

# NEW LEFT REVIEW

New Left Review I/200, July-August 1993

MIKE DAVIS

## THE DEAD WEST: ECOCIDE IN MARLBORO COUNTRY

Was the Cold War the Earth's worst eco-disaster in the last ten thousand years? The time has come to weigh the environmental costs of the great 'twilight struggle' and its attendant nuclear arms race. Until recently, most ecologists have tended to underestimate the impacts of warfare and arms production on natural history. [1] Yet there is implacable evidence that huge areas of Eurasia and North America, particularly the militarized deserts of Central Asia and the Great Basin, have become unfit for human habitation, perhaps for thousands of years, as a direct result of weapons testing (conventional, nuclear and biological) by the Soviet Union, China and the United States.

These 'national sacrifice zones', [2] now barely recognizable as parts of the biosphere, are also the homelands of indigenous cultures (Kazakh, Paiute, Shoshone, among others) who themselves may have suffered irreparable genetic damage. Millions of others—soldiers, armament workers, and 'downwind' civilians—have become the silent casualties of atomic plagues. If, at the end of the old superpower era, a global nuclear apocalypse was finally averted, it was only at the cost of these secret holocausts. [3]

### 1. Secret Holocausts

This hidden history has come unravelled most dramatically in the ex-Soviet Union where environmental and anti-nuclear activism, first stimulated by Chernobyl in 1986, emerged massively during the crisis of 1990–91. Grassroots protests by miners, schoolchildren, health-care workers and indigenous peoples forced official disclosures that confirmed the sensational accusations by earlier *samizdat* writers like Zhores Medvedev and Boris Komarov (Ze'ev Wolfson). *Izvestiya* finally printed chilling accounts of the 1957 nuclear catastrophe in the secret military city of Chelyabinsk-40, as well as the poisoning of Lake Baikal by a military factory complex. Even the glacial wall of silence around radiation accidents at the Semipalatinsk 'Polygon', the chief Soviet nuclear test range in Kazakhstan, began to melt. [4]

As a result, the (ex-)Soviet public now has a more ample and honest view than their American or British counterparts of the ecological and human costs of the Cold War. Indeed, the Russian Academy of Sciences has compiled an extraordinary map that shows environmental degradation of 'irreparable, catastrophic proportions' in forty-five different areas, comprising no less than 3.3 per cent of the surface area of the former ussr. Not surprisingly, much of the devastation is concentrated in those parts of the southern Urals and Central Asia that

were the geographical core of the ussr's nuclear military-industrial complex. [5]

Veteran kremlinologists, in slightly uncomfortable green disguises, have fastened on these revelations to write scathing epitaphs for the ussr. According to Radio Liberty and Rand researcher D.J. Peterson, 'the destruction of nature had come to serve as a solemn metaphor for the decline of a nation'. [6] For Lord Carrington's ex-advisor Murray Feshbach, and his literary sidekick Al Friendly (ex-*Newsweek* bureau chief in Moscow), on the other hand, the relationship between ecological cataclysm and the disintegration of the ussr is more than metaphor: 'When historians finally conduct an autopsy on the Soviet Union and Soviet Communism, they may reach the verdict of death by ecocide.' [7]

Peterson's *Troubled Lands* and, especially, Feshbach and Friendly's *Ecocide in the ussr* have received spectacular publicity in the American media. Exploiting the new, uncensored wealth of Russian-language sources, they describe an environmental crisis of biblical proportions. The former Land of the Soviets is portrayed as a dystopia of polluted lakes, poisoned crops, toxic cities and sick children. What Stalinist heavy industry and mindless cotton monoculture have not ruined, the Soviet military has managed to bomb or irradiate. For Peterson, this 'ecological terrorism' is conclusive proof of the irrationality of a society lacking a market mechanism to properly 'value' nature. Weighing the chances of any environmental clean-up, he holds out only the grim hope that economic collapse and radical de-industrialization may rid Russia and the Ukraine of their worst polluters. [8]

Pentagon eco-freaks Feshbach and Friendly are even more unsparing. Bolshevism, it seems, has been a deliberate conspiracy against Gaia, as well as against humanity. 'Ecocide in the ussr stems from the force, not the failure, of utopian ambitions.' It is the 'ultimate expression of the Revolution's physical and spiritual brutality'. With Old Testament righteousness, they repeat the opinion that 'there is no worse ecological situation on the planet'. [9]

Obviously Feshbach and Friendly have never been to Nevada or western Utah. [10] The environmental horrors of Chelyabinsk-40 and the Semipalatinsk Polygon have their eerie counterparts in the poisoned, terminal landscapes of Marlboro Country.

## 2. Misrach's Inferno

A horse head extrudes from a haphazardly bulldozed mass grave. A dead colt—its forelegs raised gracefully as in a gallop—lies in the hopeless embrace of its mother. Pale, leukemic tumbleweed are strewn randomly atop a bloated, tangled pyramid of rotting cattle, sheep, horses and wild mustangs. Inflated by decay, the whole cadaverous mass seems to be struggling to rise. A Minoan bull pokes its eyeless head from the sand. A weird, almost Jurassic skeleton—except for a hoof, it might be the remains of a pterosaur—is sprawled next to a rusty pool of unspeakable vileness. The desert reeks of putrefication.

Photographer Richard Misrach shot this sequence of 8 × 10 colour photographs in 1985–87 at dead-animal disposal sites located near reputed plutonium 'hot spots' and military toxic dumps in Nevada. As a short text explains, it is commonplace for local livestock to die mysteriously, or give birth to monstrous offspring. Ranchers are officially encouraged to dump the cadavers, no questions asked, in unmarked, county-run pits. Misrach originally heard of this 'Bosch-like' landscape from a Paiute poet. When he asked for directions, he was advised to simply drive into the desert and watch for tell-tale flocks of crows. The carrion birds feast on the eyes of dead livestock. [11]



Dead Animals # 327, Richard Mirrach, 1987 (Courtesy Fraenkel Gallery)

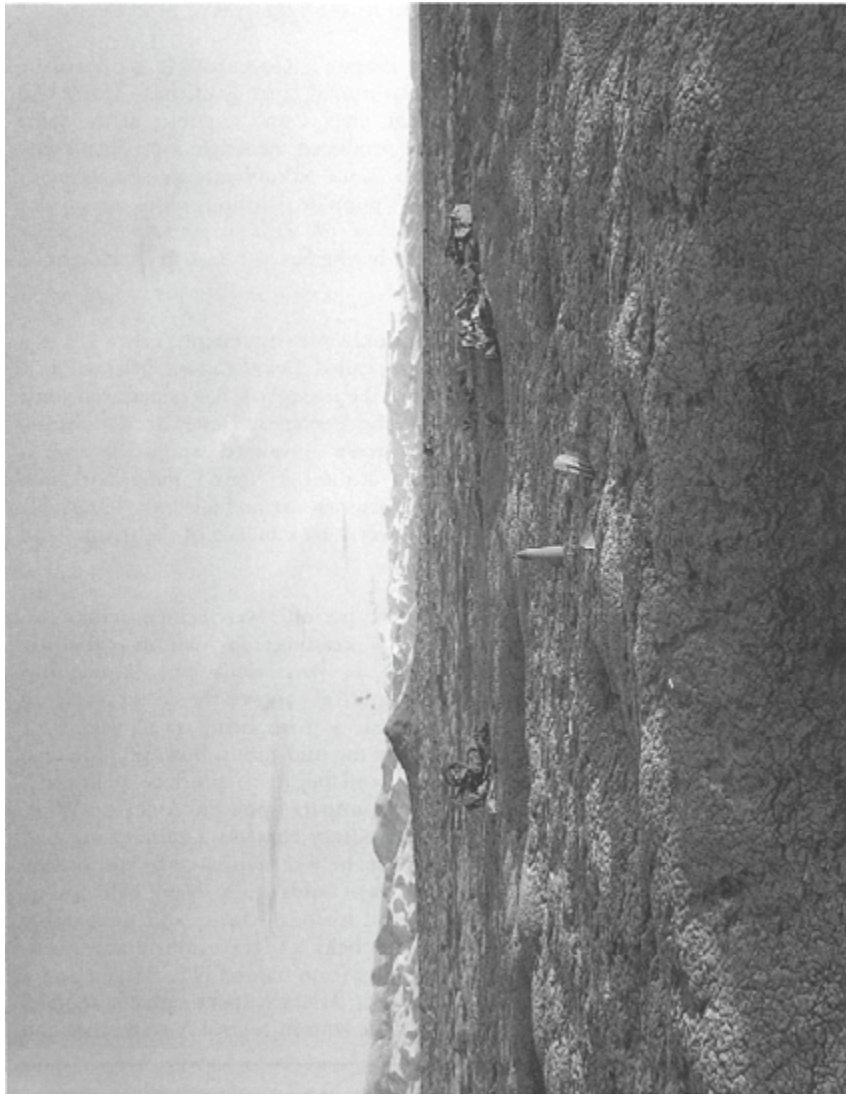
'The Pit' has been compared to Picasso's 'Guernica'. It is certainly a nightmare reconfiguration of traditional cowboy clichés. The lavish photographs are deeply repellent, elegiac and hypnotic at the same time. Indeed Mirrach may have produced the single most disturbing image of the American West since ethnologist James Mooney countered Frederick Remington's popular paintings of heroic cavalry charges with stark photographs of the frozen corpses of Indian women and children slaughtered by the Seventh Cavalry's Hotchkiss guns at Wounded Knee in 1890. [12]

