NOWHERE TO BE SEEN

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War is a shaper of landscapes. Its effects span all spatial scales, at every stage of the weapons-production process, from industrial extraction and chemical manufacturing to the damage done by machine guns and aerial explosives.

War leaves residues. It creates traces. Even today on the beaches of Normandy, more than seven decades after the D-Day invasion, as much as 4 percent of the sand is, in fact, shrapnel. Destroyed war materiel has been eroding there, year after year, abraded by the waves and weather, forming tiny metallic spheres clearly visible under a microscope. The sand washing over your feet, in other words, is also the grit of WWII weapons.

War remains. War lasts. War has spatial consequences, we might say—yet it also has spatial prerequisites. That is, war relies on other, earlier landscapes—sites of weapons design, production, and testing—whose products go on to influence the size, shape, and location of future battlefields, from the dimensions of their craters to the geometry of their ruins.

These proving grounds—or landscapes ***before*** the war—are sites of dark creativity, used by militaries for designing their wars to come.

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Dugway Proving Ground is a US Army facility located in the Utah desert approximately eighty-five miles southwest of Salt Lake City. The construction of Dugway began in the spring of 1942, and the facility's purpose, from the very beginning, was to serve as a new center for military research into the effects of biological and chemical weapons. It was where the pure destructive value of those otherworldly munitions could be proven.

As journalist Tom Vanderbilt explains in his book ***Survival City: Adventures Among the Ruins of Atomic America***, "the very idea of a 'proving ground' is indicative of the shift modern war had taken: Weapons had become so destructive, so unspeakably terrible, that even their speculative deployment required virtual states unto themselves."

In its present form, Dugway covers nearly 800,000 acres, making it larger than the US state of Rhode Island. Despite its size, Dugway remains all but invisible: not only is it located, by necessity, in an extremely remote part of the country—a site that was even more remote at the time of its initial construction—but it is only rarely discussed in the media. As such, Dugway remains little known outside military circles. When journalists write about Dugway today, it is usually because something has gone wrong there. If Dugway Proving Ground has anything resembling a claim to fame, it is that, beginning in 1943, it became host to a series of full-scale simulated villages built to resemble German

towns and Japanese cities. Working with celebrated modernist architects, including Erich Mendelsohn, Konrad Wachsmann, and Antonín Raymond, the Army designed and constructed architectural replicas of urban targets that the US and its Allies would soon attack.

Despite the fact that they were, in effect, just stage sets constructed in the middle of the Utah desert, the resulting buildings were representationally accurate to an astonishing degree. Their fidelity to the source material—the German and Japanese targets that were scheduled for obliteration by aerial bombardment—extended even to their internal furnishings.

These had been meticulously produced in collaboration with RKO Pictures' Authenticity Division in Hollywood. The roofing materials, the internal dividing walls, the floors and ceilings, even the standard dimensions for structures of this type, from the height of their bedrooms to the distance between adjacent buildings, were all chosen to be as close as possible to the real thing.

These extreme levels of care and attention were not applied merely for the sake of artistic precision. The architects' commitment to detail meant that, when these proxies were bombed from above, the resulting firestorms could be studied for their battlefield effectiveness. The US was not just designing a simulated city; it was designing a simulated city so that it could produce better weapons for destroying the real thing. These were painstakingly detailed models of the world built for no other reason than to be shattered.

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The engineers at Dugway have yet to lose this appetite for experimentation. Without being told the full implications of what they were involved in, for example, Dugway employees in the late 1950s and '60s were asked to participate in live biowarfare exercises involving mosquitoes infected with encephalitis.

According to later-declassified Army documents, dense with calculations and numerical tables, these sorts of tests were legion. In what became known as Project Bellwether-I, ten men were seated on the outer perimeter of a circle thirty feet in diameter. "They were shirtless under the hot sun," author Chip Ward wrote in his 1999 book *Canaries on the Rim*, "but that was necessary. When the scientists released the mosquitoes, the men were told to stand still and wait to be bitten." There were two other circles of the same size nearby, populated by "traps" baited with guinea pigs. Ambient wind speed and other atmospheric conditions were carefully tracked. Precisely one hundred *Aedes aegypti* mosquitoes were then released at the center of each circle and the insects were given thirty minutes to find their quarry. The soldiers were asked to note exactly where and how the mosquitoes bit them. Was it on the sunny side or the shady side of their bodies? Was it beneath their clothing or on exposed flesh? How did their skin react?

