkpatrick felt that Area 51 was "already demonstrably vulnerable to air violation including landings," that "major installations are not rigorously protected against sabotage," and that construction of facilities had been undertaken before construction personnel had received a full security clearance.

Richard M. Bissell thought these points were valid. The assistant to the CIA Deputy Director of Plans noted that Bissell "was particularly interested in why we have not yet been able to eject the various citizens holding property around the Area."

December 1961
Col. Robert J. Holbury was named commander of Detachment 1, 1129th Special Activities Squadron Roadrunners and Area 51, with Werner Weiss of the CIA as his deputy.

January 1962
The Federal Aviation Administration (FAA) expanded the restricted airspace above Groom to 22 by 20 nautical miles. The lakebed now lay at the center of a 440-square-mile box at the heart of the Nellis Air Force Range. Eventually, the airspace was restricted continuously,

at all altitudes.

February 1962
The first A-12 prototype (Article 121/ AF Serial No. 60-6924) was trucked to the test site.

April 1962
Support aircraft began arriving at Area 51. These included: six McDonnell F-101B and two F-101F Voodoos for training and photo chase, two T-33A Shooting Stars for proficiency training, one Lockheed C-130 Hercules for cargo transport, one U-8A for administrative use, one Cessna 180 for liaison use (later replaced with a Cessna 210), and a Kaman HH-43 helicopter for search and rescue (later replaced with a UH-1). Two F-104A/G Starfighters (56-0790 and 56-0801) served as chase planes during the OXCART flight test program.

Article 121 made its unofficial first flight at Area 51 with Louis W. Schalk at the controls. He flew the aircraft less than two miles at an altitude of about 20 feet.

The following day, Schalk made a 40-minute flight. Schalk's official first flight, several days later, was witnessed by a number of CIA personnel (including Richard Bissell) and Najeeb E. Halaby, head of the Federal Aviation Administration.

June 1962
Second A-12 airframe (Article 122) arrives at Groom Lake and is mounted on the RCS pylon for three months of testing.

July 1962
SEDAN, a 104-kiloton thermonuclear explosion, created a crater 320 feet deep and 1,280 feet across on Yucca Flat. The radioactive dust cloud drifted northeast over Groom Pass.

October 1962
Shot BANDICOOT detonated in a subterranean shaft with a yield of 12.5 kilotons. Dynamic venting deposited fallout on the Groom Lake area.

November 1962
A Lockheed test pilot flew a U-2 against radar sites at Area 51 to evaluate its radar cross-section. This was shortly after the Cuban Missile Crisis, and may have been precipitated by the loss of a U-2 to a Cuban SA-2 surface-to-air missile on 27 October.

May 1963
During a subsonic engine test sortie in A-12 (Article 123/60-6926), Ken Collins descended into a thick cloud deck. Ice quickly built up in the pitot tube, causing erroneous airspeed readings in the cockpit. The jet suddenly stalled and pitched up, entering an inverted flat spin. Collins ejected, and the A-12 impacted south of Wendover, near the Utah-Nevada border. Secrecy of the OXCART program was maintained by telling the press that a Republic F-105 had crashed. More information here.

August 1963
The first YF-12A (Article 1001/60-6934) made its maiden flight at Area 51 with James Eastham at the controls.

October 1963
A flight of three F-105 Thunderchiefs, led by British exchange pilot Anthony "Bugs" Bendell, was on a practice nuclear weapon delivery sortie about 80 miles north of Nellis AFB when one aircraft experienced an oil pressure malfunction. One F-105 returned to Nellis while Bendell led the stricken craft to the airfield at Groom Lake. After making a pass over the field with no response to distress calls, Bendell advised the student pilot to land. At this point, two F-101 Voodoos intercepted Bendell and forced him to land also.

1963
Lou Schalk took Kelly Johnson for a ride in the TA-12 (Article 124/60-6927).

March 1964
After President Lyndon B. Johnson announced the existence of the YF-12A (intentionally calling it "Lockheed A-11" at Kelly Johnson's request), the YF-12A test program moved to Edwards AFB, California.

July 1964
Lockheed test pilot Bill Park flew a high-speed sortie in A-12 (Article 133/60-6939). While on final approach to Groom Lake, the controls locked up, and the aircraft began to roll. Park ejected just 200 feet above the ground. He swung through just one parachute oscillation before touching down.

December 1964
Kelly Johnson flew Najeeb Halaby to the Area 51 test site. Halaby was taken up for a flight in the two-seat TA-12 trainer (Article 124/60-6927).
Bill Park piloted the first mated flight of the M-21/D-21 combination. The M-21 motherships were Article 134/60-6940 and Article 135/60-6941.

November 1965
The A-12 was declared ready for operational use.

December 1965
After takeoff in A-12 (Article 126/60-6929), Mele Vojvodich was forced to eject as the aircraft went out of control about 100 feet above the ground. The flight lasted only six seconds. Vojvodich parachuted to safety as the A-12 exploded nearby on the frozen surface of the lakebed. The cause was traced to controls that had been accidentally cross-wired during modifications.

March 1966
The Lockheed D-21 TAGBOARD ramjet powered unmanned reconnaissance drone was launched for the first time from a dorsal pylon on the M-21 mothership.

July 1966
The fourth launch attempt was made from M-21 (60-6941) with 60-6940 flying chase. After leaving Groom Lake, the aircraft flew out over the Pacific Ocean. As the D-21 separated from the launch pylon, it struck the tail of the M-21 resulting in the loss of the aircraft. Pilot Bill Park ejected safely and was rescued 150 miles off Point Mugu, California. His LSO Ray Torick ejected but drowned before he could be rescued.

Col. Hugh "Slip" Slater takes command of DWT 1, 1129th SAS and Area 51.

January 1967
While returning to Area 51 from a routine training flight, A-12 (Article 125/60-6928) crashed near Leith, Nevada. A faulty gauge had allowed the jet to run out of fuel 70 miles short of Groom Lake. Walt Ray ejected, but failed to separate from his seat, and was killed.

Mid-1967 (?)
Sam Mitchell (CIA) assigned as commander of Area 51.

September 1967
James S. Simon Jr. died while flying chase during a night sortie of the TA-12. As the TA-12 approached the south end of the runway Simon's F-101B (56-0286) struck the ground and exploded near the South Trim Pad.

Under the SENIOR BOWL program, the D-21 drone was reconfigured for launch from a B-52 and redesignated D-21B. Two B-52H aircraft (60-0036 and 61-0021) from the 4200th Support Squadron were sent to Groom Lake for the test program.

The unofficial first flight of the D-21B (Article 501) occurred when one of the drones was accidentally dropped due to a mechanical failure.

November 1967
The first actual launch of a D-21B was completed successfully from a B-52H over the Pacific Ocean.

January 1968
Project HAVE DOUGHNUT, a joint USAF/Navy technical and tactical evaluation of the MiG-21F-13 began at Area 51.

February 1968
First test flight of HAVE DOUGHNUT MiG-21.

March 1968
Project HAVE DOUGHNUT was completed.

January 1969
Project HAVE DRILL/HAVE FERRY evaluation of two MiG-17F airplanes began at Area 51 with delivery of first airplane.

February 1969
First MiG-17 test flight completed.

March 1969
Second MiG-17 delivered to Area 51.

April 1969
First flight of second MiG-17.

May 1969
Project HAVE DRILL/HAVE FERRY was completed.

July 1970
The CIA began testing a remotely piloted vehicle (RPV) At Area 51 under project AQUILINE. With a six-foot wingspan and pusher propeller, the television-guided RPV was designed to gather intelligence by intercepting electronic transmissions from inside denied territory.

November 1970
Project HAVE GLIB, evaluation of foreign radar and threat systems began. A complex of actual Soviet systems and replicas began to grow around "Slater Lake" (the pond, which had been named after the former Roadrunners commander), a mile northwest of the main base. The systems were given names such as Mary, Kay, Susan, and Kathy. They were arranged to simulate a Soviet-style air defense complex.

December 1970
BANEBERRY, a 10-kiloton blast was detonated at the bottom of a 910-foot-deep shaft on Yucca Flat. Shortly afterward, radioactive gases erupted from a surface fissure. The plume reached an altitude of 8,000 feet and moved northeast. The fallout cloud arrived at Groom Lake an hour later. Within 20 minutes, radiation levels had reached a peak exposure rate of 0.18mR/hr. (compared to a normal background reading of 0.02 mR/hr.). Within another hour the cloud had passed.

Mid-1971
The Microwave Radar/Repeater Annex (MRU-4) on a three-acre parcel at the summit of Bald Mountain was improved. Construction at the site was sponsored by the Air Force Flight Test Center (AFFTC) at Edwards AFB.

December 1971
Project AQUILINE was canceled and the surviving airframes were placed in storage.

May 1973
Project HAVE IDEA was initiated to evaluate foreign aircraft at Area 51 and elsewhere. The test aircraft initially included MiG-21 and MiG-17 variants.

July 1974
The CIA Office of Special Activities (OSA) filed a Memorandum of Agreement regarding a classified project to be undertaken at Area 51. The top-secret project, with a classified code-name, was expected to last about one year. Six permanent personnel were assigned to the test site, with up to 20 personnel "on site during peak periods of short duration activity." Project personnel planned to use Hangars 13 through 17 at the south end of the test site.

July 1975
The 4477th TEF Red Eagles was activated at Nellis AFB to support evaluation of foreign aircraft.

November 1977
A C-5 had arrived at Area 51 carrying the Lockheed HAVE BLUE prototype. Also known as the Experimental Survivable Testbed (XST), HAVE BLUE was the progenitor of the Lockheed F-117A. It was the first airplane built to be virtually invisible to radar.

December 1977
6513th Test Squadron Red Hats was activated at Edwards AFB to support evaluation of foreign aircraft.

HAVE BLUE completed its maiden flight with Lockheed test pilot Bill Park at the controls. On hand to witness the event were Skunk Works chief Ben Rich, his predecessor "Kelly" Johnson, and Ken Perko of the Advanced Research Projects Agency. The flight was also monitored by the White House Situation Room and Tactical Air Command Headquarters at Langley AFB, Virginia.

March 1978
The first HAVE BLUE aircraft (Article 1001) was returned to Burbank for modifications. It was prepared for RCS tests (with RAM coatings and removal of the nose boom).

April 1978
HAVE BLUE (Article 1001) returned to Area 51.

May 1978
During a test flight in HAVE BLUE a sudden drop caused the airplane to slam down hard on the runway. Fearing he would slide off the runway, Bill Park applied full power and aborted the landing. He climbed to altitude, automatically retracting the gear, and again attempted to land. The chase pilot told Park that his right main gear had failed to come down. As fuel levels became critical, Park decided to eject. He was struck by the seat and knocked unconscious during bailout, suffering injuries that ended his flying career.

The wreckage was buried near Groom Lake.

July 1978
HAVE BLUE (Article 1002), the low-observables technology demonstrator, made its first flight piloted by Lt. Col. Norman K. "Ken" Dyson.

October 1978
Lockheed conducted the first test of its stealth cruise missile, code-named SENIOR PROM. Six prototypes were built. They somewhat resembled a subscale, unmanned version of the HAVE BLUE. The demonstrator models were launched from a DC-130 from the 6514th Test Squadron from Hill AFB, Utah. The SENIOR PROM test articles and launch aircraft

were housed in Hangar 17 at Area 51.

July 1979
Article 1002 was lost due to an engine fire. Dyson noticed two hydraulic system warning lights while flying about 35 miles from Groom Lake. He ejected, and the last HAVE BLUE tumbled end over end to the desert floor. The wreckage was buried near Groom Lake.