But this holocaust of the beasts is only one instalment ('canto vi') in a huge mural of forbidden visions called *Desert Cantos*. Mirrach is a connoisseur of trespass who, since the late 1970s, has penetrated some of the most secretive spaces of the Pentagon Desert in California, Nevada and Utah. Each of his fourteen completed cantos (the work is still in progress) builds drama around a 'found metaphor' that dissolves the boundary between documentary and allegory. Invariably there is an unsettling tension between the violence of the images and the elegance of their composition.

The earliest cantos (his 'desert noir' period?) were self-conscious aesthetic experiments influenced by readings in various cabalistic sources. Characteristically, they are mysterious phantasmagorias detached from any explicit socio-political context: the desert on fire, a drowned gazebo in the Salton Sea, a palm being swallowed by a

sinister sand dune, and so on. [13] By the mid 1980s, however, Misrach put aside Blake and Casteneda, and began to produce politically-engaged exposés of the Cold War's impact upon the American West. Focusing on Nevada, where the military controls 4 million acres of land and 70 per cent of the airspace, he was fascinated by the strange stories told by angry ranchers: 'night raids . . . by Navy helicopters, laser-burned cows, the bombing of historic towns, and unbearable supersonic flights . . .'. With the help of two improbable anti-Pentagon activists, a small-town physician named Doc Borgen and a gritty bush pilot named Dick Holmes, Misrach spent eighteen months photographing a huge tract of public land in central Nevada that had been bombed, illegally and continuously, for almost forty years. To the Navy this landscape of almost incomprehensible devastation, sown with live ammo and unexploded warheads, is simply 'Bravo 20'. To Misrach, on the other hand, it is 'the epicenter . . . the heart of the apocalypse':

It was the most graphically ravaged environment I had ever seen . . . I wandered for hours amongst the craters. There were thousands of them. Some were small, shallow pits the size of a bathtub, others were gargantuan excavations as large as a suburban two-car garage. Some were bone dry, with walls of 'traumatized earth' splatterings, others were eerie pools of blood-red or emerald-green water. Some had crystallized into strange salt formations. Some were decorated with the remains of blown-up jeeps, tanks, and trucks. [14]



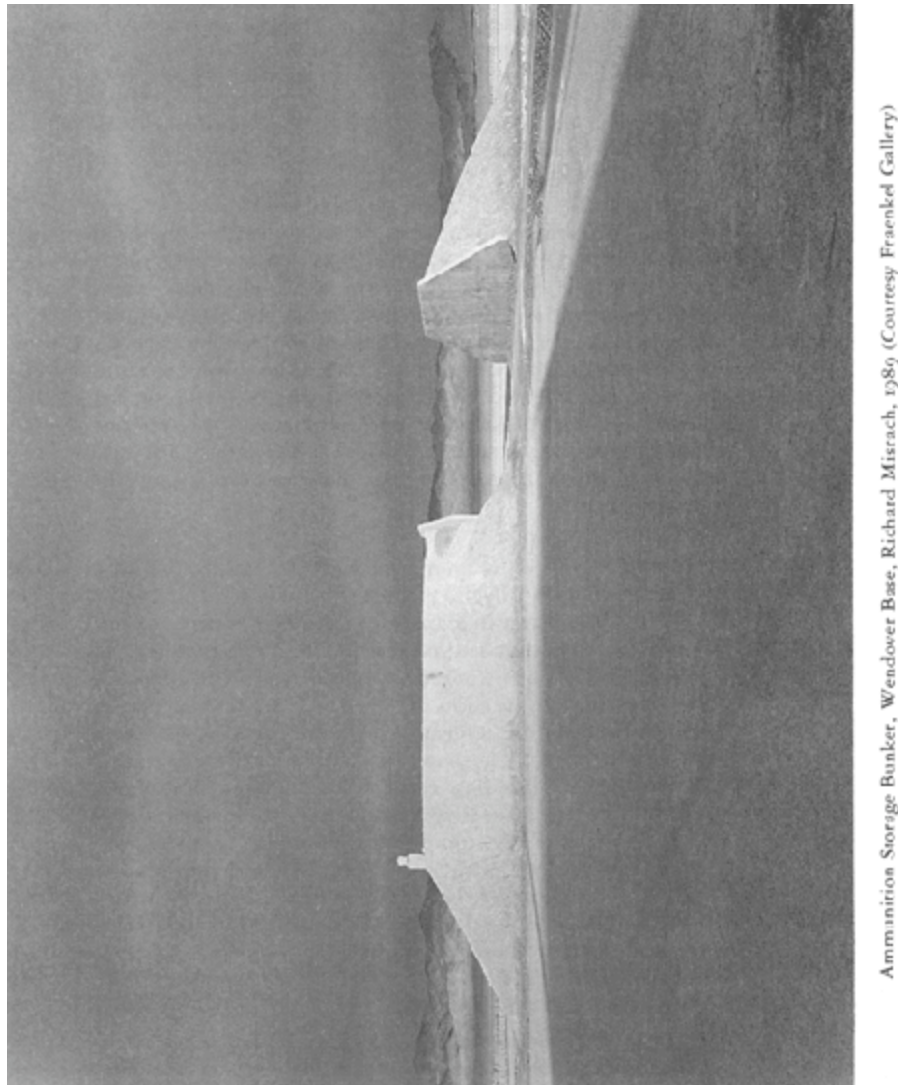
Bombs, Destroyed Vehicles and Lone Rock, 1987 (© Richard Misrach, 1987)

Although Misrach's photographs of the pulverized public domain, published in 1990, riveted national attention on the bombing of the West, it was a bitter-sweet achievement. His pilot friend Dick Holmes, whom he had photographed raising the American flag over a lunarized hill in a delicious parody on the Apollo astronauts, was killed in an inexplicable plane crash. The Bush administration, meanwhile, accelerated the modernization of bombing ranges in Nevada, Utah and Idaho. Huge swathes of the remote West, including Bravo 20, have been updated as electronically-scored, multi-target grids which, from space, must now look like a single Pentagon video-gameboard.

