

## *A Landscape of Silence*

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Drive three hours east from San Francisco on Interstate 80 and you cross the crest of the Sierra Nevada, leaving behind the Pacific Ocean watershed to descend into the Great Basin, the American West's arid interior, where all waters drain inward with no outlet to the sea. The Basin covers almost all of Nevada and western Utah, and is part of the larger physiographic province known as the Basin and Range Province, the most mountainous region on the planet outside of Afghanistan. The interstate winds through this tectonic upheaval for more than six hours, whereupon you come to the last summit in Nevada only to be confronted with the Great Salt Lake Desert and that blinding palimpsest the Bonneville Salt Flats. You have just entered one of the most hostile, toxic, and difficult landscapes on Earth—an ideal place in which to erect the world's largest air-and-ground military enclosure.

It is sometimes difficult to remember that World War II was well underway in Europe before Congress appropriated funds in 1940 for the world's largest gunnery range on the edge of these salt flats. This was in itself just one step, albeit a large one, in the militarization of the American West that had started during the nineteenth century with the US Cavalry incursions of the 1840s. In a way, the establishment of the Wendover Army Air Base and the nearby Dugway Proving Ground were expansions of the garrison mentality of the early US Army forts, facilities designed to be self-isolating against external threats. More than a year before the bombing of Pearl Harbor, the United States government was building a superfort in Utah on the Nevada border, one predicated not on the efficacy of horses, but aircraft.

Japan had provoked the Second Sino-Japanese War with China in July of 1937, and Germany had rattled leaders in Paris so severely the same year that French military extended the Maginot Line, thinking they could prevent Hitler from invading. By January 1939 President Franklin D. Roosevelt was worried enough about America being drawn into the growing conflicts that he requested Congress increase its appropriations for the US Army Air Corps, a branch of the services that he knew would be critical in any upcoming global conflict. That same summer Albert Einstein wrote Roosevelt to alert him to Germany's efforts to build an atomic bomb, and on September 1 Germany blitzkrieged its way into Poland.

One year later the US Army began construction of primitive barracks on the newly established Wendover Airfield, one of several bases fast-tracked around the American West in response to the threat of a global conflict. The idea was to determine where best to construct a facility that would be expansive enough to accommodate large bombers and their crews, yet far enough from the coast to avoid bombardment from offshore ships or long-range air raids. It also had to be close to heavy transportation, but not near a major population center. Wendover, a town of only 103 persons, was a fine

candidate. It was on the western edge of the Bonneville Salt Flats, 120 miles west of Salt Lake City, which was the nearest city, and served by the Western Pacific Railroad as well as the transcontinental highway. It would make an ideal fort.

Twelve servicemen arrived in early 1941 to survey the grounds and promptly build a long gravel runway. By year's end Japan had crossed the Pacific to bomb Pearl Harbor, and President Roosevelt had declared war on both Japan and Germany—and 2,261 military were ensconced at what had become the largest military base and bombing range in the world, a combined 3.5 million acres of relatively empty desert. A mock enemy town was constructed of blocks carved from the nearby salt flats, which made an easily identified target for nighttime bombing runs. In June 1942 the US government began serious work on its own atomic bomb with the president's approval of a construction budget for the Manhattan Project. Two thousand civilian employees and 17,500 military personnel staffed Wendover as it ramped up to train crews for related missions, and 400 government agents prowled the base and Salt Lake City, covertly dogging the servicemen to ensure that the G.I.s didn't share information on or off the base. A zone of silence had been erected around operations, one comprised of both geography and enforcement.

As part of the military build-up on the edge of the salt flats, Roosevelt had also withdrawn an additional 126,720 acres (198 square miles) in early 1942 for the purposes of establishing a separate secure location where chemical and incendiary weapons could be tested. The Dugway Proving Ground, seventy miles south-southeast of Wendover and eighty-five miles southwest of Salt Lake City, would be established in a small valley surrounded by three mountain ranges. Not only was the location remote, it was much more isolated than Wendover and cut off from even stray sightings from train tracks or the highway. The very name of Dugway emphasizes its geographical security, derived as it is from the early pioneer necessity to carve trenches in the mountainsides so ox teams could pull their wagons up the "dug way" to reach the other side. If Wendover was a long way from anywhere, Dugway was over the edge of the world.