April 1979
The CIA transferred control of the test site to the Air Force. AFFTC commander B/Gen. Philip J. Conley Jr. originally designated and activated the new unit as the 6516th Test Squadron, under the supervision of the 6510th Test Wing.

May 1979
The Special Order designating and activating the 6516th Test Squadron was revoked and the unit was activated as OL-AA, Detachment 3, AFFTC. Col. Larry D. McClain was assigned as commander of DET 3, AFFTC.

October 1979
The 4477th Test and Evaluation Flight sponsored Phase I construction of a new airfield and support facilities at Tonopah Test Range (TTR).

The $7 million project included construction of a maintenance hangar, a concrete apron, access taxiway, propane tank, a few permanent outbuildings, and 16 mobile homes. The original 6,000-foot runway was extended to 10,000 feet. It was laid out with the same heading as the main runway at Area 51.

May 1980
The 4477th TEF Red Eagles was upgraded to squadron status as the 4477th Test and Evaluation Squadron.

October 1980
Phase II construction, sponsored by the 4477th TES, began at TTR at a cost of $17 million. It included an expansion of the apron area, construction of a taxiway, fuel tanks, a dining hall, water tank, warehouse, support utilities, and a 42,000-square-foot hangar.

January 1981
The Lockheed test site at Groom Lake accepted delivery of the first SENIOR TREND Full-Scale Development prototype (designated YF-117A).

March 1981
In preparation for TAC operational test and evaluation of the F-117A, Phase III construction began at TTR.
At a cost of $79 million, facilities were built for the 4450th Tactical Group, the unit that would operate the aircraft.

May 1981
Col. Charles "Pete" Winters became commander of DET 3, AFFTC. Winters had served as McClain's vice commander.

January 1981
Lockheed test pilot Hal Farley successfully completed the first YF-117A flight.

January 1982
Phase II construction at TTR was completed in January 1982. This provided a new home for the 4477th TES, and began the transition of TTR (also known as Area 52) from a bare base to a standard Air Force base.

TACIT BLUE, a stealth technology demonstrator built by Northrop, was trucked to the Groom Lake test site in several large crates for final assembly in Hangar 8.

February 1982
Northrop test pilot Richard G. Thomas, made the first flight of TACIT BLUE. The first production F-117A (80-10785) was delivered to DREAMLAND, disassembled, inside a C-5.

April 1982
Test pilot Bob Riedenauer attempted takeoff in the first production F-117A (80-10785) on its maiden checkout flight. Before the first test flight, technicians relocated a servomechanism from one equipment bay to another, and rewired it. Unfortunately, they inadvertently reversed the rate gyros. As Riedenauer lifted off, the aircraft flipped over backwards and crashed. He suffered injuries that left him hospitalized for seven months.

The aircraft was a complete loss and, since the takeoff had not been successful in any sense, the "flight" was not even included in the test logs.

Mid-1982
Project HAVE GLASS was undertaken to significantly reduce the radar cross-section of the General Dynamics F-16 Fighting Falcon. A series of modifications included RAM coatings and fillings, reflective materials, and component shape changes.

June 1983
AeroVironment received CIA sponsorship to build a proof-of-concept high-altitude, solar-powered, radio-controlled UAV called HALSOL. It was essentially a rectangular flying wing made from lightweight materials. Initial test flights were powered by eight electric motors using silver-zinc batteries. HALSOL made nine test flights, beginning in June 1983.

Col. Ralph H. Graham assigned as commander of DET 3, AFFTC.

March 1984
Lt. Gen. Robert M. Bond, Vice Commander of Air Force Systems Command, visited Groom Lake for two orientation flights in YF-117A (79-10782).

April 1984
Lt. Gen. Robert M. Bond made two orientation flights in a Russian-built MiG-23 jet fighter. While making a high-speed run during his second flight, Bond lost control and crashed in Area 25 of the Nevada Test Site. He was killed while ejecting.

Richard Thomas completed the 100th flight of TACIT BLUE.

August 1984
Approximately 89,000 acres of public land and private holdings northeast of Groom Lake were closed to the public for "national security reasons." This area comprised the Groom Mountain Range that overlooks the lakebed. The appropriation was done without fulfilling the legal requirements for an environmental impact statement. Air Force officials denied there would be any significant impact because the area would only be used as a buffer zone.

February 1985
TACIT BLUE completed its final flight. Following a highly successful test program, the one-of-a-kind aircraft was stored in the Area 51 "boneyard." Eventually, it was displayed at a classified museum facility in the low bay (called "Dyson's Dock") of Hangar 18.

April 1985
Col. Karl M. Jones Jr. assigned as commander of DET 3, AFFTC.

Mid-1985
Maj. Frank T. Birk piloted the first flight of a "classified demonstrator" at Groom Lake. For his work on the project, the Society of Experimental Test Pilots gave Birk the Lieutenant General Bobby Bond Memorial Aviator Award which "recognizes an AFSC military rated crew member for outstanding contribution to AFSC's test and evaluation mission while participating in aerial duties."

The U.S. Air Force issued a proposal (ex post facto) for the withdrawal of the 89,000 acres of land in the Groom Mountains that had already been seized in 1984.

Mid-1980s
New dormitories were constructed. Several large water tanks were added to supply the base. Hangar 18 was built near the south ramp. Four "Rubber Duck" temporary aircraft shelters were erected near the Southend for use by TAC during F-117A OT&E. Many new facilities were built and, by the end of the decade the "Rubber Duck" shelters were replaced with metal hangars (Hangars 20 through 23). Runway 14/32 was extended 4,600-feet further southeast of the lakebed because the north end was subject to flooding during the rainy season.

1987
Congress officially authorized the withdrawal of the Groom Mountains.

Spring 1987
Col. James W. Tilley II assigned as commander of DET 3, AFFTC.

1988
President Ronald Reagan signed legislation making the Groom Mountains part of the Nellis Air Force Range until 2003. The Desert Research Institute in Reno was contracted to conduct an archeological survey of the area for renewal of the withdrawal.

Spring 1989
Col. ??? assigned as commander of DET 3, AFFTC.

December 1990
Northrop's stealthy AGM-137 Tri-Service Standoff Attack Missile (TSSAM), based on technology from TACIT BLUE, underwent initial tests.

1991
After several decades of use, Runway 14/32 was becoming too expensive to maintain. AFFTC leadership considered several options, and ultimately decided to build a new parallel runway east of the old one. Construction of Runway 14L/32R began.

Spring 1991
Col. William W. Dobbs assigned as commander of DET 3, AFFTC.

April 1992
The F-117A Combined Test Force relocated its operation from Groom Lake to Site 7 at AF Plant 42 in Palmdale, California.

October 1992
The 6513th Test Squadron Red Hats was inactivated. It was reactivated immediately as the 413th Flight Test Squadron, providing test and evaluation capability for electronic warfare (EW) systems.

When Runway 14L/32R was completed, the old airstrip became Runway 14R/32L. The new runway had no asphalt extension, but an overrun line, extending to "The Hook" was marked on the lakebed. Most of the northern half of Runway 14R/32L was closed, reducing the active runway length to about 10,000 feet.

Spring 1993
Col. Craig P. Dunn assigned as commander of DET 3, AFFTC.

October 1993
The U.S. Air Force filed a notice in the Federal Register seeking to withdraw 3,972 acres of land from public on the eastern perimeter of the DREAMLAND section of the Nellis Air

Force Range.

January 1994
The 412th Test Wing at Edwards began formation of an EW Directorate to encompass all aspects of ground and flight test of EW assets and act as a "gateway" to DET 3, AFFTC, providing technical guidance on how to use their capabilities for electronic combat testing.

Several workers filed a lawsuit against the government, claiming damages from exposure to toxic fumes from burning waste at the Groom Lake facility.

September 1994
Gen. Ronald W. Yates, commander of Air Force Materiel Command, visited DET 3, AFFTC for two days.

October 1994
The EW Directorate was unofficially established, consisting of the Electronics Research Division, 413th FLTS, Avionics Test and Integration Division, and Electronic Combat Development Flight.

A unique Electromagnetic Test Environment (EMTE) was created to support open-air development test and evaluation and operational test and evaluation of electronic combat systems.

January 1995
The NC-130H (87-0157), with a dorsally mounted rotating radar dish, was modified under the Advanced Simulation and Training Initiative (ASTI). ASTI provided enhanced threat density of open-air combat training ranges by injecting virtual targets from a ground-based simulator through real-time data links.

April 1995
The Air Force seized 5,000 more acres of public land to prevent civilians from viewing the base from nearby hilltops that had been overlooked in previous seizures. This occurred in the midst of increased public scrutiny of the secret base.
Col. ??? assigned as commander of DET 3, AFFTC.

Mid-1990s
The YF-113G "classified prototype" made its first flight.

September 1995
On 29 September 1995 President Bill Clinton signed Presidential Determination No. 95-45. It stated in part: "I find that it is in the paramount interest of the United States to exempt the United States Air Force's operating location near Groom Lake, Nevada from any applicable requirement for the disclosure to unauthorized persons of classified information concerning that operating location."

April 1996
TACIT BLUE was declassified and delivered to the U.S. Air Force Museum in Dayton, Ohio, for permanent display.

Late-1996
McDonnell Douglas test pilot Rudy Haug piloted the maiden flight of the "Bird of Prey" (also known as the BoP). The classified technology demonstrator showcased low-observables ("stealth") and lean manufacturing capabilities. Over a three-year period, the "Bird of Prey" completed 38 test flights. The Boeing Company purchased McDonnell Douglas in 1997 and continued funding for the BoP. Besides Haug, the BoP was flown by Air Force test pilot Doug Benjamin and Boeing test pilot Joe Felock.

Spring 1997
Col. ??? assigned as commander of DET 3, AFFTC.

Spring 1999
Col. Mark A. Stubben assigned as commander of DET 3, AFFTC.

August 1999
There was a large fire, possibly caused by an aircraft accident, on the southern slopes of the Groom Mountains north of Groom Lake.

October 1999
Air Force takes official ownership of Area 51 in a land swap deal, signed by President Clinton. Click here for LVRJ article. The white Jeep Cherokee security vehicles are being replaced by Ford F-150's, and later Chevy 2500 4x4 pickup trucks.

2000
The Transient Parking ramp (JANET ramp) was excavated and re-paved.

August 2000
Col. David W. Eidsaune assigned as commander of DET 3, AFFTC.

October 2000
Area 51 North Gate (Back Gate) is upgraded with a chain link fence, double gate and a new guard shack. More information and photos here.

2001
F-22A (91-4004) was flown through the Dynamic Coherent Measurement System (DYCOMS) airborne RCS range (known on-site as Project 100 or simply P-100) to verify the low-observable characteristics of the Lockheed Martin F/A-22A Raptor. All but two of the original tanks in the fuel farm were removed and two new large tanks were installed.

April 2001
The South Delta Taxiway was marked as Runway 12/30. It is approximately 5,420-feet-long and 150-feet-wide, with convenient access to the Southend ramp. Runway 14R/32L was closed in its entirety.

December 2001
DET 3 security personnel from EG&G Technical Services went on strike for two days, citing low wages and excessive amounts of overtime in the three months since the terrorist strikes in September. Supervisors were forced to man posts vacated by the 70 striking guards. Click here for LVRJ article.

June 2002
Col. Thomas J. Masiello assigned as commander of DET 3, AFFTC.

Early 2003
Construction of the two new fuel tanks is completed. A new Center Taxiway, providing access to Runway 14L/32R, is constructed. It includes a new access way to Hangar 19 (the "Scoot-n-Hide shed"). Construction is completed by July 2003. Click here for a Satellite Image, and photos from Tikaboo Peak.