In his most recent collection of cantos, *Violent Legacies* (which includes 'The Pit'), Misrach offers a haunting, visual archeology of 'Project W-47', the super-secret final assembly and flight testing of the bombs dropped on Hiroshima and Nagasaki. The hangar which housed the *Enola Gay* still stands (indeed, a sign warns: 'Use of deadly force authorized') amidst the ruins of Wendover Air Base in the Great Salt Desert of Utah. In the context of incipient genocide, the fossil flight-crew humour of 1945 is unnerving. Thus a fading slogan over the a-bomb assembly building reads 'Blood, Sweat and Beers', while graffiti on the administrative headquarters commands 'Eat My Fallout'. The rest of the base complex, including the atomic bomb storage bunkers and loading pits, has eroded into megalithic abstractions that evoke the ground-zero helter-skelter of J.G. Ballard's famous short-story, 'The Terminal Beach'. Outlined against ochre desert mountains (the Newfoundland Range, I believe), the forgotten architecture and casual detritus of the first nuclear war are almost beautiful. [15]

In cultivating a neo-pictorialist style, Misrach plays subtle tricks on the sublime. He can look Kurz's Horror straight in the face and make a picture postcard of it. This attention to the aesthetics of murder infuriates some partisans of traditional black-and-white political documentarism, but it also explains Misrach's extraordinary popularity. He reveals the terrible, hypnotizing beauty of Nature in its death-throes, of Landscape as Inferno. We have no choice but to look.





Ammunition Storage Bunker, Wendover Base, Richard Misrach, 1989 (Courtesy Fraenkel Gallery)

If there is little precedent for this in previous photography of the American West, it has a rich resonance in contemporary—especially Latin American—political fiction. Discussing the role of folk apocalypticism in the novels of García Márquez and Carlos Fuentes, Lois Zamora inadvertently supplies an apt characterization of *Desert Cantos*:

The literary devices of biblical apocalypse and magical realism coincide in their hyperbolic narration and in their *surreal images of utter chaos and unutterable perfection*. And in both cases, [this] surrealism is not principally conceived for psychological effect, as in earlier European examples of the mode, but is instead grounded in social and political realities and is designed to communicate the writers' objections to those realities. [16]

### 3. Resurveying the West

Just as Márquez and Fuentes, then, have led us through the hallucinatory labyrinth of modern Latin American history, so Misrach has become an indefatigable tour guide to the Apocalyptic Kingdom that the Department of Defense has built in the desert West. His vision is singular, yet, at the same time, *Desert Cantos* claims charter membership in a broader movement of politicized Western landscape photography that has made the destruction

of nature its dominant theme.

Its separate detachments over the last fifteen years have included, first, the so-called *New Topographics* in the mid 1970s (Lewis Baltz, Robert Adams and Joel Deal), [17] closely followed by the *Rephotographic Survey Project* (Mark Klett and colleagues), [18] and, then, in 1987, by the explicitly activist *Atomic Photographers Guild* (Robert Del Tredici, Carole Gallagher, Peter Goin, Patrick Nagatani, and twelve others), [19] If each of these moments has had its own artistic virtue (and pretension), they share a common framework of revisionist principles.

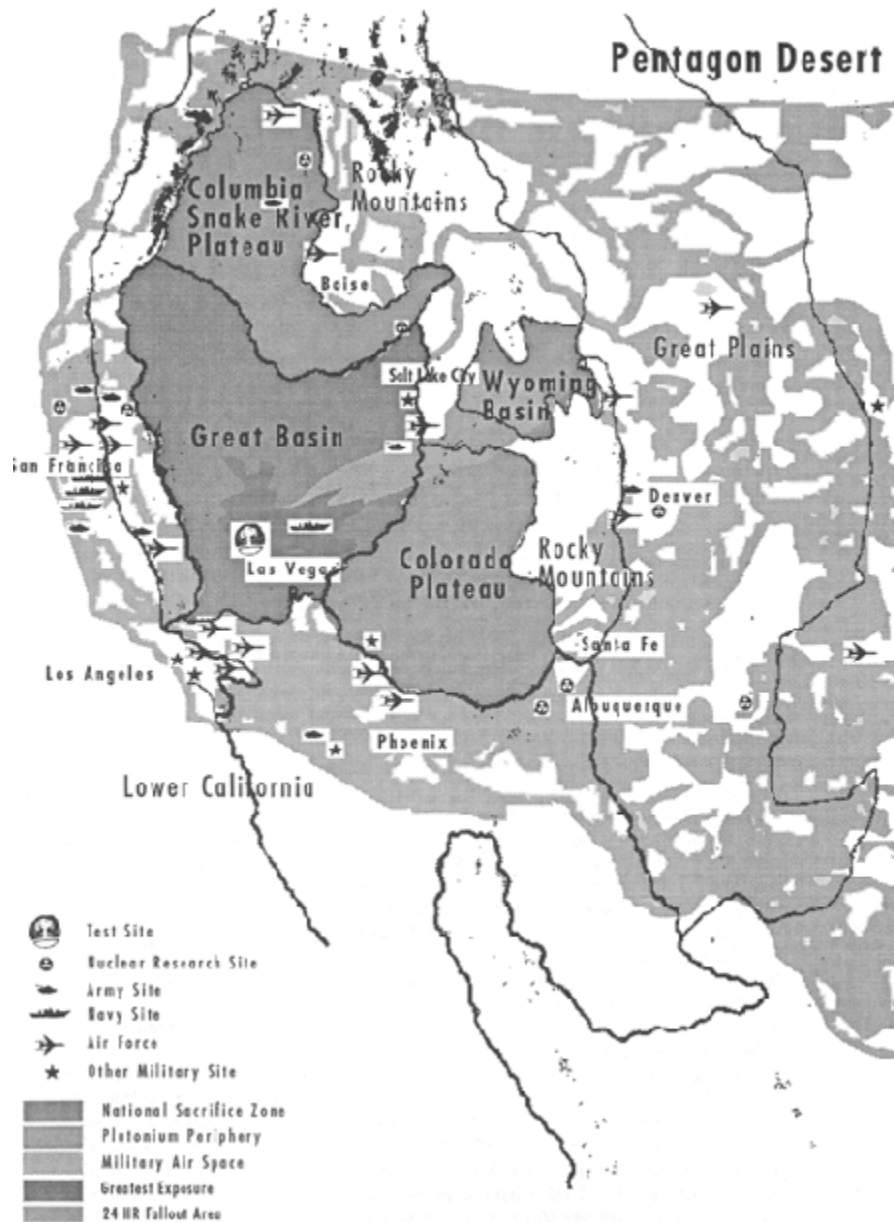
In the first place, they have mounted a frontal attack on the hegemony of Ansel Adams, the dead pope of the 'Sierra Club school' of Nature-as-God photography. Adams, if necessary, doctored his negatives to remove any evidence of human presence from his apotheosized wilderness vistas. [20] The new generation has rudely deconstructed this myth of a virginal, if imperilled nature. They have rejected Adams' Manichaen division between 'sacred' and 'profane' landscape, which 'leaves the already altered and inhabited parts of our environment dangerously open to uncontrolled exploitation'. [21] Their West, by contrast, is an irrevocably social landscape, transformed by militarism, urbanization, the interstate highway, epidemic vandalism, mass tourism, and the extractive industries' boom-and-bust cycles. Even in the 'last wild places', the remote ranges and lost box canyons, the Pentagon's jets are always overhead.

Secondly, the new generation has created an alternative iconography around such characteristic, but previously spurned or 'unphotographable' objects as industrial debris, rock graffiti, mutilated saguaros, bulldozer tracks, discarded girlie magazines, military shrapnel and dead animals. [22] Like the surrealists, they have recognized the oracular and critical potencies of the commonplace, the discarded, and the ugly. [23] But as environmentalists, they also understand the fate of the rural West as the national dumping ground.