Once again, test villages were constructed, this time accurate wooden simulacra of Japanese apartments and two versions of plaster-and-masonry German row houses. One of the first weapons tested there in the summer of 1942 was a bomb filled with a newly reformulated version of the jellied petroleum that had been used in flame throwers since World War I. The two villages were bombed repeatedly with what was now called *napalm*; once the flames were put out after each test by a crew from the onsite fire station, the buildings were repaired or rebuilt. And bombed again and again until it was understood what combination of bombs would first and most quickly penetrate roofs, and then thoroughly incinerate the civilian structures and their occupants. The calculus was among the most ruthless employed by any military in the history of the world, but a predictable response to Germany's strategic and incendiary bombing of London and other British cities, which had started with the Blitz of September 1940.

In the early summer of 1945 Colonel Paul Tibbets relocated his bomber squadron to

Wendover to finalize the training of crews in B-29 Superfortress bombers to deliver an atomic device over Japan. In June, Tibbets flew the Enola Gay from Wendover to Tinian Island in the Pacific, and then on August 6 dropped his atomic payload over Hiroshima. Two days later another B-29 from Wendover dropped its bomb on Nagasaki. Common public perception has it that the atomic bombs dropped on Hiroshima and Nagasaki in 1945 ended World War II, but Italy and Germany had already conceded defeat in Europe during the end of April and the first week of May.

One of the reasons was because of the intense firebombing of cities such as Hamburg by the British in 1943 and then Dresden in February 1945 by British and American planes, which killed hundreds of thousands of civilians. Likewise, in March of that year Tokyo was firebombed by 325 aircraft, most of them manned by crews trained at Wendover; their planes each carried 10,000 pounds of napalm bombs.

Two hundred and sixty-seven thousand buildings covering seventeen square miles of Tokyo were obliterated, along with 100,000 people. By the time Tibbets flew over Hiroshima the population had been reduced to making bullets out of wood. The testing and training at Wendover and Dugway had effectively ended the war before the atomic bombs were dropped, although the Japanese generals refused to give up until Emperor Hirohito overrode them to unconditionally surrender on August 14.

Following the war, the Wendover Army Air Base was repurposed to evaluate rockets systems captured from the Germans, but weapons development was transferred in 1951 to the newly established Nevada Test and Training Range (NTTR), an even larger area that included the Nevada Proving Grounds, soon to be known as the Nevada Test Site (NTS).

The exploding of nuclear devices was carried out over 680 square miles of desert, where the strict secrecy protocols deployed at Wendover were adopted and refined by first the military and then private contractors such as the Wackenhut Corporation, now known as G4S Secure Solutions.

In August 1961, the US Air Force essentially mothballed the Wendover base, then turned control over most of it to the town of Wendover in 1977; and by the mid-1980s nuclear tests at the NTS ceased. But Dugway continued on as the nation's premier test facility for chemical and biological weapons, which corresponded to how the threat and actual usage of "CB" weapons had displaced nuclear bombs. Dugway now covers 798,214 acres—that's 1,300 square miles or a little larger than Yosemite National Park. An official count from 2014 states that more than 1,700 civilian and military personnel work there. Dugway is part of the Utah Test and Training Range (UTTR), which covers 2,624 square miles and sits under America's largest "overland contiguous special use airspace," which stretches over a footprint of 207 by 122 nautical miles. It's the only place in the United States large and empty enough for the testing of cruise missiles and large-footprint munitions such as cluster bombs. Dugway is so remote and its facilities so far from unauthorized eyeballs that it might as well have a dome over it. It's much easier to discern the history of the Wendover base than Dugway, in part because of the historical pride nurtured by former pilots and aircrews over their role in the war, and by

those who developed and deployed the atomic weapons to help end the conflict. The history of Dugway, which is based on the country's research into biological and chemical weapons, is darker in every sense of the word. The United States started to develop both chemical and biological weapons by the end of World War I, producing 6,360 tons of chemical weapons, including mustard gas and phosgene, the latter an agent causing suffocation. Although mustard gas was used by the Germans and then the English in WWI, chemical weapons were disavowed on the battlefield by Hitler in WWII. By 1991, which is when President George H. W. Bush ordered the destruction of all chemical weapons, the country had stockpiled 30,500 tons of chemical weapons, which it had never deployed; by 2012, most of the chemicals stored at nine facilities around the country had been eliminated. The only lethal incident involving American chemical weapons occurred at Dugway in 1968, when an uncontrolled cloud of Venomous Agent X nerve gas (an organophosphate) drifted outside the boundaries of the proving grounds and killed 6,400 sheep. The most recent known use of mustard gas may have been in 2015 by the Islamic State against the Kurds in Iraq.