Mid-2003
The Southend ramp in front of Hangars 9 through 16 was similarly replaced in the summer of 2003.

March 2004
A Beech 1900 (N27RA), operated by EG&G, crashed on a flight from Groom to TTR. The civilian pilot, David D. Palay, and passengers Derrick L. Butler, Michael A. Izold, Daniel M. Smalley, and Roy A. Van Voorhis (contractors with JT3 LLC) perished. Click here for LVRJ article.

May 2004
The 413th Flight Test Squadron was inactivated as part of a consolidation and realignment

of EW assets.

Spring 2005
50th Anniversary of establishment of Groom Lake test facility.

Project 57
Explosion Dispersed Plutonium Near Secret Groom Lake Base
by **Peter W. Merlin**

A secret place in the desert

During the late 1950s, the Nevada desert near Groom Dry Lake echoed with the roar of jet engines as Lockheed's U-2 spyplane was put through its paces. The small airbase on the southern edge of the lakebed was called Watertown. There, Lockheed test pilots developed the airplane and its systems, while pilots assigned to the Central Intelligence Agency (CIA) trained for operational reconnaissance missions.

Just over the hills at Yucca Flat, the Atomic Energy Commission (AEC) was detonating nuclear bombs. Since Watertown was downwind of the Nevada Test Site (NTS), it received much of the radioactive fallout. Consequently, there was a standing agreement that Watertown personnel would be evacuated prior to a nuclear shot to limit their exposure. Most of the tests, and all of those involving full-scale nuclear explosions, took place more than 10 miles away.

One shot however took place on Watertown's doorstep.

One-Point Safe

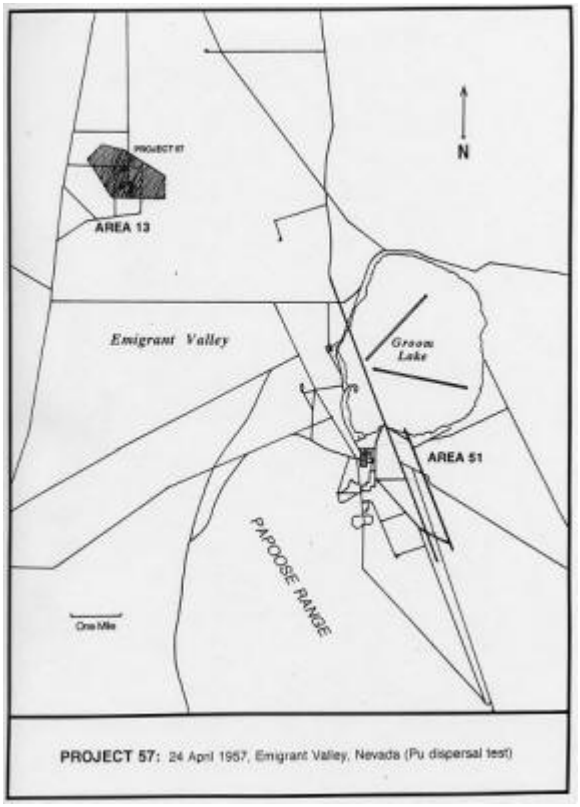
The 1957 nuclear test series, called Operation Plumbbob, included 24 nuclear detonations and six safety experiments. The first shot of the series was a safety experiment called Project 57. A test of this type is usually conducted to determine that a weapon or warhead damaged in an accident will not detonate with a nuclear yield, even if some or all of the high explosive components burn or detonate. While not producing a nuclear explosion, such a detonation usually spreads a substantial amount of plutonium into the atmosphere and across the surrounding landscape. As such, safety experiments are also known as plutonium dispersal tests.

Such experiments were necessary because aircraft crashes and other operational and logistical accidents involving nuclear weapons could result in one-point detonation of the weapon's high explosive components, producing no nuclear yield but contaminating the local area with radioactive materials. Project 57 was designed to study the particle physics of plutonium, biomedicine of animals exposed to the fallout, radiation monitoring, and decontamination of plutonium-contaminated surfaces.

According to Chuck Hansen, in U.S. Nuclear Weapons: The Secret History, the weapon used was an XW-25 warhead, with a design yield of 1.5 kilotons. The XW-25 was 26.7-inches long, 17.4-inches wide, and weighed about 218 pounds. It was designed to be the warhead for the Douglas MB-1 Genie air-to-air-missile.

A formerly secret document detailing the minutes of the first meeting on Project 57 states that the weapon was to be "fired on the ground at the bottom detonator."

Area 13



This map shows the location of the Project 57 site in Area 13 and its relation to Area 51. The groom lake airbase is shown much as it appears today.
The first challenge of Project 57 was to select a test site. A lengthy discussion at the first project meeting focused on a choice between "Papoose Lake with adjoining valleys and the Groom Lake Valley lying due north of it," both outside the Nevada Test Site.

Both sites were considered equal from an operational viewpoint, but the decision was ultimately based on soil contamination levels from previous testing. Samples taken by K. H. Larson of the University of California at Los Angeles (UCLA) indicated that "in the first inch of cover, maximum plutonium backgrounds differed by a factor of 60."

Soil in the Groom Lake area contained a maximum of 0.5-micrograms of plutonium per-square-meter versus 30-micrograms per-square-meter around Papoose Lake. After reviewing these results, according to the minutes of the first meeting, "the choice of Groom Lake Valley went uncontested."

The Project 57 test site was added to the NTS as Area 13, an approximately 10-by-16-mile block of land abutting the northeast boundary of the Test Site, and partially overlapping the Watertown facility. The overlap area was not considered part of Area 13. Ground Zero for the shot was only five miles northwest of Groom Lake and seven miles from the main cantonment area of the airbase. Personnel approaching the site from the NTS would drive over Groom Pass from Yucca Flat, then head north on Valley Road for about eight miles to reach the turnoff for Ground Zero.

A formerly secret AEC report dated 14 March 1957 described the new test area, stating that it, "is not contaminated to a degree that would effect the experiment, and, when contaminated, will not interfere with the conduct of the PLUMBBOB nuclear tests which are scheduled to begin in May 1957. The Armed Forces Special Weapons Project has obtained approval for the use of the land for the test."
An appendix to the report contained a letter to Brigadier General Alfred D. Starbird from Maj. Gen. Alvin R. Luedecke, USAF, Chief of the AFSWP, further explained that "entry into the

area has also been approved and has been coordinated with the agency which has been using the Range." The XW-25 warhead was flown to the airstrip at Yucca Flat, then trucked to Watertown.

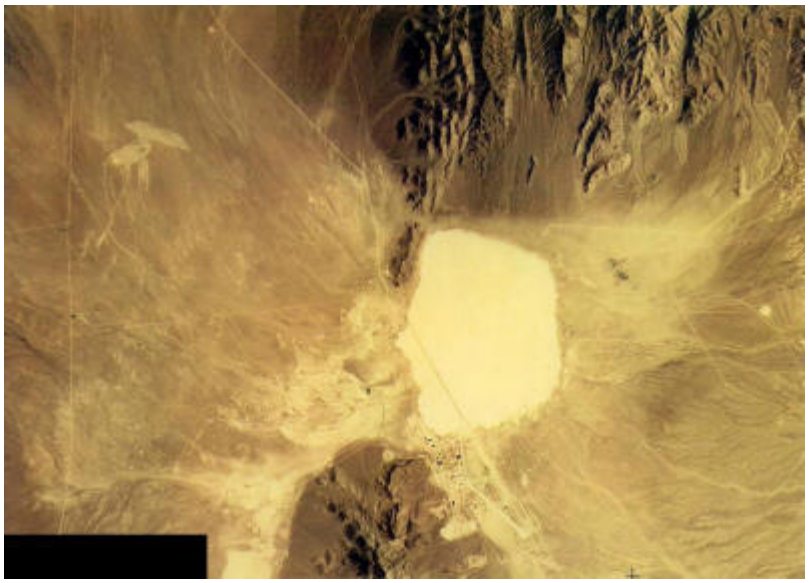
It was stored in Building 10 prior to being moved to Area 13 for final placement.

The Project 57 shot was originally scheduled for early April, but was pushed back several times. Personnel at Watertown were undoubtedly evacuated before the shot in case of unfavorable winds that could spread plutonium over the airbase, or an unexpected nuclear yield. Evacuation must have been terribly inconvenient to flight test and training operations at Watertown. According to declassified documents, most of the delays were due to unfavorable weather conditions.

Finally, on the morning of 24 April, the signal was sent to the detonator, and the warhead's high explosive charge destroyed the weapon. Although there had been no obvious atomic explosion, a three-man team in protective clothing was dispatched to determine whether or not any beta or gamma radiation hazard existed from a partial nuclear yield.

There was none, but all personnel entering the area were required to wear full protective suits and respirators to shield themselves from alpha radiation emitted by plutonium.

Plutonium hazards



This Russian satellite image shows Area 51 and Area 13. Groom Lake is about three miles long from north to south. Ground Zero for the Project 57 plutonium dispersal test was located five miles northwest of the edge of Groom Lake.

Several isotopes of plutonium (Pu) are typically found at safety experiment sites: Pu-238 (with a half-life of 89 years), Pu-239 (24,300 years), Pu-240 (6,600 years), and Pu-241 (14 years). Pu-239 is the most abundant. The decay of Pu-241 produces an americium isotope, Am-241, which emits gamma rays and has a half-life of 432 years.

Radiation Safety (Rad-Safe) technicians measure gamma emissions from Am-241 with a device called a FIDLER (Field Instrument for the Determination of Low-Energy Radiation). Am-241 activity in contaminated soil provides a reasonable indication of Pu-239/240 levels.

Plutonium emits alpha particles, the weakest form of radiation. A sheet of paper is sufficient shielding against alpha radiation. Although alpha particles are highly energetic, they are not

capable of penetrating the dead layers of skin on the surface of the human body. If inhaled, however, even microscopic quantities will cause damage to soft tissues.

Particles of plutonium that are absorbed into the bloodstream may be deposited in the lungs, liver, lymph nodes, or in the surfaces of newly formed bone. There, they can cause damage leading to cancer, chronic anemia, osteoporosis, or bone necrosis that may produce spontaneous bone fractures. Such results may not manifest until 10, 20, or even 30 years after deposition, depending on the size of the dose. Lung damage may become apparent in only a few years.

Project 57 contaminated over 895 acres with plutonium and americium dust and fragments. The primary hazard to personnel is from resuspension of small particles of plutonium dust in the air. Soil samples taken in the late 1990s indicate that plutonium particles at Area 13 are mostly smaller than 40 microns across.

The exact amount of plutonium expended for the test remains classified, but one pound of plutonium involved in a fire or explosion could produce, under moderate wind conditions, hazardous contamination as far as a mile downwind.

Alpha contamination at Watertown

During Project 57, air samplers were set up in the contaminated area and at Watertown, and readings were averaged for 24-hour periods for 28 days. According to The Hazards and Characteristics of Plutonium and Uranium Contamination, published by the Atomic Weapons Training Group in 1962,
"no consideration was made for wind changes or rain, and the averaged readings...were lower than is reasonable."
Initial readings at radiation monitoring sites indicated no detectable fallout at Watertown. According to a declassified telex dated from the day after the shot, air samplers were "operating in all populated areas," and would be checked "after a five day seasoning period and it [was] expected that readings [would] be minor."

After all samples were studied, it was determined that there was minor alpha activity for 12 days following the shot, but it was "well below operational guidelines." Nevertheless, this meant that resuspended plutonium dust was reaching the airbase in small amounts.