Finally, their projects derive historical authority from a shared benchmark: the photographic archive of the great nineteenth-century scientific and topographic surveys of the intermontane West. Indeed, most of them have acknowledged the centrality of 'resurvey' as strategy or metaphor. The *New Topographers*, by their very name, declared an allegiance to the scientific detachment and geological clarity of Timothy O'Sullivan (famed photographer for Clarence King's 1870s survey of Great Basin), as they turned their cameras on the suburban wastelands of the New West. The *Rephotographers* 'animated' the dislocations from past to present by painstakingly assuming the exact camera stances of their predecessors and producing the same scene a hundred years later. Meanwhile, the *Atomic Photographers*, in emulation of the old scientific surveys, have produced increasingly precise studies of the landscape tectonics of nuclear testing.

Resurvey, of course, presumes a crisis of definition, and it is interesting to speculate why the new photography, in its struggle to capture the meaning of the postmodern West, has been so obsessed with nineteenth-century images and canons. It is not because, as might otherwise be imagined, Timothy O'Sullivan and his colleagues were able to see the West pristine and unspoiled. As Klett's 'rephotographs' startlingly demonstrate, the grubby hands of manifest destiny were already all over the landscape by 1870. What was more important was the exceptional scientific and artistic integrity with which the surveys confronted landscapes that, as Jan Zita Grover suggests, were culturally 'unreadable'. [24]

The regions that today constitute the Pentagon's 'national sacrifice zone' (the Great Basin of eastern California, Nevada and western Utah) and its 'plutonium periphery' (the Columbia-Snake Plateaux, the Wyoming Basin and the Colorado Plateau) have few landscape analogues anywhere else on earth. [25] (See map.) Early accounts of the intermontane West in the 1840s and 1850s (John Fremont, Sir Richard Burton, the Pacific railroad surveys) chipped away eclectically, with little success, at the towering popular abstraction of 'the Great American Desert'. Nevada and Utah, for instance, were variously compared to Arabia, Turkestan, the Takla Makan, Timbucktoo, Australia, and so on, but in reality, Victorian minds were travelling through an essentially extraterrestrial terrain, far outside their cultural experience. [26] (Perhaps literally so, since planetary geologists now study lunar and Martian landforms by analogy with strikingly similar landscapes in the Colorado and Columbia-Snake River plateaux.) [27]



The bold stance of the survey geologists, their artists and photographers, was to face this radical 'Otherness' on its own terms. [28] Like Darwin in the Galapagos, John Wesley Powell and his colleagues (especially Clarence Dutton and the great Carl Grove Gilbert) eventually cast aside a trunkful of Victorian preconceptions in order to recognize novel forms and processes in nature. Thus Powell and Gilbert had to invent a new science, geomorphology, to explain the amazing landscape system of the Colorado Plateau where rivers were often 'antecedent' to highlands and the 'laccolithic' mountains were really impotent volcanoes. (Similarly, decades later, another quiet revolutionary in the survey tradition, Harlen Bretz, would jettison uniformitarian geological orthodoxy in order to show that cataclysmic ice-age floods were responsible for the strange 'channeled scablands' carved into the lava of the Columbia Plateau). [29]

If the surveys 'brought the strange spires, majestic cliff facades, and fabulous canyons into the realm of scientific



explanation', then (notes Gilbert's biographer), they 'also gave them a critical aesthetic meaning' through the stunning photographs, drawings and narratives that accompanied and expanded the technical reports. [30] Thus Timothy O'Sullivan (who with Mathew Brady had photographed the ranks of death at Gettysburg) abandoned the Ruskinian paradigms of nature representation to concentrate on naked, essential form in a way that presaged modernism. His 'stark planes, the seemingly two-dimensional curtain walls, [had] no immediate parallel in the history of art and photography . . . No one before had seen the wilderness in such abstract and architectural forms.' [31] Similarly Clarence Dutton, 'the *genius loci* of the Grand Canyon', created a new landscape language—also largely architectural, but sometimes phantasmagorical—to describe an unprecedented dialectics of rock, colour and light. (Stegner says he 'aestheticized geology'; perhaps, more accurately, he eroticized it.) [32]

But this convergence of science and sensibility (which has no real twentieth-century counterpart) also compelled a moral view of the environment as it was laid bare for exploitation. Setting a precedent which few of his modern descendants have had the guts to follow, Powell, the one-armed Civil War hero, laid out the political implications of the Western surveys with exacting honesty in his famous 1877 *Report on the Lands of the Arid Region*. His message, which Wallace Stegner has called 'revolutionary' (and others 'socialistic'), was that the intermontane region's only salvation was Cooperativism based on the communal management and conservation of scarce pasture and water resources. Capitalism pure and simple, Powell implied, would destroy the West. [33]

The surveys, then, were not just another episode in measuring the West for conquest and pillage; they were, rather, an autonomous moment in the history of American science when radical new perceptions temporarily created a pathway for a utopian alternative to the future that became Project w-47 and The Pit. That vantage-point is now extinct. In reclaiming this tradition, contemporary photographers have elected to fashion their own clarity without the aid of the Victorian optimism that led Powell into the chasms of the Colorado. But 'Resurvey', if a resonant slogan, is a diffuse mandate. For some it has meant little more than checking to see if the boulders have moved after a hundred years. For others, however, it has entailed perilous moral journeys deep into the interior landscapes of the Bomb.