Chemical weapons are relatively cheap to produce when compared to nuclear devices and very easy to disperse in urban areas. You know how scary the "poor man's atomic bomb" is when you consider that President Bush, who ordered the destruction of chemical stockpiles, was the former head of the Central Intelligence Agency. Biological weapons are of a magnitude worse. The United States had tested ricin in WWI as a toxin put on shrapnel in artillery shells and as an aerosol, but dropped research into weaponization as impractical. The Japanese persisted with chemical weapons research, however, and in 1942 the people running the US Chemical Warfare Service (now known as the Chemical Corps) convinced the military leadership that the US should resume development. The biowarfare laboratories were established at Fort Detrick the next year, where the majority of research and development would be conducted. The Pine Bluff Arsenal in Arkansas was a major point of production, and Dugway one of the primary testing sites.

Thousands of American civilians and military personnel were used as test subjects, and clandestine dispersal of simulants and harmless bacteria occurred in major American cities. By the 1970s the United States and the USSR had produced enough biological weapons to kill everyone on the planet. It was President Richard Nixon, who in 1969—in part influenced by the accident at Dugway—unilaterally declared the weapons off-limits for offensive deployment. He, like Bush Senior, simply found the weapons too disturbing to contemplate, as well as being politically inconvenient during the Vietnam War, when the effects of the defoliant Agent Orange were being reported on the Vietcong and American troops. The wafting of odorless chemicals that blister your skin or cause you to suffocate, and the deliberate propagation of germs that spread bubonic plague, or worse, are the collective nightmare of American military leaders and politicians alike, albeit sometimes for different reasons. And that's why one has to infer much of what has gone on and still occurs at Dugway.

While the desert itself provided a defensible moat of silence around Wendover and Dugway, the military's culture of secrecy was deepened by the Cold War with the

Soviets, which prompted additional layers of protection, and Dugway remains one of the more difficult sites about which to obtain accurate information. While the base maintains a presence online, and aerial views are available on Google Earth, details about its operations are scant. The most effective tool to understand what is done on the base may be a combination of inductive and deductive reasoning— to make small specific observations and then generalize the larger picture, and at the same time to test a theory against the collection of data. That starts with understanding the local geomorphology.

Wendover and Dugway are located in the heart of the Great Basin, a closed hydrographic unit that encompasses 209,162 square miles. A young lieutenant in the US Army Corps of Topographical Engineers, John C. Frémont, who first circum-navigated the region in 1844-45, was the first person to realize that the hundreds of dry lakes and parallel mountain ranges formed a distinct physiographic unit, the last to be discovered in North America. From around 32,000 years ago, the Great Basin was covered by two immense prehistoric lakes, the ancient Lake Lahontan in northwestern Nevada and Lake Bonneville in western Utah. When the northern boundary of the lake in Utah was breached 14,500 years ago, a flood of biblical proportions lowered the lake by 351 feet. At its highest, Bonneville reached 5,102 feet above sea level. Dugway sits at 4,856 feet. The flood uncovered the site of the base but also left behind the Bonneville Salt Flats and other alkali flats inhospitable for human habitation or agriculture, and that would prove to be a fine testing ground for munitions, hazardous chemicals, and the world's deadliest biological agents. John McPhee, writing about the region in *Basin and Range*, has described its geology as among the most inscrutable in the world, a kind of geo-secrecy that is a fitting metaphor and setting for classified military sites.

Such deserts worldwide are often seen as sacrificial areas, whether they are the southern reaches of Western Australia, the Atacama Desert of Chile, or Russia's Gobi Desert. The deserts offer clear, relatively treeless sightlines amenable to security and measuring the visual effects of weapons, and the low-density or no-density populations guarantee minimal impact on civilians. They also offer land that is either cheap or comparatively easy to withdraw from public usage.