In other experiments at Dugway, confined animals were systematically bombed with nerve gas. In yet others, atmospherically released chemical agents inadvertently got

“sucked into a storm cell,” Ward explains. These experimental munitions later “rained out downwind” in a place appropriately known as Skull Valley. Entire herds of sheep were annihilated. Anecdotal evidence suggests that many families in the region were also affected; as several aging residents explained to Utah’s ***Deseret News*** in February 2001, the Skull Valley incident led them to suffer through six-month- long headaches, chronic hair loss, and even brain cancer. This is still not the end of a long list of macabre tests that occurred on this remote military base. Hand grenades packed with radioactive dust were exploded at Dugway to measure and map the resulting contamination. Undulant fever, a form of brucellosis, was released from airplanes, the germs often blowing onto civilian areas with no warning. Perhaps most shocking of all, the US Air Force “conducted what amounted to eight intentional meltdowns of small nuclear reactors in the Utah desert in 1959,” the ***Deseret News*** reported in 1994. These deliberate meltdowns produced clouds of radiation that drifted far beyond the confines of Dugway, possibly directly through the neighboring towns of Knolls and Wendover. “The total amount of radiation released by the tests was 14 times more than the infamous Three Mile Island reactor accident,” the newspaper adds.

What locals thought was actually happening at Dugway— this exotic base hidden by intermediary mountain ranges, subject to dark rumors and urban legends, but a source of steady employment for so many—remains hard to judge. As one resident said to the ***Deseret News***, with characteristically conservative understatement, “It makes you wonder what all did happen out there.”

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While Dugway’s current incarnation lacks the architectural delicacy of its twentieth-century past, the use of simulated environments for testing toxic compounds and other cutting-edge weapons systems has continued. On the one hand, there is a place known as “Mustang Village,” described in Dugway’s promotional literature as a “Realistic Surrounding for Realistic Scenarios.” In truth, it is just a cluster of low-slung structures made of cinderblock and vinyl siding; taken together, these buildings resemble a townscape only in the loosest possible sense.

On the other hand, however, there is the entire landscape of Dugway Proving Ground: a state-sized terrain transformed into an abstract tool for measuring the effects of weapons. Looking down at Dugway from above reveals vast targeting grids laid out across the landscape. There are tight grids, broad grids, irregular grids. Taken out of context, these might suggest some terrible parallel world in which twentieth- century artistic minimalism has been taken to a violent extreme, as if the elegant line drawings of Agnes Martin had somehow been blown up to the scale of a military testing range. Huge shapes are plowed into the ground, converging on circular gas-dispersal towers that resemble nothing so much as Stonehenge. In other sites, oversized Xs appear, inscribed into the planet like primordial sigils aching to be interpreted, appearing one after another in horizon- defying lines; they mark spots meant for targeting by artillery calculations.

These are landscapes designed to be destroyed, to be sure, but they are also meant

to be seen and contemplated by military engineers, every point and line mathematically analyzed. In many cases, the terrain itself is literally a measuring tool, these grids laid out to mark the furthest possible point reached by test clouds of smoke and other strategic chemical "obscurants." Consider, for example, a September 2015 test-event known as Jack Rabbit II, in which a ten-ton cloud of chlorine gas was released into the environment, mimicking an industrial accident or terrorist attack. (Its predecessor, Jack Rabbit I, took place in 2010.) The chlorine's "greenish yellow cloud moved across the bare earth," the Army reported, as if describing a Biblical vision, passing "around shipping containers arranged to replicate an urban array of buildings." Given no explanation, however, the test could easily have been mistaken for a work of contemporary Land Art: unnatural, colored clouds generated in the middle of nowhere flowing slowly down the empty streets of a simulated city.

The Jack Rabbit tests are just one example of what the Army calls, in the peculiar majesty of military-speak, ***operational meteorology***. This includes the study of gas dispersal in the event of a chemical weapons attack. Philosopher Peter Sloterdijk has his own, arguably more fitting term for this, however. In his book ***Terror From The Air***; Sloterdijk refers to what he calls "black meteorology," or research into how atmospheric conditions can be coopted to wage war. The purpose of Sloterdijk's slender book is to redefine chemical warfare. For Sloterdijk, the use of chemical weapons should be thought of as the temporary creation of an environment within which life itself is impossible.

A chemical weapon is thus similar to introducing the atmosphere of another planet here on Earth, he suggests, one in which terrestrial organisms can no longer survive. The slow but relentless fogs of Dugway, seen through Sloterdijk's eyes, appear as unearthly glimpses of another, abiotic world, one that temporarily—terrifyingly—coexists with our own. They represent the replacement of the Earth's biosphere with a temporary space of universal extermination.

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In May 2015, it was discovered that researchers at Dugway had inadvertently been shipping live anthrax samples to laboratories around the world for the better part of a decade. By year's end, the Department of Defense (DOD) had released a report explaining that "194 laboratories in all 50 states and 9 foreign countries had received low concentrations of anthrax in samples sent by Dugway Proving Ground." Worse, many of the labs those samples had been sent to did not have the proper equipment in place, let alone the institutional organization, to handle live anthrax.