As described in an AEC report on Off-Site Radiological Safety Activities For Project 57, there were two high-volume air samplers located at Watertown and fallout trays located on the roofs of the Air Weather Building, and a building behind the Maintenance Shop. Minor alpha counts were detected in the trays. Samples of rainwater were collected eleven hours after shot time when a brief shower passed across Area 13 and then across Watertown. The samples contained both alpha and beta particles.

Water from the Deer Camp Watering Hole east of Area 13 was also sampled, but only contained a small amount of alpha radiation.

Decontamination techniques



A Project 57 technician in anti-contamination gear picks up a sample tray with a magnetic device.

Rad-Safe workers from Task Group 57 at the NTS collected data on particulate physics, plutonium inhalation, alpha monitoring, and decontamination techniques on experimental surfaces at Area 13.

For the particulate physics study, surface and airborne plutonium levels were measured as a function of time after detonation. Air samplers, balloon-borne precipitators, soil samples, and photographic methods were used. Scientists constructed a fallout pattern model using a grid of more than 4,000 sticky pans distributed over a 43-square-mile area.

They also analyzed the fractionation characteristics and physical nature (size, shape, and distribution) of the fallout particles. Interestingly, the maximum air concentration levels of alpha contaminants were found at a distance of 5,000 feet from the detonation point.

A biomedical field study examined environmental short-term and chronic effects of plutonium inhalation and persistency of debris resulting from subcritical bursts. For this experiment, a group of test animals (dogs) were exposed to the radioactive cloud to test the effects of acute exposure. A larger group of dogs was placed in the contaminated zone for a longer period of time to study the effects of chronic exposure. Test animals were periodically sacrificed and autopsied by veterinary scientists to collect data.

A third study was undertaken to practice monitoring of alpha contamination on various surfaces. This effort correlated alpha monitoring data from sticky pan collectors with field study data from broom-finished concrete slabs. The slabs and sticky pans were placed adjacent to each other at various locations throughout Area 13. The monitors also took readings from nearby soil and vegetation.

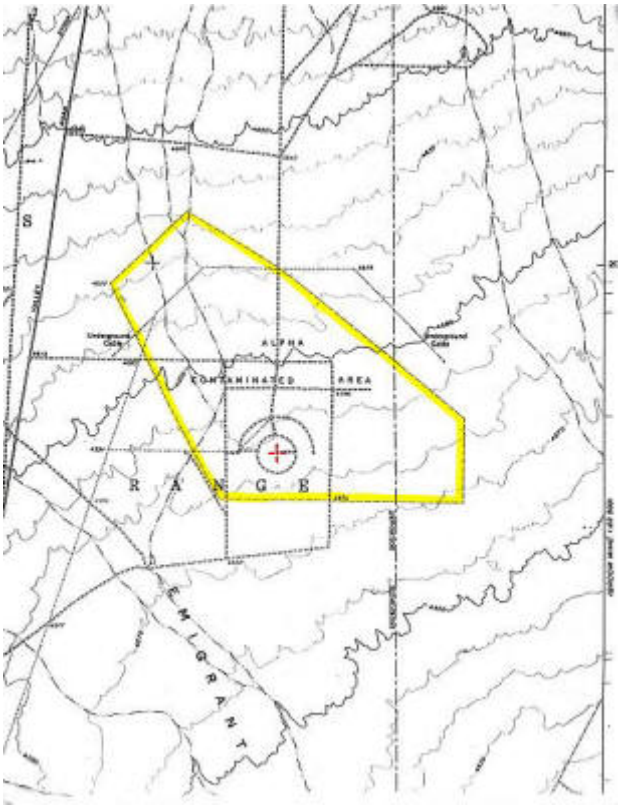
The largest effort was expended on developing techniques for decontamination of large surface areas. Technicians studied plutonium removal from large land surface areas, concrete

and asphalt pads, and materials used in equipment and building construction (aluminum, steel, galvanized and tar-paper roofing, glass, brick, stucco, wood, etc.).

Methods of soil decontamination and fixation included wetting, oiling, leaching and stabilizing agents, and spraying with fire-fighting foam, as well as disking, plowing, and scraping. The top two inches of soil was scraped and hauled away for burial at the NTS. The ground was plowed to a depth of 12 inches. Rad-safe technicians decontaminated test materials by washing, steam cleaning, and vacuuming.

Contaminated equipment was disposed of in waste burial sites adjacent to Valley Road within Area 13.

Radiation safety procedures



This map shows the location of Project 57 ground zero (GZ) and the fence surrounding the Alpha Contaminated Zone.

Reynolds Electrical and Engineering Company (REECo) provided operational radiation safety support for Project 57. Prior to the day of the test, REECo personnel erected a temporary decontamination facility at the entrance to the access road to ground zero. It was stocked with supplies of radiation detection instruments, protective clothing, and other equipment.

The building also contained an equipment issue room, showers, and a dressing room. All personnel entering or leaving the contaminated zone had to pass through the Rad-Safe building. Containers were made available to dispose of contaminated clothing. Northwest of the building, a parking area was established for contaminated vehicles. Uncontaminated vehicles parked on the south side of the building. There was also an area for processing fallout trays and soil samples for shipment to Sandia Corporation for analysis.

To protect workers at Area 13 against the hazards of plutonium inhalation, personnel were required to wear full protective clothing with all openings taped to their skin and full-face respirators with high-efficiency filters. Heavy respiratory protection made breathing difficult

during hard physical labor. Supplied-air respirators were used during the biomedical study program.

These provided positive pressure inside protective clothing so that any leaks would be outwards to prevent contaminants from entering the suit. After the extent of hazardous conditions in the test area was determined, workers were given the option of wearing supplied-air respirators or full-face filter respirators. As restrictions were further reduced, half-face respirators with high-efficiency filters were adopted for areas with less than 100 micrograms of plutonium contamination per square meter. All participants in field activities for Project 57 received bioassay tests to check for exposure to plutonium.

These tests consisted primarily of nasal swabs and, occasionally, urinalysis.

Once members of Task Group 57 had mapped the extent and distribution of the remaining plutonium contamination within Area 13, the contaminated zone was fenced off and posted with signs denoting Internal Radiation Hazard to unprotected personnel. Warning signs were also posted at the equipment burial trench, approximately 300 feet west of the "No. 36 Marker" on Valley Road.

The Project 57 site lay abandoned and nearly forgotten for almost 20 years as nearby Watertown (designated Area 51 in June 1958) grew into a thriving clandestine flight test center.

Return to Area 13

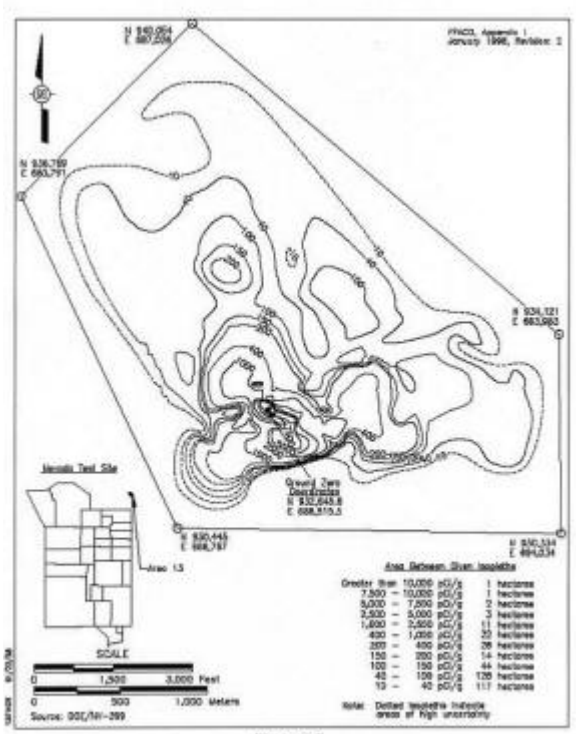


Figure 1-6
Area Subject to the Federal Facilities Agreement and Consent Order in the Vicinity of the Area 13

Map illustrating radioactive contamination levels within the fenced section of Area 13.

In the 1970s, the contaminated area was studied by the DOE Nevada Applied Ecology Group (NAEG) to estimate the amount and distribution of plutonium in the soil. NAEG scientists took numerous soil samples for analysis. In 1974, A. Wallace and E. M. Romney (UCLA Laboratory of Biomedical and Environmental Sciences) inspected the Area 13 test plots to evaluate vegetation recovery and compare soil surface conditions. They found that the plowed and

scraped areas had recovered about 25% of their vegetation, compared to the surrounding undisturbed landscape.

Areas treated with road oil appeared approximately the same as untreated areas except for some remaining oil residue. Based on a FIDLER survey, R. O. Gilbert estimated (in a paper included in Transuranics in Desert Ecosystems, NVO-181, 1977) that the inventory of Pu-239/240 remaining in the top two inches of soil at Area 13 was approximately 46-Curies, covering a 4,017,000-square-meter area. An aerial survey in 1979 by A. E. Fritzsche yielded an estimated inventory of 62.1 to 90.5-Curies of Pu-239/240, based on Am-241 levels.

In their 1980 report, Estimates of Soil Removal for Cleanup of Transuranics at NAEG Offsite Safety-Shot Sites, R. R. Kinnison and R. O. Gilbert used available summary data to determine the amount of soil removal necessary to decontaminate the project 57 site down to 160-picoCuries of plutonium. They determined that roughly 198,000 tons of the top six inches of soil would need to be removed from an area covering 269 acres. Soil profiles studies indicated that most of the plutonium contaminants are located in the top two inches.

In 1981, the Department of Energy Nevada Operations (DOE-NV) sought funding through the Surplus Facilities Management Program (SFMP) for the decontamination and decommissioning of Area 13. The application for funding was submitted by Arden E. Bicker of REECo. In the application, Bicker describes Area 13 as being "approximately five miles from a public road and directly adjacent to the site of a rapidly growing military installation."

In fact, the contaminated zone was located just east of Valley Road, which is the primary thoroughfare from Area 51 to the town of Rachel in Sand Springs Valley to the north of Area 13. The "public road" described by Bicker was the road to Groom Mine.

Three years later, the road, the mine, and most of the Groom Mountains were seized by the Air Force to prevent public access, and provide additional security for Area 51.

Decontamination plan

A draft of the SFMP response to the application describes the request "to provide funding beginning in fiscal year 1983 to enable DOE to remove contaminated surface soil from Area 13 and dispose of it in appropriate disposal facilities on the Nevada Test Site." Estimates of contaminated soil volumes indicated that it would take 10 years to complete the cleanup if the funding was made available.

The application was reviewed by the SFMP Facility Acceptance Review Board to determine whether the site was eligible.

The Review Board discussed the fact that Area 13 was off-site from the NTS, on the Nellis Air Force Range. Presumably then, it might be the responsibility of the Air Force to decontaminate the site (or leave it alone). Also, the Board wondered if it was even appropriate to include a parcel of contaminated ground in the SFMP since it was not actually a "facility" per se.

The Review Board's most pressing questions were rooted in the "Requirements for Acceptance" portion of the SFMP Facility Acceptance Procedure, the rules and regulations for inclusion in the SFMP. These requirements stated that "the facility shall be in a radiologically safe condition."

Specifically, a current radiation/contamination survey of the facility and surrounding area had to be available, structures and monitoring equipment had to be adequate to contain and monitor any radioactivity, and security systems and procedures had to be adequate to prevent unauthorized entry. The Review Board was very concerned about these points.