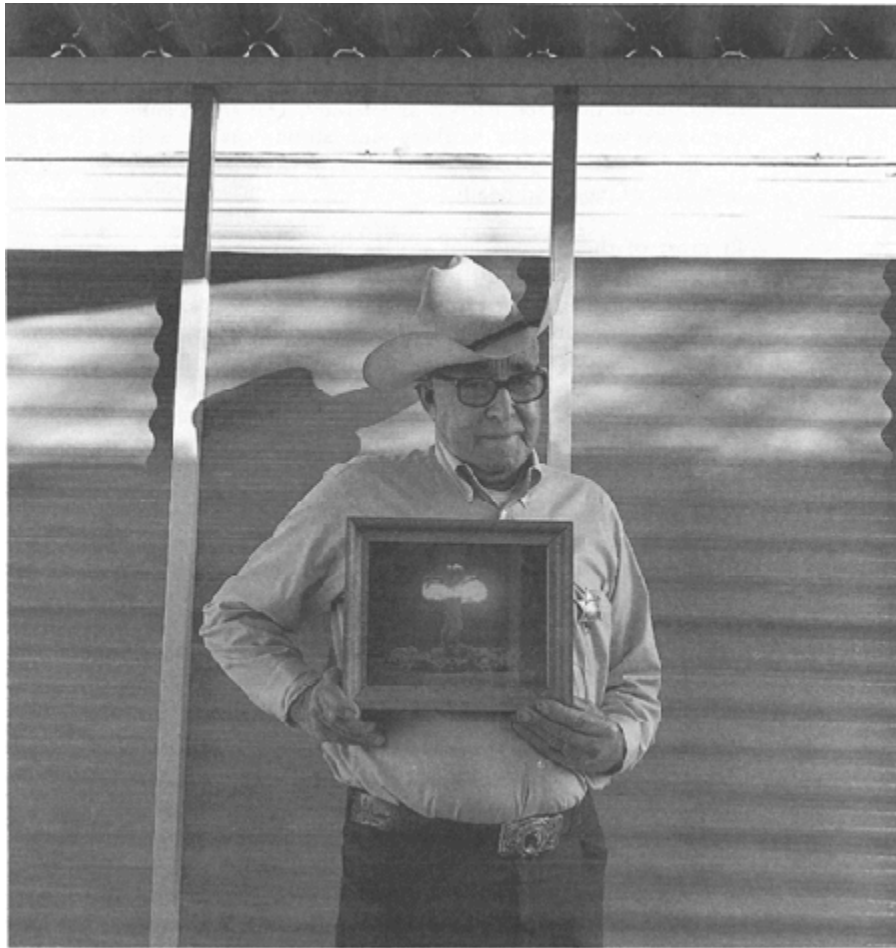
#### 4. Jellyfish Babies

If Richard Misrach has seen 'the heart of the apocalypse' at Bravo 20, Carole Gallagher has spent a decade at 'America Ground Zero' (the title of her new book) in Nevada and southwestern Utah photographing and collecting the stories of its victims. [34] She is one of the founders of the Atomic Photographers Guild, arguably the most important social-documentary collaboration since the 1930s, when Roy Stryker's Farm Security Administration Photography Unit brought together the awesome lenses of Walker Evans, Dorothea Lange, Ben Shahn, Russell Lee and Arthur Rothstein. Just as the fsa photographers dramatized the plight of the rural poor during the Depression, so the Guild has endeavoured to document the human and ecological costs of the nuclear arms race. Its accomplishments include Peter Goin's revelatory *Nuclear Landscapes* (photographed at test-sites in the American West and the Marshall Islands) and Robert Del Tredici's biting exposé of nuclear manufacture, *At Work in the Fields of the Bomb*. [35]

But it is Gallagher's work that proclaims the most explicit continuity with the fsa tradition, particularly with Dorothea Lange's classical black-and-white portraiture. Indeed she prefaces her book with a meditation on a Lange motto and incorporates some haunting Lange photographs of St. George, Utah in 1953. There is no doubt that *America Ground Zero* is intended to stand on the same shelf with such New Deal-era classics as *An American Exodus*, *Let Us Now Praise Famous Men* and *You Have Seen Their Faces*. [36] Hers, however, is a more painful book.

In the early 1980s, Gallagher moved from New York City to St. George to work full-time on her oral history of the casualties of the American nuclear test programme. Beginning with its first nuclear detonation in 1951, this small Mormon city, due east of the Nevada test-site, has been shrouded in radiation debris from scores of atmospheric and accidentally 'ventilated' underground blasts. Each lethal cloud was the equivalent of billions of x-rays and contained more radiation than was released at Chernobyl in 1988. Moreover, the Atomic Energy Commission

(aec) in the 1950s had deliberately planned for fallout to blow over the St. George region in order to avoid Las Vegas and Los Angeles. In the icy, Himmelerian jargon of a secret aec memo unearthed by Gallagher, the targeted communities were 'a low-use segment of the population'. [37]



Ken Case, the 'Atomic Cowboy', North Las Vegas (© Carol Gallagher, 1993)

As a direct result, this downwind population (exposed to the fallout equivalent of perhaps fifty Hiroshimas) is being eaten away by cumulative cancers, neurological disorders and genetic defects. Gallagher, for instance, talks about her quiet dread of going into the local k-Mart and 'seeing four- and five-year-old children wearing wigs, deathly pale and obviously in chemotherapy'. [38] But such horror has become routinized in a region where cancer is so densely clustered that virtually any resident can matter-of-factly rattle off long lists of tumorous or deceased friends and family. The eighty-some voices – former Nevada test-site workers and 'atomic gis' as well as Down-winders – that comprise *America Ground Zero* are weary with the minutiae of pain and death.

In most of these individual stories there is one single moment of recognition that distills the terror and awe of the catastrophe that has enveloped their life. For example, two military veterans of shot Hood (a 74-kiloton hydrogen bomb detonated in July 1957) recall the vision of hell they encountered in the Nevada desert:

We'd only gone a short way when one of my men said, 'Jesus Christ, look at that!' I looked where he was pointing, and what I saw horrified me. There were people in a stockade – a chain-link fence

with barbed wire on top of it. Their hair was falling out and their skin seemed to be peeling off. They were wearing blue denim trousers but no shirts . . .

I was happy, full of life before I saw that bomb, but then I understood evil and was never the same. . . I seen how the world can end. [39]

For sheep ranchers it was the unsettling spectacle they watched season after season in their lambing sheds as irradiated ewes attempted to give birth: 'Have you ever seen a five-legged lamb?' [40] For one husband, on the other hand, it was simply watching his wife wash her hair.

Four weeks after that [the atomic test] I was sittin' in the front room reading the paper and she'd gone into the bathroom to wash her hair. All at once she let out the most ungodly scream, and I run in there and there's about half her hair layin' in the washbasin! You can image a woman with beautiful, raven-black hair, so black it would glint green in the sunlight just like a raven's wing, and it was long hair down onto her shoulders. There was half of it in the basin and she was as bald as old Yul Brynner . . . [41]

Perhaps most bone-chilling, even more than the anguished accounts of small children dying from leukemia, are the stories about the 'jellyfish babies': irradiated fetuses that developed into grotesque hydatidiform moles.

I remember being worried because they said the cows would eat the hay and all this fallout had covered it and through the milk they would get radioactive iodine . . . From four to about six months I kept a-wondering because I hadn't felt any kicks. . . I hadn't progressed to the size of a normal pregnancy and the doctor gave me a sonogram. He couldn't see any form of a baby . . . He did a d and c. My husband was there and he showed him what he had taken out of my uterus. There were little grapelike cysts. My husband said it looked like a bunch of peeled grapes. [42]

The ordinary Americans who lived, and still live, these nightmares are rendered in great dignity in Gallagher's photographs. But she cannot suppress her frustration with the passivity of so many of the Mormon Downwinders. Their unquestioning submission to a Cold War government in Washington and an authoritarian church hierarchy in Salt Lake City disabled effective protest through the long decades of contamination. To the cynical atomocrats in the aec, they were just gullible hicks in the sticks, suckers for soapy reassurances and idiot 'the atom is your friend' propaganda films. As one subject recalled his Utah childhood: 'I remember in school they showed a film once called *A is for Atom, B is for the Bomb*. I think most of us who grew up in that period . . . [have now] added *c is for Cancer, d is for Death*.' [43]

Indeed, most of the people interviewed by Gallagher seem to have had a harder time coming to grips with government deception than with cancer. Ironically, Washington waged its secret nuclear war against the most patriotic cross-section of the population imaginable, a virtual Norman Rockwell tapestry of Americana: gungho Marines, ultra-loyal test-site workers, Nevada cowboys and tungsten miners, Mormon farmers, and freckled-face Utah schoolchildren. For forty years the Atomic Energy Commission and its successor, the Department of Energy, have lied about exposure levels, covered up Chernobyl-sized accidents, suppressed research on the contamination of the milk supply, ruined the reputation of dissident scientists, abducted hundreds of body parts from victims and conducted a ruthless legal war to deny compensation to the Downwinders. [44] A 1980 Congressional study accused the agencies of 'fraud upon the court', but Gallagher uses a stronger word—'genocide'—and reminds us that 'lack of vigilance and control of the weaponers' has morally and economically 'played a large role in bankrupting . . . not just one superpower but two'. [45]



Baby photographs of Sherry Millett, before and during the leukaemia from which she died, with the 1957 Atomic Energy Commission propaganda booklet (© Carol Gallagher, 1993)

And what has been the ultimate cost? For decades the aec cover-up prevented the accumulation of statistics or the initiation of research that might provide some minimal parameters. However an unpublished report by a Carter administration taskforce (quoted by Philip Fradkin) determined that 170,000 people had been exposed to contamination within a 250-mile radius of the Nevada Test Site. In addition, roughly 250,000 servicemen, some of them cowering in trenches a few thousand yards from ground zero, took part in atomic war games in Nevada and the Marshall Islands during the 1950s and early 1960s. Together with the Test Site workforce, then, it is reasonable to estimate that at least 500,000 people were exposed to intense, short-range effects of nuclear detonation. (For comparison, this is the *maximum* figure quoted by students of the fallout effects from tests at the Semipalatinsk Polygon). [46]