Landscape is what humans make of land; these deserts are not wastelands, but are socially construed to be waste-scapes. Humans build facilities in deserts that range from atomic test sites and nuclear waste dumps to the world's largest solar installations and server farms, to aircraft boneyards and Land Art installations. All of them rely on the above-mentioned factors to one degree or another. Walter De Maria built *The Lightning Field* and Michael Heizer his *City* project in New Mexico and Nevada, respectively, because the land was expansive, cheap, and had sightlines bounded by mountains in the distance but unencumbered in the immediate surroundings.

The population ratio of Dugway is not dissimilar to that of the super-sized big box architecture in the continent's largest industrial park twelve miles east of Reno, which the architect Rem Koolhaas has compared to *City* and other Land Art installations. He points out: "During the last twenty years an immense proliferation of boxes totaling

more than 14 million square feet has emerged in this landscape—a combination of high-tech warehouses, factories and data centers of at least 300 feet wide, and from 1,200 to 2,600 feet long—organized in a number of competing grids. Both Land Art and boxes exploit the emptiness, and the supply of unlimited land and absence of any opposition.” He also notes the depopulation of these landscapes; whereas a worker at a Ford factory in 1930 occupied an average of six square feet, employees at Switch’s SUPERNAP carrier-neutral colocation data center in northern Nevada occur only once every 15,500 square feet in its 6.5-million-square-foot building. And, like a military installation, Switch’s center is surrounded by razor wire and is patrolled by armed guards in Humvees who silently ensure the security of data from sources as diverse as the military’s Defense Advanced Research Projects Agency (DARPA) to eBay.

Koolhaas touches on grids in the desert, one of the most visible features of arid architecture, a device that humans have deployed since at least the late neolithic village of Çatalhöyük in southern Turkey more than 9,000 years ago. We apply rectilinear grids onto the desert as if the land were a piece of paper, and where the intersecting lines appear to be infinitely scalable, whether you are expanding Phoenix across the Valley of the Sun, or pushing out the western portion of the Dugway Proving Ground across a playa in order to measure the dispersion of chemicals and biological agents (or, more commonly today, their inert analogs, or simulants). Maisel’s overlay of his own grid atop the ones bulldozed in the desert—and the grid of the photographic format reinforced by either placement on a gallery wall or within a book that is a codex of grids—is a many-layered analog for the cartographic imperative exercised by humans in the world’s deserts over millennia. The results are reminiscent of the work of the Italian aerial photographer Mario Giacomelli, who in the 1970s began to fly over and photograph his native region of Senigallia. At first intrigued by the patterns made by farmers working their fields, he then took to plowing the land himself in order to make the patterns more interesting, and then, finally, scratching directly on the negatives, as if to reveal some pattern on the Earth that was otherwise undetectable.

Scale and gridding also help create anonymity. You can zoom down on your laptop at home with Google Earth to high-resolution images of Dugway and trace the grids, the 11,000-foot-long runway, the parking lots of the West Desert Test Center, the ninety-one artillery firing points, and the CB labs—and you won’t discover anything useful, any more than you would peering at the roof of Switch’s data centers. As with Land Art, examining an aerial image can only convey so much information and is not to be confused with actually experiencing the art, or the place. The grid’s very usefulness as a neutral mathematical device goes only so far in promoting knowledge, and an unrealized 1968 proposal by early conceptual artist Adrian Piper acknowledged this.

In *Parallel Grid Proposal for Dugway Proving Ground Headquarters* Piper sketched a steel armature with 5,280 square feet of surface that was 1,320 feet high, and that would have been suspended 1,320 feet above the ground on I-beams. The one-mile by quarter-of-a-mile object, a maximalist work of minimalism, would have cast a moving set of shadows over the stationary grid of the base and most of the town. It can be read as if it were a sly critique of target grids, and was an unusual injection of politics into the

otherwise aggressively neutral aesthetic stance of earthworks at the time.

All this being said—the history of acquiring silence by virtue of distance, geomorphology, scale, and our assumptions about the grid—there are still intellectual and emotive understandings of secret sites that photography can acquire on our behalf. The aerial photographs of the Nevada Test Site by David Maisel’s mentor at Princeton, Emmet Gowin, for example, reveal no secrets, yet they uncover the geometry of both above- and below-ground nuclear testing, and the transformation of an already unfamiliar landscape into an alienscape.