At the time of the original application for SFMP acceptance, the most recent radiological survey of Area 13 had been taken in 1977. Results were reported only for land within the 895-acre contaminated zone. The Board took issue with the fact that "additional Pu migration within the site since the time of the 1977 survey, and dispersal of Pu outside the site boundaries were not discussed in the DOE-NV request."

The application had also stated that "minimal DOE surveillance is being performed at Area 13 because the contaminated area is not within direct control of DOE." The Board held off on accepting Area 13 into SFMP, stating that "with the limited information available, the board was unable to assess the current radiological safety of Project 57."

The Board made several recommendations to DOE-NV that would allow the Project 57 site to meet the guidelines for SFMP funding. A new radiological survey was required to determine the extent and migration of plutonium from the fenced contaminated zone. A hazards analysis had to be performed, with particular emphasis on assessing the predicted radiation exposure of workers at the new construction site. DOE-NV had to determine an acceptable concentration level for plutonium in the soil (for any levels detected after the cleanup).

The Board also required that DOE-NV provide a description of safety measures that would ensure that plutonium would not continue to migrate off-site.

Cleanup costs

DOE-NV followed the Board's recommendations, and the site was subsequently accepted into the Surplus Facilities Management Program. According to DOE documents, the initial phase of the operation was set to begin in October 1982. First of all, a preliminary site characterization was made for both the Project 57 contaminated zone and the inactive contaminated waste dump adjacent to Valley Road. Also included in the Fiscal Year (FY) 1983 budget were plans for perimeter survey work, pathway and criteria analysis, clean-up technique investigation, engineering design and equipment specification, and procurement of mobile laboratory equipment.

This phase was scheduled to be completed in September 1983 at a total cost of $500,000.

Next, heavy equipment was to be procured for the excavation of contaminated soil. Four 30-ton ore-haulers and one earth-mover were to be purchased for $1,250,000. A water-well was to be drilled for dust suppression support in order to prevent resuspension of plutonium into the atmosphere. Actual decontamination was set to begin in January 1984, with an initial effort to remove 40,000 cubic yards of soil. Estimated expenses for FY-1984 were $2,500,000.

Three more 30-ton ore-haulers and a 5,000-gallon water tanker were to be purchased in FY-1985 to support the removal of an additional 90,000 cubic yards of soil. Total costs for FY-1985 were estimated at $2,500,000.

The plan called for removal of 100,000 cubic yards of soil per year from FY-1986 through FY-1991 at an annual cost of $2,500,000.

The fate of Area 13?

The decontamination and decommissioning project was scheduled for completion in FY-1992. Tasks included final decontamination, revegetation, demobilization, certification, and production of a final report. Total cost for FY-1992 was estimated to be $500,000. The total cost of the project was estimated at $21,000,000. No documents have yet surfaced to show whether or not the project remained on schedule and within budget.

A Russian spy satellite photo from 1988 apparently shows that large amounts of soil had been recently removed from an area just north of the Project 57 contaminated zone in Area 13.

However, cleanup of the Project 57 site was still a concern during environmental studies in the late 1990s. A preliminary site characterization was completed in 1998 and a complete assessment of plutonium cleanup was scheduled for FY 1999.

According to Steve L. Hoeffner et al (Clemson University-Research Park) and Richard Smalley (Waste Policy Institute, Savanna River Research Campus) in Evaluation of Remediation Methods for Plutonium Contaminated Soil, "a limited amount of data is available for the Area 13 soils," and cleanup of the site is a "low priority."

Area 51 Panorama
Taken from Tikaboo Peak on August 7, 2005

This Area 51 panorama was taken under exceptionally good viewing conditions in the early morning hours of August 7, 2005 from the top of Tikaboo Peak. It is by far the best and as of this writing the most recent Area 51 Panorama from Tikaboo Peak ever published. The panorama is split into three segments, going from south to north.

The panorama was assembled from 16 individual photos, taken with a Canon D-60 digital camera mounted to a Celestron C-5 spotting scope. The effective focal length was 2000mm. The full-sized panorama is 1/4-meter resolution.

This section shows some remote facilities at the far south end of the base. Moving from left to right (south to north):



The two light-colored buildings in the background on the left are the Engine Test Cells. This is where new jet engines are tested. Due to noise and the possibility of an explosion it makes sense to have them as far away from the main base as possible. The scraped area behind the left Test Cell is a waste burial site. It has not changed much since 1995, and it is not clear whether it is still in use.

Further to the right, the circular area with the long light-colored building is the Explosives Storage Area. Notice that the entire area is surrounded by a mound of dirt to protect the rest of the base in case of an accident.

In front of the Explosives Storage you can see the south end of the two runways and the southern taxiway and holding pad. Two red-and-white arresting devices, designed to catch planes that are about to overshoot the runway, can be seen at the south end of the new runway (14L/32R).

Further over to the right, at the foot of Papoose Mountain, is a large scraped area. This is a large gravel pit and concrete plant. It supplies the building material for new construction at the base, such as runway extensions etc. This photo shows that what looks like an underground tunnel entrance in older panoramas and satellite images is really a truck ramp, where trucks dump their load onto the conveyor below. There is a large parking area for construction vehicles on the far right side of this segment.

In front of the gravel pit is the South Trim Pad, where engine tests and adjustments are performed. Clearly visible the jet deflector and the South Pad Weather Office.

This section shows the South Base area, with the southern ramp and hangars:



To the right of the gravel pit discussed above is the main fuel storage area of the base. There used to be eight large fuel tanks, which were left over from the A-12 spy plane development at Area 51 in the 1960's. Most of the tanks have been removed in early 2001, only the southern two remained. In early 2003 two large new fuel tanks were installed to replace the older tanks. The brown building near the fuel truck parking area is probably a fire station or maintenance building.

In front of the fuel storage area and to the right is a site with aircraft communications and navigation equipment. Several tall antenna poles can be seen next to the left building. Another antenna pole is further to the right.

Behind it is another parking area with construction vehicles surrounding a vehicle maintenance building. In the background is the Area 51 "Boneyard". This is where abandonned projects and prototypes end up after they reach the end of their usefulness. Some test platforms, such as the Boeing Bird of Prey or Northrop's Tacit Blue, are stored in the hangars here for years, before finally being declassified and placed in a museum.

Others are being disassembled and never see the light of the "White World". The long white building to the right is the shooting range, facing away from us (and from the base).

Now we are getting to the South Ramp area, and to some interesting new additions. The South Ramp has been re-paved in summer of 2003, several new buildings were added and there is still some construction equipment visible in the area. This part of the base is clearly getting ready for a major new project to move in.

This new project is likely related to the development and test of a larger UAV (Unmanned Aerial Vehicle) or UCAV (Unmanned Combat Aerial Vehicle). UCAVs are a fairly new technology, but have already proven their usefulness in recent conflicts in Afghanistan and Iraq. The first generation of UCAVs, the MQ-1 Predator, is armed with two laser-guided Hellfire missiles.

Newer UCAVs are expected to be larger, and to be designed for much greater payloads.

The building in the foreground, surrounded by a mound of dirt, is the weapons assembly and storage facility. As with the explosives storage area described above, the surrounding wall of dirt is designed to deflect a blast in case of an accident here. Behind it, in front of Hangars 9-16, is a large new hangar, built in spring 2005. It is much taller than the other hangars, which could indicate that it is used to mount a test vehicle on top of a carrier aircraft.

Many new experimental high-speed aircraft, known as X-Planes, are carried to their operating altitude by a carrier aircraft, referred to as the Mothership. Hangars 9 through 16 were used for development of the A-12 "Oxcart", and its successor, the SR 71 "Blackbird". Both aircraft were reconnaissance platforms (or, less diplomatic: spy planes), designed for high altitudes (90,000ft.) and high speed (mach 3+).

They were used until the early 1990's, in the gulf war. It appears that the long disused hangars 9-16 are part of the recent renovation, and that they will be used for the new project(s) mentioned above.

The long two-tone building in the back is Hangar 17. The two white double-hangars in front of

it are Hangars 20 through 23, and the lower building to their left is an associated storage building. Hidden behind Hangar 22 is another new building, constructed in 2003. It is smaller, and connected to the surrounding hangars by underground pipes. Possibly a fuel storage or heating unit.

In front of that group of hangars, next to the weapons storage facility mentioned above, is Hangar 19. It is used for Weapons Arm and De-Arm of aircraft. In spring 2005 two extensions were constructed to the north and south, effectively tripling the size of this hangar. The purpose of this extension is not yet known, but it is interesting that the lower section of the extensions is open.

This could indicate a need for good ventilation, possibly due to running jet engines. It appears that the extensions are designed to hide something from curious eyes. This is supported by the fact that the open section of the southern extension is hidden by an additional screen in the direction of Tikaboo. Whatever goes on here is obviously top secret! A new concrete ramp connects these hangars to the new Center Taxiway, constructed in spring of 2003. The new taxiway connects the South Ramp with the new runway 14L/32R.

In the background, on the slope of the Papoose Range, is a group water tanks. Originally there were only four white tanks. The three huge dark colored tanks were added between 1995 and 1999.

Further over to the right is Hangar 8, which is said to be used by Northrop Grumman. To the right of it is Fire Station #2 (#1 is near the four northern hangars). Sometimes the doors can be seen open, and we have seen the inside brightly lit at night, with what appeared to be a fire truck inside. The next building is the P.E. Building ("Personal Equipment").

This is where the pilots keep their flight gear, and prepare for their missions. It is surrounded by marked parking spaces and the only trees at Area 51.

Next to it is the huge Hangar 18. It is approximately 100 ft. tall, easily large enough for even the largest aircraft. A B747 could easily fit inside. It opens on both ends to make it easier for large planes to get in and out. The exact purpose is not known, but it is assumed that it is used for new developments. We have also seen Janet aircraft, Boeing 737 that are used to shuttle workers back and forth between Area 51 and Las Vegas, on the ramp north of it. So it may be used for maintenance work on the Janet fleet. Behind Hangar 18, partly visible on the right, is a connected office and support building.

The brown building further over to the right is the Security Building, the headquarters of the famous cammo-dudes. Area 51 security is split into several layers. The Cammo Dudes (so named after their camouflage outfit) are members of a private contractor, guarding the outer perimeter of Area 51. They can bee seen near the Groom Lake Road entrance of the base, keeping an eye on curious tourists. Security further inside is likely provided by Air Force Police.

The next building over contains several labs. It is known as "Photo Lab and Precision Measurement Equipment Lab (PMEL)".

Behind these two buildings are the old toxic waste burning pits. This is where until the early 1990's highly toxic waste products were burned in open trenches, including still classified and highly toxic byproducts of the stealth paint used for the development of the F-117 Stealth Fighter. After several workers got sick and even died from breathing the toxic fumes, the open burning has stopped and the area has been covered up with dirt.

This section shows the central part of the base and the North Base Area:



Next to the Security Building and the Labs discussed above, is the Janet Terminal. This is where the workers arrive when they fly in from Las Vegas on the unmarked Boeing 737's. When a Janet 737 is at the terminal you can see its white tail sticking up over the hills. In the mornings and evenings the terminal and ramp area are brightly lit by yellow floodlights. In front of the Janet Terminal is the Area 51 Control Tower, partially hidden by the Jumbled Hills in the foreground.

Behind the Terminal are three taller dormitory buildings. There are a total of 33 dormitory buildings that can house over 1000 civilian contractors and military personnel. Instead of flying home to Las Vegas every night the workers have the option to stay at the base during the week. There is a financial incentive for this, and many employees choose to do so. Most of the dormitory buildings in the central part of the base are single-story and barely visible from Tikaboo.