But these figures are barely suggestive of the real scale of nuclear toxicity. Another million Americans have worked in nuclear weapons plants since 1945, and some of these plants, especially the giant Hanford complex in Washington, have contaminated their environments with secret, deadly emissions, including radioactive iodine. [47] Most of the urban Midwest and Northeast, moreover, was downwind of the 1950s atmospheric tests, and storm fronts frequently dumped carcinogenic, radio-isotope 'hot spots' as far east as New York City. As the commander of the elite Air Force squadron responsible for monitoring the nuclear test clouds during the 1950s told Gallagher (he was dying of cancer): 'There isn't anybody in the United States who isn't a downwinder. . . . When we followed the clouds, we went all over the United States from east to west. . . . Where are you going to draw the line?' [48]

## 5. Humbling 'Mighty Uncle'

Yet protesting native Americans and Downwinders have drawn one kind of line in the Nevada desert. Flash back to last fall. [49]

The (private) Wackenhut guards at the main gate of the Nuclear Test Site (nts) nervously adjust the visors on their riot helmets and fidget with their batons. One block away, just beyond the permanent traffic sign that warns 'Watch for Demonstrators!', a thousand anti-nuclear protestors, tie-dyed banners unfurled, are approaching at a funeral pace to the sombre beat of drum.

The unlikely leader of this youthful peace army is a rugged-looking rancher from the Ruby Mountains named Raymond Yowell. With a barrel chest that strains against his pearl-buttoned shirt, and callused hands that have roped a thousand mustangs, he makes the Marlboro Man seem wimpy. But if you look closely, you will notice a sacred eagle feather in his Stetson. Mr Yowell is chief of the Western Sho-shone National Council.

When an official warns protestors that they will be arrested if they cross the cattleguard that demarcates the boundary of the Test Site, Chief Yowell scowls that it is the Department of Energy who is trespassing on sacred Shoshone land. 'We would be obliged', he says firmly, 'if *you* would leave. And please take your damn nuclear waste and rent-a-cops with you.'

While Chief Yowell is being handcuffed at the main gate, scores of protestors are breaking through the perimeter fence and fanning out across the desert. They are chased like rabbits by armed Wackenhuts in fast, low-slung dune-buggies. Some try to hide behind Joshua trees, but all will be eventually caught and returned to the concrete-and-razor-wire compound that serves as the Test Site's hoosegow. It is 11 October, the day before the quincentenary of Columbus's crash landing in the New World.

The us nuclear test programme has been under almost constant siege since the Las Vegas-based American Peace Test (a direct-action offshoot of the old Moratorium) first encamped outside the nts's Mercury gate in 1987. Since then more than ten thousand people have been arrested at apt mass demonstrations or in smaller actions ranging from Quaker prayer vigils to Greenpeace commando raids on ground zero itself. (In *Violent Legacies* Misrach includes a wonderful photograph of the 'Princesses Against Plutonium', attired in radiation suits and death masks, illegally camped inside the nts perimeter.) Dodging the Wackenhuts in the Nevada desert has become the rite of passage for a new generation of peace activists.

The fall 1992 Test Site mobilization—'Healing Global Wounds'—was a watershed in the history of anti-nuclear protest. In the first place, the action coincided with Congress's nine-month moratorium on nuclear testing (postponing until this September a test blast code-named 'Mighty Uncle'). At long last, the movement's strategic goal, a comprehensive test ban treaty, seemed tantalizingly within grasp. Secondly, the leadership within the movement has begun to be assumed by the indigenous peoples whose lands have been poisoned by nearly a half century of nuclear testing.

These two developments have a fascinating international connection. Washington's moratorium was a grudging response to Moscow's earlier, unilateral cessation of testing, while the Russian initiative was coerced from Yeltsin by unprecedented popular pressure. The revelation of a major nuclear accident at the Polygon in February 1989 provoked a non-violent uprising in Kazakhstan. The famed writer Olzhas Suleimenov used a televised poetry reading to urge Kazakhs to emulate the example of the Nevada demonstrations. Tens of thousands of protestors, some brandishing photographs of family members killed by cancer, flooded the streets of Semipalatinsk and Alma-Ata, and within a year the 'Nevada-Semipalatinsk Movement' had become 'the largest and most influential public organization in Kazakhstan, drawing its support from a broad range of people—from the intelligentsia to the working class'. [50] Two years later, the Kazakh Supreme Soviet, as part of its declaration of independence, banned nuclear testing forever.



It was the world's first successful anti-nuclear revolution, and its organizers tried to spread its spirit with the formation of the Global Anti-Nuclear Alliance (gana). They specifically hoped to reach out to other indigenous nations and communities victimized by nuclear colonialism. The Western Shoshones were amongst the first to respond. Unlike many other Western tribes, Chief Yowell's people have never conceded us sovereignty in the Great Basin of Nevada and Utah, and even insist on carrying their own national passport when travelling abroad. In conversations with the Kazakhs and activists from the Pacific test sites, they discovered a poignant kinship that eventually led to the joint gana-Shoshone sponsorship of 'Healing Global Wounds' with its twin demands to end nuclear testing and restore native land rights. [51]

In the past some participants had criticized the American Peace Test encampments for their overwhelmingly countercultural character. Indeed, last October as usual, the bulletin board at the camp's entrance gave directions to affinity groups, massage tables, brown rice and karmic enhancements. But the Grateful Dead ambience was leavened by the presence of an authentic Great Basin united front that included Mormon and Paiute Indian Downwinders from the St. George area, former gis exposed to the 1950s atmospheric tests, Nevada ranchers struggling to demilitarize public land (Citizens Alert), a representative of workers poisoned by plutonium at the giant Hanford (Washington) nuclear plant, and the Reese River Valley Rosses, a Shoshone country-western band. In addition there were friends from Kazakhstan and Mururoa, as well as a footsore regiment of European cross-continent peace marchers.

The defeat of George Bush a month after 'Healing Global Wounds' solidified optimism in the peace movement that the Congressional moratorium would become a permanent test ban. The days of the Nevada Test Site seemed numbered. Yet to the dismay of the Western Shoshones, the Downwinders and the rest of the peace community, the new Democratic administration has shown immodest enthusiasm for the ardent wooing of the powerful nuclear-industrial complex. Cheered on by the Tory regime in London, which is eager to test the nuclear warhead for the raf's new 'tasm' missile in the Nevada desert, the Pentagon and the three giant atomic-energy laboratories (Livermore, Los Alamos and Sandia) came within a hairsbreadth this spring of convincing Clinton to resume 'Mighty Uncle'. Only a last-minute revolt by twenty-three senators—worried that new us tests might undermine the crusade against incipient third-world nuclear powers like Iraq and North Korea—forced the White House to extend the moratorium until next September. Meanwhile, as the pro-test forces regroup for the next round, another of the Cold War's Frankenstein monsters—biological and chemical warfare—is alive and well in the Utah desert.

## 6. The Death Lab

January, this year. It has been one of the coldest winters in memory in the Great Basin. Truckers freeze in their stalled rigs on ice-bound Interstate 80 while flocks of sheep are swallowed whole by huge snow drifts. It is easy to miss the exit to Skull Valley.

An hour's drive west of Salt Lake City, Skull Valley is typical of the basin and range landscape that characterizes so much of the intermontane West. Ten thousand years ago it was an azure-blue fjord-arm of prehistoric Lake Bonneville (mother of the present Great Salt Lake), whose ancient shorelines are still etched across the face of the snow-capped Stansbury Mountains. Today the valley floor (when not snowed-in) is mostly given over to sagebrush, alkali dust and the relics of the area's incomparably strange history.