The long-distance photographs of off-limits military installations by Trevor Paglen furnish another example. Paglen is not so much concerned with “evidentiary material” in his images of Area 51, Dugway, and other unapproachable subjects, as he is with evoking what we don’t know about them. He is often forced to shoot across buffer zones, those moats of silence that can be as deep as twenty miles or more. Although he uses catadioptric telescopes as his lenses—the powerful instruments frequently chosen by astrophotographers to capture images of planets and faraway galaxies—he eschews attaching the image stabilizers often found in association with such optics. He doesn’t want to clean out the visual noise, the heat waves and shimmer of atmospheric distortion, instead letting much of what he’s photographing remain deliberately obscure. He wants us to know what we don’t know, and to be uneasy about it, to question the value of the secrecy.

Other photographers have worked the edge of the visible along the horizon of military deployments, such as French artist Sophie Ristelhueber, whose seventy-one color photographs in her series *Fait* were created seven months after the Kuwait War. Ristelhueber, who has also worked in other Middle East war sites since 1984, such as Lebanon and Iraq, photographed bomb craters and other traces left on the land by the first Gulf War, interested in the “fact” that something happened, but more intrigued by the fact that we also can’t see it directly. Everything is implied. The contemporary artists who work over military sites are turning the tables. Earlier artists, such as Edward Steichen and Beaumont Newhall, worked in military photoreconnaissance in WWII, while Margaret Bourke-White flew with Allied bombers over northern Italy, actually managing to capture plumes from bombs exploding on the ground far below. The two men were serving the war effort, and Bourke-White documenting the results, the bombing guided by the aerial photographs.

The work was all about what you could see, what you could discern through photography in order to prosecute the war. Ristelhueber, Paglen, and Maisel, on the other hand, are photographing the boundaries of what we can’t see, in order to question what we’re doing.

Maisel questions the validity of those in power keeping secrets from civilians, but he is also concerned with the assumptions we have about the structure of power and how we organize visual knowledge. This has been a hallmark of his work, whether photographing the exquisite coloration of chemical ponds in the Great Salt Lake and Owens Dry Lake, or the sublime grid of the Los Angeles Basin. The panoptic aerial view

has gradually grown more ubiquitous over time, starting with Leonardo da Vinci's 1502 town plan of Imola, Italy, an almost perfectly imagined and then painted depiction of an Italian town from the air made centuries before we would have the ability to fly. Because we take aerial photographs to be a God's view—comprehensive and objective, all-seeing—we don't question what we're shown. By overprinting his own grid upon that of the military's, both of which are ruled over pre-existing land forms, Maisel makes sure that we are aware of the tendency of human vision to totalize our understanding of a place from an aerial perspective. He makes us consciously question our assumption that we know everything about a location by our ability to map a grid atop it, and to fix an image of it in time. He reminds us that both maps and photographs—even aerial ones—have subjective frames, and that grids themselves, albeit mathematical, are created through the exercise of multiple decisions and choices.

In turn, Maisel's photographs are both revealing and opaque, showing us what is at Dugway, but also demonstrating that they are limited by what he was allowed to photograph, as well as what it is possible for a photograph to capture. They thus serve as a metaphor for the nature of secrecy, misdirection, surveillance, and all the related measures and methods that surround military installations in the desert. His photographs embody that steep contradiction inherent use of deserts, which we treat as places where we go to have a revelation as well as to conceal ourselves.

In arid lands we especially assume that we are perceiving the ground truth of the planet, the bones laid bare. Deserts are where we go to experience God, find ourselves or cosmic enlightenment, and take the measure of myth. We thus assume that what we see in the desert has a special relationship to truth, when in fact the opposite may be true. It is not just heat mirages that distort reality—that supposed pool of water floating just ahead of you on the road, or off on the playa in the mid-distance, which is really just a thermal discontinuity between air and surface. Our sense of distance and scale are radically off, in part because of those clear vistas, no tree limbs against which to measure the lengths of our own limbs: cars look like soda cans, beer cans look like trucks. And the color shift over distance is all wrong, not turning blue fast enough, which leads us to think mountains are much closer than they really are. Hikers in Death Valley die from that miscalculation on a regular basis. Veracity can be difficult to come by in the desert, whether physical or historical, and even as Maisel's photographs show us a world we've never seen before, they remind us of how much we fail to see, and how we underestimate what we do perceive.

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