The next building to the right, almost hidden behind the Jumbled Hills, is the Test Engineering Support Center (TESC). This is the central intelligence repository of the base, containing data on various research projects in several vaults. Next to it, also partially hidden, is the Consolidated Services Facility, used by various services such as the base telephone service and electric power service. Further over to the right is the lower Base Supply and Administration Building.

Behind it, among the group of smaller buildings are the Dining Hall, the Main Operations Building, from where all activities at Area 51 are being controlled, and Fire Station #1.

Behind these buildings, and various workshops and support buildings, is a fenced-in area that we don't know much about. Two fairly large hangars, clearly visible in these photos, have been added there in late 2002. It is interesting is that, although the hangars are side-by-side, one of the hangars is inside and one outside the fence.

The huge building next to this area on the right is the Shipping and Receiving Facility. Notice the A/C units on the roof, and the trucks parked all around it. On some nights the whole area is brightly lit with white floodlights. The S&R facility is located on the road coming in from the NTS via gate 700. On the other side of the road is a large parking area. This is where workers who drive in via Mercury and the NTS leave their private vehicles.

In front of this area and the old checkered water tower, with a dark colored roof, are some of the original hangars from the 1950's. They were used for development and test of the U-2 Spy Plane. This Lockheed "Skunkworks" project, and its need for secrecy, was the reason Area 51 was founded 51 years ago in this remote location.

Behind the old U-2 hangars, at the foot of the water tower, you can barely see the Green of the Area 51 baseball field. This is part of the base recreation complex, which also includes tennis courts, a gym, a swimming pool and a popular bar known as Sam's Place.

Continuing right from the water tower are Hangars 4 through 7, and the northern Ramp area. These hangars were used for the A-12 program, and later housed a fleet of Russian fighter jets that the U.S. Government acquired through various channels. These jets, flown by U.S. pilots known as the Red Hats, were used to evaluate their capabilities and weaknesses. This information of course gave U.S. pilots a huge advantage in air-to-air combat.

The hangars are still known as the "Red Hat Hangars". It is not clear what these hangars are used for today, but we have seen light in some of them on several occasions, and one time we observed a plane taxi into one of the hangars.

The ramp area north of the Red Hat hangars is used for the security helicopters, which can often be seen parked here. The three MH-60G Pave Hawk helicopters can sometimes be seen patrolling the perimeter of the restricted area. The building in the background, with open sides and a gray roof, was added between 1998 and spring of 2000. It is connected to the North Ramp Area around the Red Hat Hangars.

The area to the north contains the DYCOMS and Quick Kill radar systems and various support buildings. DYCOMS stands for "Dynamic Coherent Measurement System", and is basically a radar cross section measurement system for the development of Stealth aircraft. The two large dishes are typically pointed straight up when they are not in use.

The Quick Kill radar site visible in the photo has two individual antennas near the south end of the dry lakebed. Two similar sites, connected to this one with underground lines, are located out of view east of the runways. Not much is known about these sites, but they appear to also be related to radar cross section measurements.

There are several smaller facilities scattered all over Emigrant Valley west and north of Groom Lake. Most of them are radar sites of various flavors, used to test the stealth capabilities of new developments. Some of these radar sites, and the road to Gate 700 and the NTS, can be seen on the right side of this section. A section of Groom Lake Road is visible on the far site of the dry lakebed of Groom Lake.

The facility on the far right is near Slater Lake. This man-made lake, surrounded by trees, was established in the 1960's as a recreation area for workers at the base.

There are rumors that today it is surrounded by so many classified sites that access to the lake had to be restricted, even for most Area 51 personnel.

Area 51 was rocked by atomic blasts
By Peter W. Merlin

A remote location



This aerial view shows the Watertown Airstrip at Groom Lake in 1959. The paved runway is 5,000 feet long.

In 1954, Lockheed and the Central Intelligence Agency (CIA) needed a secure test site for the secret U-2 spyplane that was nearing it first flight. Test pilot Tony LeVier and Lockheed Skunk Works foreman Dorsey Kammerer scouted the deserts of the southwestern United States, looking for remote dry lakebeds. Skunk Works chief Clarence "Kelly" Johnson selected a site, but it was rejected by Richard M. Bissell, Jr., of the CIA and his Air Force Liaison, Col. Osmond J. Ritland because it was too close to populated areas. Ritland recommended Groom Dry Lake, Nevada, on the Las Vegas Bombing and Gunnery Range. At first, Johnson objected to Groom Lake because of its proximity to the Atomic Energy Commission (AEC) nuclear proving ground at Yucca Flat. Not only were atomic bombs being detonated above ground just 12 miles to the southwest, Groom Lake was also directly downwind of the radioactive fallout clouds. Johnson relented when he realized that the military and AEC restrictions on the surrounding area would help provide security for the U-2 operation. Nevertheless, atmospheric testing of nuclear weapons plagued the secret base with radioactive fallout and other hazards for many years.

Poison rain

The history of fallout in the Groom Lake area was well documented (starting with the 1951 test series), according to John G. Fuller's book The Day We Bombed Utah, which describes the effects of fallout on the populations of eastern Nevada and western Utah. Fuller relates the story of the Sheahan family who operated the Groom Mine, overlooking the dry lakebed. According to Fuller, the AEC monitored radioactive contamination at the Groom Mine through

the use of sticky pans, air and water samples, dosimeters [radiation detectors], and even live rabbits. The Sheahans were informed that there would be "a lot of radioactive dust,...and the clouds would be coming in the direction of the Groom Mine."

There would also be times when the Sheahan family and the miners would have to evacuate. The days of non-productivity were a costly nuisance to the Sheahans. The frequent nuclear testing required the mine "to be shut down often, once as long as 12 days in a row," according to Fuller. As Fuller describes the fallout from interviews with surviving Sheahan family members, it "would just sweep in, thick as a dry thunder shower, just as heavy and just as pelting as actual rain." Cattle, horses, and deer in the Groom area were later observed dead or injured with beta burns, a form of radiation damage from fallout.

Other damage at the Groom mine was caused by shockwaves from the blasts. One detonation broke 30 windows and ripped sheet metal off the sides of buildings. According to Fuller, the Sheahans were informed that detonations were planned for times when the winds would send the atomic clouds north and east. In this way, the fallout would pass over sparsely populated areas, rather than major cities like Las Vegas, Nevada, and Los Angeles, California. In later years, this necessity would plague the workers at the secret Groom Lake airfield with the need to suspend operations and evacuate personnel during nuclear tests.

An open secret



The airfield at Watertown, on the southwest corner of Groom Lake, as it appeared during the 1950s. U-2 aircraft were parked north of the hangars and west of the runway.

The existence of the facility at Groom Lake was announced by the AEC in 1955, during its construction. The airbase was called Watertown, a name that was commonly used for the facility until 1958 when it was added to the Nevada Test Site as Area 51. In fact, Watertown is still officially listed as a member of Alamo Township in Lincoln County.

An information booklet distributed to the news media in 1957 by the AEC (titled Background Information On Nevada Nuclear Tests) mentioned the "Watertown Project." It was described as "a small facility at Groom Dry Lake adjacent to the northeast corner of the Nevada Test Site, and within the boundaries of the Las Vegas Bombing and Gunnery Range." It noted that the base included "dormitories, equipment, buildings, and a small airstrip."

Naturally, there was no mention of the fact that it had been built for the CIA to test fly a new spyplane and train pilots for covert reconnaissance missions. The booklet did include a cover story that the National Advisory Committee for Aeronautics (NACA) had "announced that U-2 jet aircraft with special characteristics for flight at exceptionally high altitudes have been flown

from the Watertown strip with logistical and technical support by the Air Weather Service of the U.S. Air Force to make weather observations at heights that cannot be attained by most aircraft." In fact, U-2 aircraft at Waterown were painted in NACA markings to protect the cover story in the event that one of them was lost off-site.

Under the cloud



Shot STOKES was fired from a balloon above Area 7. It exploded with a yield of 19 kilotons. The fallout cloud passed through the Groom Lake area.

Prior to the construction of the Watertown facility, there were 32 atmospheric nuclear tests at the NTS. Since they were detonated when the wind was blowing generally northeast, the shots usually deposited fallout on the Groom Lake area. In 1955 and 1956, there were 14 more. The 1957 test series, Operation Plumbbob, included 24 nuclear detonations and six safety experiments (three of which had a slight nuclear yield). These tests frequently required the evacuation of personnel from Watertown, interrupting flight test and crew training operations.

A memo from Brig. Gen. Alfred D. Starbird in the Department of Energy (DOE) historical archives describes a teleconference regarding Watertown exposure to fallout during the 1957 test series. According to the memo, the "Watertown agreement requires that personnel evacuate, if necessary, to permit [the] test device to be fired." It was also cautioned that "expected fallout on Watertown from a given shot should be limited so as to permit re-entry of personnel within three to four weeks without danger of exposure exceeding the established off-site rad-safe [radiation safety] criteria, and with understanding that evacuation for a later shot may be required."

It was requested that this position be passed on to the Nevada Test Organization planning board, and that the Board should determine "delays in firing which may result, if any, from Watertown consideration," and "maximum tolerable fallout on Watertown under stated conditions." At this time, the Groom Lake facility was only being used for the U-2, and was expected to be deactivated as the aircraft and crews were dispersed to overseas bases for operational missions. The memo states: "Latest info here indicates Watertown will continue operation through June 30, 1957, and possibly for an additional year thereafter." The evacuations must have been inconvenient to Watertown personnel, as they would have had a severe impact on flight test and training schedules.

Plutonium dispersal near Groom Lake



Shot SMOKY was fired atop a steel tower in Area 2, adjacent to some hills. It had a yield of 44 kilotons. SMOKY's dusty cloud deposited radioactive fallout over the Groom Lake area.

The first shot of Operation Plumbbob was a safety experiment called Project 57. Such tests were usually conducted to determine that a weapon or warhead damaged in an accident will not detonate with a nuclear yield, even if some or all of the high-explosive components burn or detonate. Because the non-nuclear explosion would disperse nuclear materials, such as plutonium, the Project 57 test was mainly used for developing decontamination and radiation monitoring techniques.

On the morning of 24 April 1957, an XW-25 warhead was subjected to a one-point detonation. Only the bottom detonator was fired. The warhead's high-explosive charge destroyed the weapon and spread plutonium over nearly 900 acres of the surrounding landscape. The primary hazard from plutonium is the danger of inhaling microscopic particles. Alpha radiation emitted by the material is very weak, but can damage soft tissue (as in the lungs).

Ground Zero for Project 57 was only five miles northwest of Groom Dry Lake. Initially, no fallout was detected at Watertown. It was later determined that there was minor alpha activity for 12 days following the shot, but it was well below operational guidelines.

Blast effects at Watertown

The following month saw the beginning of full-scale nuclear detonations for Operation Plumbbob. A DOE database of Estimates of Exposure Rates and Times of Fallout Arrival Near the Nevada Test Site lists six of these shots as having deposited measurable fallout at Watertown. The first to do so was the fourth detonation, called WILSON, which was fired on 18 June 1957. It was a 10-kiloton device, lofted on a balloon to height of 500-feet above Area 9 in the northern part of Yucca Flat. The mushroom cloud climbed to 30,779-feet where a steady wind blew it northeast. Meanwhile, WILSON's stem was blown in the opposite direction towards California. Balloon shots were somewhat cleaner than tower shots because there was no steel structure to vaporize and contribute to the fallout cloud.



Shot HOOD was fired on 5 July 1957. It was lofted by balloon to a height of 1,500-feet over Area 9, about 14 miles southwest of Watertown. The device exploded with a yield of 74 kilotons, the most powerful airburst ever detonated within the continental United States. HOOD's nuclear cloud drifted over Groom Pass and the Papoose Range, depositing fallout on the Groom Lake area and its shock wave damaged a number of buildings at Watertown.