In the middle of the valley, for example, the unexpected Polynesian ghost town of Iosepa testifies to the ordeal of several hundred native Hawaiian Mormon converts who fought drought, homesickness and leprosy here at the end of the nineteenth century. Further south, a few surviving families of Gosiute Indians—cousins of the Western Shoshone and people of Utah's Dreamtime—operate the 'Last Pony Express Station' (actually a convenience store) and lease the rest of their reservation to the Hercules Corporation for testing rockets and explosives.

Finally, at the valley's southern end, across from an incongruously large and solitary Mormon temple, a sign warns spies away from Dugway Proving Ground: since 1942, the primary test-site for us chemical, biological and

incendiary weapons. Napalm was first tested here on replica German and Japanese workers' housing, as was the supersecret Anglo-American anthrax bomb (Project n) that Churchill wanted to use to kill twelve million Germans. Misrach's Project w-47 was based nearby, just on the other side of Granite Mountain. And it was here in 1968 that an Army nerve-gas experiment went haywire and asphyxiated six thousand sheep on the neighbouring Gosiute Reservation.

Shrouded in secrecy and financed by a huge black budget, Dugway operated for decades without public scrutiny. Then in 1985 Senator Jeremy Stasser and writer Jeremy Rifkin teamed up to expose Pentagon plans to use recombinant genetic engineering to create 'Andromeda strains' of killer microorganisms. Despite the American signature on the 1972 Biological Weapons Convention that banned their development, the Army proposed to build a high-containment laboratory at Dugway to 'defensively' test its new designer bugs.

Opposition to the Death Lab was led by Downwinders, Inc., a Salt Lake City-based group that grew out of solidarity with the radiation victims in the St. George area. In addition to local ranchers and college students, the Downwinders were able to rally support from doctors at the Latter Day Saints (Mormon) Hospital, and, eventually, from the entire Utah Medical Association. Local unease with Dugway was further aggravated by the Army's admission that ultra-toxic organisms were regularly shipped through the us mail. [52]

The Pentagon, accustomed to red-carpet treatment in super-patriotic Utah, was stunned by the ensuing storm of public hearings and protests, as well as the breadth of the opposition. In September 1988 the Army reluctantly cancelled plans for its new 'bl-4' lab. In a recent interview, Downwinders' organizer Steve Erickson pointed out that 'this was the first grassroots victory anywhere, ever, over germ or chemical warfare testing'. In 1990, however, the Dugway authorities unexpectedly resurrected their biowar lab scheme, although now restricting the range of proposed tests to 'natural' lethal organisms rather than biotech mutants. [53]

A year later, while Downwinders and their allies were still skirmishing with the Army over the possible environmental impact of the new lab, Desert Shield suddenly turned into Desert Storm. Washington worried openly about Iraq's terrifying arsenal of biological and chemical agents, and Dugway launched a crash programme of experiments with anthrax, botulism, bubonic plague and other microtoxins in a renovated 1950s facility called Baker Lab. Simulants of these organisms were also tested in the atmosphere.

The Downwinders, together with the Utah Medical Association, are currently in us District Court challenging the resumption of tests at the veteran Baker Lab as well as the plan for a new 'life sciences test facility'. Their case is built around the Army's noncompliance with federal environmental regulations as well as their scandalous failure to provide local hospitals with the training and serums to cope with a major biowar accident at Dugway. The fantastically toxic botulism virus, for example, has been tested at Dugway for decades, but not a single dose of the anti-toxin is available in Utah (indeed, there are only twelve doses on the entire West Coast). [54]

If the suit goes to trial, the Downwinders hope to pry the lid open on the role of biological weapons in the Gulf War. According to Erickson, the plaintiffs will make two discovery motions. In the first place, they will demand to know why the Army vaccinated tens of thousands of its troops with an experimental anti-botulism serum. Were gis once again being used as Pentagon guinea-pigs? Is there any connection between the vaccinations and the strange sickness brought home by so many Gulf veterans?

Secondly, the Downwinders hope to shed more light on why the Bush administration allowed the sales of potential biological weapons to Iraq in the months before the invasion of Kuwait. 'If the Army's justification for resuming tests at Dugway was the imminent Iraqi biowar threat, then why did the Commerce Department previously allow \$20 million of dangerous "dual-use" biological materials to be sold to Iraq's Atomic Energy Commission? Were we trying to defend our troops against our own renegade bugs?' [55]

## 7. The Great Waste Basin?

Echoing sentiments frequently expressed at 'Healing Global Wounds', Steve Erickson of Downwinders boasts of the peace movement's dramatic breakthrough in the West over the past decade. 'We have managed to defeat the mx and Midgetman missile systems, scuttle the proposed Canyonlands Nuclear Waste Facility, stop construction of Dugway's bl-4 and impose a temporary nuclear test ban. That's not a bad record for cowboys and Indians in Nevada and Utah, two supposedly bedrock pro-military states!' [56]

At the same time, the Downwinders and other groups, including the Western Shoshones, foresee an ominous new environmental and health menace under the apparently benign slogan of 'Demilitarization'. With the abrupt ending of the Cold War, millions of aging strategic and tactical weapons, as well as six tons of military plutonium (the most poisonous substance that has ever existed), must somehow be disposed of. As Seth Schulman warns, 'the nationwide military toxic waste problem is monumental—a nightmare of almost overwhelming proportion'. [57] The Pentagon's immediate temptation is simply to dump most of its obsolete missiles, chemical weaponry and nuclear waste in the thinly populated triangle between Reno, Salt Lake City and Las Vegas.

In last September's bruising battle over the omnibus energy bill, Nevada's congressional delegation (morally compromised by their traditional enthusiasm for the Nuclear Test Site) were routed in a last-ditch attempt to block the Department of Energy from locating the nation's first high-level nuclear waste dump at Yucca Mountain, just a hundred miles northeast of Las Vegas, the nation's fastest growing metropolitan area. Meanwhile, nearly half of the Pentagon's chemical weapons stockpile is awaiting incineration at Tooele Army Depot, just west of Salt Lake City. Although sites in seven other states have also been designated for chemical weapons disposal, the Downwinders fear that local political opposition has virtually eliminated every facility except Tooele, where a pilot incinerator has been plagued by poor management and repeated accidental releases of deadly nerve gas.

Private defence contractors like General Atomic, Thiokol, Hercules, and Aerojet General are also looking at new disposal sites in Nevada, Idaho and Utah. Environmental journalist Triana Sifton believes that a 'full-fledged corporate war is shaping up as part of the old military-industrial complex transforms itself into a new toxic waste-disposal complex'. There is especially fierce rivalry over who will win the lucrative contract to incinerate the Pentagon's two million surplus solid-fuel rocket motors, a potential source of fantastic pollution. [58]

Finally, other corporations are rushing to make the Great Basin the urban West's city dump. Just west of Skull Valley, for example, subsidiaries of Westinghouse and Union Pacific are building behemoth incinerators to burn imported solid waste from Los Angeles and Sacramento. Scores of other low-level radiation landfills and hazardous waste dumps, together with the ubiquitous cyanide ponds associated with the revival of gold mining, pockmark the cow counties of Nevada. A further 500 to 1,000 (the total number is classified) 'highly contaminated' sites pose incalculable hazards on sixteen military and Department of Energy facilities from Mercury to Dugway. [59] With so much toxicity in the landscape, it is no wonder that Misrach's dead animal pits are commonplace.