While this might not inspire confidence in the base's ability to process and treat biological agents, the Army's response, at least, was transparent; within days, the Centers for Disease Control and Prevention (CDC) had sent investigators to Dugway to determine exactly what had happened and to gauge the extent of the hazard. At a public hearing held later that summer, Deputy Defense Secretary Robert O. Work described the incident as "a massive institutional failure," adding that the DOD would now take steps "swiftly and comprehensively to ensure that a failure of this sort never

happens again..... The American public expects much more from us," Work admitted, "and we should expect much more from ourselves."

Writing for ***National Geographic*** in May 2016, medical journalist Maryn McKenna pointed out that many scientists remain unconvinced that things would actually change. They are worried, she writes, that "the DOD commitment does not go far enough. That view is backed up by a Government Accountability Office report published [in April 2016] that criticizes all eight federal departments that operate high- containment laboratories managing hazardous organisms. The report says the agencies are not training personnel adequately, not inspecting labs, and not reporting the results of their inspections."

The colonel in charge of overseeing not just Dugway's laboratory activities but also these international shipments was not fired. He was promoted: Colonel William E. King IV is now Brigadier General William E. King IV. In an unclassified US Army Investigation Report entitled "Individual and Institutional Accountability for the Shipment of Viable *Bacillus anthracis* from Dugway Proving Ground," it specifically recommends that King "should be held accountable for [his] failure to take action." King "failed to conduct internal reviews to improve the operations of [Dugway Proving Ground] and prevent future incidents. This indicates a lack of introspection and leadership expected from senior personnel. It should also be noted that during his command, Colonel King repeatedly deflected blame and minimized the severity of incidents." It is worth pausing to note what Brigadier General King's new job actually is, now that he has left Dugway. King has been made head of the US Army's 20th Chemical, Biological, Radiological, Nuclear, and Explosives Command, or CBRNE. Among other responsibilities, CBRNE oversees the shipping and storage of chemical, biological, and radiological materials—including fully functional nuclear weapons—on US bases around the world.

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In September 2014, nearly a full year before the public revelation of these anthrax shipments, photographer David Maisel secured rare permission to travel to and document Dugway Proving Ground. Maisel arrived there on the occasion of what amounted to a military trade show, known as the "S/K Challenge," where "S/K" stands for ***Sophos Kydoimos***. The Army helpfully translates this as, "Ancient Greek for 'Wisdom over the din of battle.'" Given closely chaperoned access to facilities throughout Dugway, as well as to the base's heavily restricted airspace, Maisel was able to see a range of different structures. In his time there, he photographed seemingly abandoned gantries from which contagions once bloomed, as well as a white-roofed targeting structure inhabited only by spiders. Along with aerial views of test fields, grids, and other ballistic geometries, he encountered on an entirely different scale the machinery of biological weapons testing and mitigation. This included the Whole System Live Agent Test (WSLAT) Chamber, lying inactive before its next impending phase of use.

The architecture of these facilities is one of isolation and quarantine, of controlled encounters and indirect exposure, where scientists interact with materials whose escape could mean imminent death, like an esoteric desert religion obsessed with the

end of days. Hermetic environments, ritualistically manipulated by way of biosafety gloves, stood alone inside cavernous interiors. Normally, these gloves would be attached to positively air-pressurized body suits, as an extra level of protection for working with lethal compounds, but, that day, they hung limply in the harsh light, like dozens of empty prostheses awaiting some multi-limbed inhuman user. There were mazes of carefully sealed valves and gaskets only one mistake away from opening.

Maisel's move to document military proving grounds is a logical next step for an artist already widely known for his explorations of damaged landscapes—terrains ravaged by drought, mining, construction, and deforestation. Indeed, an aura of creeping apocalypse surrounds the resulting photographs, not in their composition but inherent in the materials themselves. Each weapons test, each measured release, each chemical plume is a controlled glimpse of the end of our world and the temporary introduction of a less beneficent one. These weapons are destroyers of worlds— but also remakers of them.

As depicted in Maisel's work, Dugway's interior and exterior spaces suggest a heavily designed encounter with substances we do not fully understand, dormant materials we should perhaps think twice about before reawakening. Whether in the form of empty test-grids and abstract geoglyphs through which clouds of chlorine gas will soon drift, the nested circles of chemical-release platforms, or uncanny laboratories built for neutralizing biological threats and decontaminating battlefield materials, Dugway becomes a place of approach and proximity, a knot where our world brushes against another. Perhaps the strangest thing Maisel has revealed, however, is that the spatial side effects of military research and testing are no less powerful for the absence of actual weapons. The munitions themselves, in other words, are nowhere to be seen. There are craters, to be sure. There is disfigurement and deformation. There is a signature of violence everywhere. But these weapons' real magic happens when they make themselves disappear, in otherworldly acts of dispersal and detonation. It's what their passing has done here that creates such visible scars, remaking these grounds so brutally proven by testing.