The Groom Lake base had always been intended as a temporary facility. As U-2 testing began to wind down and CIA pilot classes finished training, Watertown became a virtual ghost town. By mid-June 1957, the U-2 test operation had moved to Edwards AFB, California, and the operational U-2 aircraft were assigned to the 4028th Strategic Reconnaissance Squadron at Laughlin, Texas. This was just as well. The airbase was about to be rocked as never before.

HOOD, the sixth nuclear shot of Plumbbob was truly spectacular, and caused substantial damage at Watertown. The device had been designed by the University of California Radiation Laboratory at Livermore, California. It was lofted by balloon to a height of 1,500-feet over Area 9, about 14 miles southwest of Watertown. At 4:40 a.m. on 5 July 1957, HOOD exploded with a yield of 74 kilotons, the most powerful airburst ever detonated within the continental United States. It was five times as powerful as the bomb dropped on Hiroshima, Japan, during World War II.

According to Under The Cloud by Richard Miller, HOOD was a thermonuclear explosive, or hydrogen bomb. It was detonated in spite of an informal agreement between the government and the military precluding the use of fusion weapons on U.S. soil. Miller cites a letter from Col. William McGee of the Defense Nuclear Agency, dated 7 July 1980, which admits that HOOD "was a thermonuclear device and a prototype of some thermonuclear weapons currently in the national stockpile."

HOOD's nuclear cloud drifted over Groom Pass and the Papoose Range, depositing fallout on the Watertown camp where the blast had already left its mark. According to a memorandum from R.A. Gilmore of the Nevada Test Organization's Off-Site Radiation Safety Office, HOOD's shockwave damaged a number of buildings at Watertown. Damage included shattered windows on the west sides of Building 2 and the Mess Hall, a broken ventilator panel on the north side of Dormitory Building 102. Two metal Butler buildings suffered the most severe blast effects. A maintenance building on the west side of the base had its west and east doors buckled, and the south door of the supply warehouse west of the hangars buckled in.

Watertown as a radiation field laboratory



Shot DIABLO was fired on top of a 500-foot steel tower in Area 2 on 15 July 1957. It had a yield of 17 kilotons (the bomb dropped on Hiroshima, Japan, during World War II had a 13KT yield). Radiation safety (RAD-SAFE) monitors instrumented buildings and vehicles at Watertown to measure radiation-shielding capabilities of materials commonly found in an average U.S. town.

Ten days later, 17-kiloton shot DIABLO vaporized its 500-foot tower on the northwest corner of Yucca Flat. The fiery mushroom cloud sucked up dust and debris and, predictably, headed northeast across the hills. AEC monitors at Watertown documented radiation levels as measured by equipment placed in various buildings, vehicles, and open areas. The airbase included structures made from wood, sheet metal, plaster and other materials commonly found in an average American small town. Therefore, the data provided information on the characteristics of these materials to protect inhabitants against radioactive fallout. The information was logged in tables of "shielding data" for later study. Watertown shielding data from several shots, including DIABLO, is now available to any interested person at the DOE Public Reading Facility in Las Vegas, Nevada. The data tables for DIABLO list readings taken at the Groom Mine main residence, a wood-frame house where radiation levels reached a maximum of 80 milliroentgens per hour (mR/hr). By comparison, normal background levels are between 0.02mR/hr and 0.04mR/hr. Readings were taken at Watertown in several rooms inside wood-frame dormitory Building 103. Levels varied from 12mR/hr to 30mR/hr inside the building. Readings inside Trailer 10, with four-inch-thick aluminum and wood walls, went off-scale three hours after DIABLO detonated. Within an hour, levels dropped to 65mR/hr, and then 24mR/hr 90 minutes later.

A warehouse west of the Watertown trailers experienced a maximum of 75mR/hr inside, while levels outside the building reached 110mR/hr. The Base Theater received 90mR/hr for a few minutes as the cloud passed. Levels inside the cab of the Control Tower reached 37mR/hr, while outside levels were up to 60mR/hr. Additional readings were taken in several types of office and storage buildings, and even on the Volleyball court.

Measurements were also taken inside parked vehicles positioned on Groom Lake Road. Radiation monitoring equipment was placed inside trucks, some with closed windows and some open. One truck (with windows open) was located 9.5 miles west of Watertown, along Groom Lake Road. This turned out to be a real "hot spot." The interior of the metal cab received 950mR/hr, while outside registered 1,420mR/hr (or 1.42R). Another truck, two miles west of Watertown only received 0.3mR/hr inside the cab and 0.5mR/hr outside.

A nest for Blackbirds

Air-sampling data was taken almost daily at Watertown during 1958 and 1959 and intermittently in 1960. The airbase was revitalized during this period when it was selected to support the OXCART program, a predecessor of the Lockheed SR-71 Blackbird. In 1959, the base facilities were expanded to include a radar cross-section measurement range for use in developing the anti-radar capabilities of the OXCART airplane, known as the A-12. The decision to test the A-12 and train CIA pilots at Groom Lake meant that the base would not only have to be expanded, but almost entirely rebuilt. The expansion of the base included new hangars, dormitories, runways, and fuel storage facilities. By 1960, Watertown was commonly known as Area 51, a designation that would appear on most documents and maps for the next two decades.

The OXCART program operated at Area 51 from 1962 until 1968. This did not signal the demise of the remote airbase, however. Other CIA and Air Force programs sustained it for many decades. The Air Force took control of the site in 1977, and it has only continued to grow.

Cratering tests



Shot SEDAN was part of the Plowshare program for peaceful uses of nuclear explosives. The device was buried at a depth of 635 feet to maximize its cratering potential. SEDAN exploded with a yield of 104 kilotons, blasting a crater 320 feet deep and 1,280 feet across in the sandy soil of Area 10 on Yucca Flat. Fallout from the shot drifted over Groom Lake.

The last completely above ground test at NTS took place on 17 July 1962. There were, however, several cratering tests conducted in support of Project Plowshare. This endeavor called for the use of nuclear explosives for excavation of canals, harbors, and mountain passes. To prove the feasibility of such peaceful uses of nuclear explosives, devices were buried at a depth that would allow the maximum amount of soil to be displaced.

Fallout and debris from cratering shots were hurled high into the atmosphere. The first cratering test was actually sponsored by the Department of Defense, and was not part of Plowshare. Called DANNY BOY, the 0.43-kiloton shot blasted an 84-foot deep, 265-foot wide crater in basaltic rock on 5 March 1962. Radioactivity was detected off-site, probably at Area 51 which was downwind. The largest cratering shot was SEDAN, on 6 July 1962. The 104-

kiloton thermonuclear device left a crater 1,280 feet across and 320 feet deep. Again radioactivity was detected off-site. Shot ANACOSTIA was a low-yield device development test on 27 November 1962. No radioactivity was detected beyond the boundaries of the Test Site.

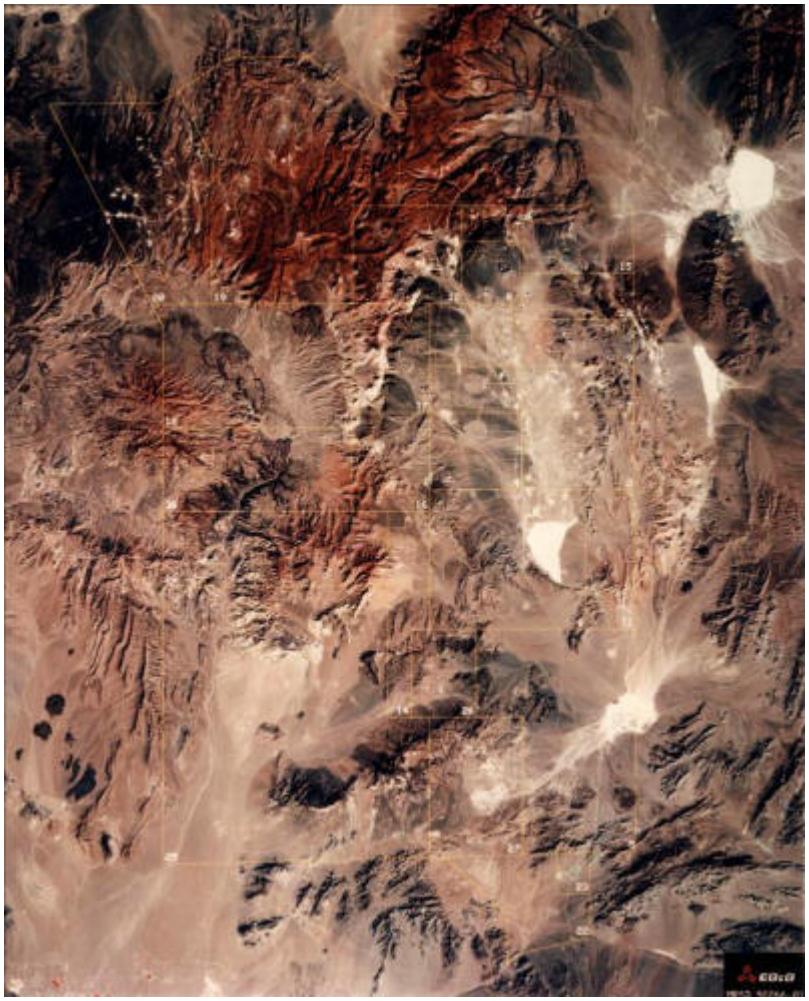
Two other Plowshare cratering tests were scheduled for 1969. The shots, code named YAWL and STURTEVANT, were planned for detonation on northern Yucca Flat. In preparation for the tests, DOE officials analyzed the predicted effects that the blasts would have on Area 51. Documents titled EVENT SAFETY AND DAMAGE EVALUATION - AREA 51 for each test are available at the DOE Public Reading Facility in Las Vegas. These draft reports provide insight into the manner in which nuclear testing impacted operations at Area 51. The analyses for both shots cover the following areas: predicted effects, atmospheric overpressures, radiation, base surge and ejecta, possible damage to Groom Lake road, evacuation from Area 51, and possible delays in firing.

According to the documents, the STURTEVANT device was to be buried about 800 feet below ground, and have a yield of 170 to 250 kilotons. YAWL was to have a yield of 750 to 900 kilotons. Buried about 1,000 feet underground, YAWL would have blasted a crater 500 to 700 feet deep and as much as 1,500 feet across. Predicted effects of both shots were similar. "Anticipated ground motion at Area 51 Camp," according to the STURTEVANT report, "is below the damage threshold for structures, therefore, only minimal architectural damage is expected."

Radiation was an important consideration. Neither shot would have been fired if winds would cause the "hot line", area of highest radiation, to pass near the airbase. The reports state that "wind conditions at detonation time will be chosen such that predicted contamination at Area 51 camp will be less than 6R total dose including shine and redistribution. The dose rate is expected to fall below 6mR/hr before D+4." To reduce risk of radiation exposure, personnel were to be evacuated as with so many previous shots. "Detonation...will require evacuation of the entire Area 51 on D-day." Additionally, the duration of the evacuation would "depend on reliability of contamination predictions and in-field measurements. Re-occupancy is expected by D+4 although field conditions may require short work shifts for several days, possibly two to three weeks."

The possibility of successive firing delays raised the specter of evacuation for a period of days, or even weeks. As always, weather was the determining factor. The reports specified that it might "be necessary to delay detonation on a day-to-day basis awaiting favorable atmospheric conditions." In the case of YAWL and STURTEVANT, all the planning was in vain. Both shots were cancelled.

The blasts move underground



This satellite view of the Nevada Test Site shows all the major test areas. The craters on Yucca Flat are clearly visible. Groom Lake (Area 51) is just off the northeast corner of the NTS near Area 15.

After the nuclear tests moved completely underground, air-sampling stations continued to operate to detect any radiation that might be accidentally released. In addition, observers were stationed at off-site locations, including Area 51, to record ground motion caused by subterranean detonations. When shot TIJERAS was fired on 14 October 1970, Donald Bruskert recorded his observations outdoors at Area 51. According to Bruskert, the motion came "in rolling waves" five seconds after detonation, and that there was "no jolt." According to the DOE list of United States Nuclear Tests, the yield of the blast was between 20 and 200 kilotons. The ground motion lasted for 25 seconds. During shot ARTESIA, on 16 December 1970, William Moore felt the shock distinctly inside the Area 51 security building. Donald Bruskert, standing outdoors, described the motion from the "20 to 200" kiloton blast as "questionable."

The proximity of Watertown/Area 51 to the Nevada Test Site helped shield activities at the airstrip under the blanket of security that already surrounded the nuclear proving ground. It also created such operational difficulties as radiation exposure, damage to facilities and equipment, and numerous delays due to evacuation. Air Force, CIA, and civilian contractor personnel at the secret airbase willingly accepted these risks in order to accomplish their mission: to develop advanced aircraft and systems in defense of the United States.

Building Map of Area 51


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This map has been compiled from the latest satellite images of the Groom Lake Base, combined with the input from very reliable sources, who prefer to remain anonymous. The map is not to scale.

#	Building #	Comments
1	110	Quick Kill Radar Site
2	200	Hangar 4
3	202	Hangar 5
4	208	Hangar 6
5	206	Hangar 7
6	217-220	Old U-2 hangars
7	265	Base Supply and Administration Building
8	275	Consolidated Services Facility
9	299	Test Engineering Support Center
10	300-335	Dormitories
11	400-404	Janet Terminal
12	285	Shipping and Receiving Facility
13	430	Hangar 18
14	431-432	Hangar 18 support buildings
15	437	Fire Station #2
15	438	P.E. Building ("Personal Equipment", flight preparation)
16	443	Hangar 8
16a	441,442,444	Hangar 8 support buildings
17		Hangars 20 and 21
18		Hangars 22 and 23
19		Hangars 20-23 storage building
20	470	Hangar 17
21A	480	Hangars 16 and 15
21B	480	Hangars 14 and 13
21C	482	Hangars 12 and 11
21D	482	Hangars 10 and 9
22	485	Weapons Bunker
23	730	Hangar 19, Arm/De-Arm, Scoot-n-Hide
24	710	Control Tower
25	123	Dish Antenna Building
26	120	Range Maintenance Shop
27	122	Range B.E. Office
28	131?	
29	130	DYCOMS Radar Building
30		DYCOMS Dish
31		Helicopter Ramp
32	103	Red Hat Quonset Storage
33	100,101	Hangar 2, Red Hat Storage
34	267	Dining Hall
35	269	Old Base Headquarters
36	170	Sam's Place, Gym and Swimming Pool
37		Baseball field
38		Water Tower
39	410	Photo Lab and Precision Measurement Equipment Lab (PMEL)
40	412	Main Security Building
41	447	Compressor Building
42	476	Steam Plant
43		New Scoot-n-Hide shelter
44	213	Fire Station #1
45		Runway 14L/32R (new runway)
46		Runway 14R/32L (old runway, no longer used)
47		Southern Taxiway and Runway 12/30
48		New Center Taxiway (Spring 2003)

49 New Quonset Hut (2003)
50 Workshops (?)
51 Unknown use
52 Old Toxic Waste burning pits
53 New smaller building (2003) with indications of a larger underground structure, possibly a new buried tank. Underground lines leading to #20, 41 and 42 from here.
54 New Twin Hangar (Late 2002/Early 2003)
55 New Hangar east of Hangar 9 (Spring 2005)
56 New Extension to Hangar 19 (Spring 2005)
57 New Extension to Hangar 19 (Spring 2005)
58 New tower structure near RCS range (Late 2005)
59 New Base Headquarters (2005)
60 New building east of Hangar 17 (2005)
61 New large hangar (Spring/Summer 2007)

Close-up aerial photo of Area 51 from 1965



This excellent close-up aerial photo of Area 51 shows the base as it looked in 1965. Most of the buildings are still in place today, as part of what is now the north end of the base. The four

large hangars in the foreground are hangars 4-7 (building #200, 202, 206 and 208), which were used for the A-12 and YF-12 development. Later they were used for "foreign technology" items, such as fully operational MiG fighter jets, and became known as "Red Hat Hangars". Behind them are the U-2 hangars, the oldest hangars of the base, followed by a group of administration and operations buildings.

The large building on the left is the Base Supply and Administration Building (building #265). Next to it is the Dining Hall (building #267) and the Base Headquarters (#269). On the far right is the recreation complex, including the building that later became known as "Sam's Place" (building #170), a gym and swimming pool. Behind it, partly out of the frame, is the baseball field.

In the background are the old living quarters, which have since been replaced by more modern and more comfortable quarters. The runway is out of the frame to the left.

New Tall Structure at Area 51, January 2006



A new tower structure was built near the RCS range at the north end of Area 51. The shadow of the structure can first be seen on a satellite image taken on January 17, 2006. The tower is not present in a September 28, 2005 photo. So we know that it was built between Sept. 28, 2005 and January 17, 2006. It appears to be a permanent structure, with no visible change between January 2006 and June 2007, when this photo was taken.

The new tower is about 180 ft. tall, with a triangular cross-section (visible on new satellite images). It is too tall and too solid for a drill rig. It is located at approximately N 37° 14.782' and W 115° 49.396', west of the sump ponds. This location is near the DYCOMMS and Quick Kill radar sites at the south end of Groom Lake. It may hold a new radar array for RCS tests or other radar measurements.

The tower has line-of-sight to a newly expanded remote facility near N37° 14' 32" and W115° 53' 24". That facility in turn has several tall poles, although not as solid. The remote facility was expanded around the same time our tower was built, so there may be a connection.

The structure looks somewhat similar to the ICECAP tower at the Nevada Test Site, without the siding. See this LVRJ article from December 2000 for more information and some photos. Because of the proximity to the NTS, and the fact that the towers there are no longer used, it may be a re-used tower originally designed for underground nuclear tests. But re-used for what?...

There are also a couple of new structures and tall light poles at the south end of the scraped area in the back. On new satellite photos it looks like a shooting range, located at N 37° 14.6'

and W 115° 50.25'.

Area 51 Satellite Image, July 18, 2007



The photo was taken by the IKONOS-2 satellite on Wednesday, July 18, 2007 at 11.43am PDT. Scroll down for some commented 1 meter resolution clips, showing changes since the last published satellite image.

Area 51 Satellite Image, July 24, 2003

5 meter resolution version of a satellite image of Area 51 taken on July 24, 2003 by the Ikonos Satellite.



The most notable change over previous images is the finished new taxiway (with dark shoulders) in the center of the image. The older runway 14/32 on the left is no longer used and marked as closed with large yellow X's. The access ramp to Hangar 19, the arm/de-arm scoot-n-hide hangar, has been extended to the new taxiway. The old E-W taxiway has been partially removed.

The new taxiway is 4625 ft. long and 125 ft. wide. It connects the southern ramp area with the northern section of the new runway 14/32 on the right. This provides a convenient shortcut for Janets, which usually land on Rwy. 32 and take off on Rwy. 14. The Janet ramp is just north of the western end of the new taxiway.

The benefits of the new taxiway are obviously saving taxi time for the Janets, and avoiding the section of the northern taxiway at the north end of the old runway that is prone to flooding after heavy rains. However, both could have been accomplished much easier and cheaper by widening and extending the existing taxiway east of the Red Hat hangars.

Most likely, the new center taxiway and the new ramp to the scoot-and-hide hangar are connected to a new project that is about to move into the South Ramp area, where several construction projects can be observed (see below). Access to Runway 14/32 from the South Ramp would be much faster with the new taxiway. And, as an added advantage, the most likely top secret development does not have to taxi past the entire base, with personnel not

briefed on that project.

Other new buildings and construction:
A new quonset hut east of the Consolidated Services Facility
Two smaller new quonset huts in the complex east of the Shipping and Receiving facility
A new building (possibly covering a larger underground structure, possibly a large tank) in the southern area of the base. Buried pipes or cables connect it to the Hangar 8 storage building, to Hangar 17 and to the Steam Plant
The southern ramp, north of Hangars 9-16 is being resurfaced
Two large new fuel tanks have been set up at the site of the old smaller fuel tanks, which were removed in 2001
Runway 14R/32L is now marked as closed over its full length, including the lakebed overrun
Two Janet 737's can be seen parked at the Janet terminal, as well as three of the smaller biz-jets. If you look closely you can even see an F-16 parked on the northern ramp, west of Hangar 6.

Most older satellite images were taken on weekends, with most of the base vehicles parked at the Janet terminal. This photo, taken on a weekday, gives a better idea of areas of activity, based on the number of cars parked there.

These areas include:
The parking lot around and north of the Shipping and Receiving Facility
The building complex just west of the Shipping and Receiving Facility
The parking lot in the center of the base administration offices
The area around the Test Engineering and Support Center
The northern ramp area

Area 51 Satellite Image, June 7, 2002

5 meter resolution version of a satellite image of Area 51 taken on June 7, 2002.



This satellite photo, taken on June 7, 2002, shows the beginning construction of a new center taxiway and the extension of the ramp that connects it with the scoot-and-hide Hangar 19. The old center taxiway has been partially removed.

Other new buildings and construction:
New foundation for a hangar in the complex east of the Shipping and Receiving facility
The surface of the parking lot south of the Test Engineering Support Center has been partially removed. Possibly in preparation of construction of a new building there
Beginning construction of two large new fuel tanks at the site of the old smaller fuel tanks, which were removed in 2001

Area 51 Satellite Image, December 22, 2001

4 meter resolution version of a satellite image of Area 51 taken on December 22, 2001 by the Ikonos Satellite. © Space Imaging with friendly permission
This satellite photo was taken on Saturday, December 22, 2001. Construction at the Janet ramp is completed, and now there appears to be some construction at the ramp west of Hangar 20-23. Judging by the piles of snow in front of Hangars 9-16 these are not used at the moment. If you look closely you can see the new markings designating the south taxiway as

runway 12/30. Most of the older fuel tanks south of Hangars 9-16 have been removed, and you can see the foundation for two large new tanks.



Area 51 Satellite Image, April 2, 2000

4 meter resolution version of a satellite image of Area 51 taken on April 2, 2000 by the Ikonos Satellite.
This satellite photo was taken on Sunday, April 2, 2000. The north end of the older runway is marked as closed, while the south end is still in use. The ramp south of the Janet terminal is being re-surfaced. During the construction the Janets were parked on the ramp west of Hangar 20-23.



Area 51 and the NTS (December 4, 1991)

This satellite photo was taken on December 4, 1991 by "Landsat 4". It shows Area 51 and Groom Lake in the north-east, Papoose Lake south of it and the craters from the atomic tests in the 60's at Yucca Flat and Frenchman Flat west of Papoose in the Nevada Test Site. The town of Mercury is in the south, and the mysterious Area 19 in the very northwest corner. You can clearly see the buildings of Area 51 just southwest of Groom Lake, and the first runway across the dry lake. The second runway, visible as a white line south of the lake, is just under construction.