Certainly there has been every reason for the massive international outcry against the malign ecological legacy of Stalinism in Eastern Europe and the ex-ussr. But the Cold War, as Edward Thompson has so often emphasized, was based on an 'isomorphism' of bureaucracies and weapons-complexes. [60] It is time to see the other side of this terrible symmetry. Blinded by the myth of the American West, few urban Americans, and probably even fewer Europeans, are aware of the comparable role of the Pentagon in turning the Great Basin into a silent, toxic desert. Nor, until now, have we had cause to reflect on how 'Demilitarization' may just be a new and perverse dispensation for continuing ecocide and internal colonialism.

---

[1] Although whale-hunting and sewerage are considered at length, the environmental impact of twentieth-

century militarism is an inexplicably missing topic amongst the forty-two studies that comprise the landmark global audit: B.L. Turner et. al. (eds), *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years*, Cambridge 1990.

[2] This is the term used by Michael Carricato, the Pentagon's former top environmental official. See Seth Shulman, *The Threat at Home: Confronting the Toxic Legacy of the us Military*, Boston 1992, p. 8.

[3] Nuclear landscapes, of course, also include parts of the Arctic (Novaya Zemlya and the Aleutians), Western Australia and the Pacific (the Marshall Islands and Mururoa).

[4] Zhores Medvedev, *Nuclear Disaster in the Urals*, New York 1979; and Boris Komarov, *The Destruction of Nature in the Soviet Union*, White Plains 1980.

[5] See D.J. Peterson, *Troubled Lands: The Legacy of Soviet Environmental Destruction*, a rand research study, Boulder 1993, pp. 7-10.

[6] Ibid., p.23.

[7] Murray Feshbach and Alfred Friendly, Jr., *Ecocide in the ussr*, New York 1992, p. 1.

[8] Peterson, p. 248. Peterson also quotes Russian fears that Western joint-ventures and multinational investment may only increase environmental destruction and accelerate the conversion of the ex-ussr, especially Siberia, into a vast 'ecological colony' (pp. 254-257).

[9] Feshbach and Friendly, pp. 11, 28, and 29.

[10] Indeed, their sole citation of environmental degradation in the United States concerns the oyster beds of Chesapeake Bay. (Ibid., p. 49.)

[11] Richard Misrach, *Violent Legacies: three cantos*, New York 1992, pp. 38-59, 86.

[12] An Irish nationalist who sympathized with the struggle of the Plains Indians, Mooney risked professional ruin by including the Ogalala account of the massacre in his classic *The Ghost-Dance Religion and the Sioux Outbreak of 1890*, Fourteenth Annual Report of the Bureau of Ethnology, Washington 1896, pp. 843-886. The actual photographer was George Trager. See Richard Jensen et al., *Eyewitness at Wounded Knee*, Lincoln 1991.

[13] Richard Misrach, *a photographic book*, Grapestake Gallery 1979; and *Desert Cantos*, Albuquerque 1987.

[14] Richard Misrach (with Myriam Weisang Misrach), *Bravo 20: The Bombing of the American West*, Baltimore 1990, p. xiv.

[15] *Violent Legacies*, pp. 14-37, 83-86.

[16] Lois Parkinson Zamora, *Writing the Apocalypse: Historical Vision in Contemporary us and Latin American Fiction*, Cambridge 1989, p. 189 (my emphasis).

[17] William Jenkins, *New Topographics: Photographs of a Man-Altered Landscape*, International Museum of Photography, Rochester 1975.

[18] Mark Klett, Ellen Manchester et. al., *Second View: The Rephotographic Survey Project*, Albuquerque 1984.

[19] San Francisco Camerawork, *Nuclear Matters*, San Francisco 1991.

[20] See Adams's own account of how he retouched a famous photograph of Mount Whitney to eliminate a town name from a foreground hill: *Examples: The Making of Forty Photographs*, Boston 1983, p. 165.

[21] Barry Lopez paraphrased by Thomas Southall, 'I Wonder What He Saw', from Klett, Manchester, et. al., p. 150.

[22] Aside from Misrach, see especially Mark Klett, *Traces of Eden: Travels in the Desert Southwest*, Boston 1986; and *Revealing Territory*, Albuquerque 1992.

[23] Revealingly, a decisive influence on the *New Topographics* was the surrealist photographer Frederick Sommer. His portraits of the Arizona desert were published in 1944 at the instigation of Max Ernst. See the essay by Mark Haworth-Booth in Lewis Baltz, *San Quentin Point*, New York 1986.

[24] Jan Zita Gover, 'Landscapes Ordinary and Extraordinary', *Afterimage*, December 1983, pp. 7-8.

[25] The cold deserts and sagebrush (*Artemisia*) steppes of the Great Basin and the high plateaux are floristic colonies of Central Asia (see Neil West [ed.], *Ecosystems of the World 5: Temperate Deserts and Semi-Deserts*, Amsterdam 1983), but the physical landscapes are virtually unique (see Graf, W.L. [ed.], *Geomorphic Systems of North America*, Boulder 1987).

[26] It is important to recall that the initial exploration of much of this 'last West' occurred only 125 years ago. Cf. Gloria Cline, *Exploring the Great Basin*, Reno 1963; William Goetzmann, *Army Exploration in the American West, 1803-1863*, New Haven 1959; and *New Lands, New Men*, New York 1986.

[27] The aeloian processes of the Colorado Plateau have provided valuable insights into the origin of certain Martian landscapes (Julie Laity, 'The Colorado Plateau in Planetary Geology Studies', in Graf, pp. 288-297), while the Channeled Scablands of Washington are the closest terrestrial equivalent to the great flood channels discovered on Mars in 1972. (See Baker et al., 'Columbia and Snake River Plains', *ibid.*, pp. 403-468.) Finally, the basalt plains and calderas of the Snake River in Idaho are considered the best analogues to the lunar mare (*ibid.*).

[28] There were four topographical and geological surveys afoot in the West between 1867 and 1879. The Survey of the Fortieth Parallel was led by Clarence King, the Survey West of the One Hundredth Meridian was under the command of Lieutenant George Wheeler, the Survey of the Territories was directed by Ferdinand Vandeveer Hayden, and the Survey of the Rocky Mountain Region was led by John Wesley Powell. They produced 116 scientific publications, including such masterpieces as Clarence Dutton, *Tertiary History of the Grand Canyon*, Washington 1873; Grove Karl Gilbert, *Report on the Geology of the Henry Mountains*, Washington 1877; and John Wesley Powell, *Exploration of the Colorado River of the West*, Washington 1873. John McPhee has recently repeated King's survey of the fortieth parallel (now Interstate 80) in his four-volume 'cross-section of human and geological time': *Annals of the Former World*, New York, 1980-1993.

[29] Cf. R.J. Chorley, A.J. Dunn and R.P. Beckinsale, *The History of the Study of Landforms, Volume 1: Geomorphology Before Davis*, London 1964, pp. 469-621; and Baker et. al., *ibid.*

[30] Stephen Pyne, *Grove Karl Gilbert*, Austin 1980, p. 81. (He is referring specifically to the renowned geologist, Clarence Dutton, another member of the Powell survey.)

[31] Ann-Sargent Wooster, 'Reading the American Landscape', *Afterimage*, March 1982, pp. 6-8.

[32] Consider 'relapsing chasms', 'wilted, drooping faces', 'waving cones of the Uinkaret', and so on. See Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West*, Boston 1954, chapter 2.

[33] *Ibid.*, chapter 3. The ironic legacy of Powell's *Report* was the eventual formation of a federal Reclamation Agency that became the handmaiden of a Western power-structure commanded by the utility monopolies and corporate agriculture.

[34] Carole Gallagher, *American Ground Zero: The Secret Nuclear War*, Boston 1993.



[35] Peter Goin, *Nuclear Landscapes*, Baltimore 1991; and Robert Del Tredici, *At Work in the Fields of the Bomb*, New York 1987. See also Patrick Nagatani, *Nuclear Enchantment*, Albuquerque 1990; John Hooton, *Nuclear Heartlands*, 1988; and Jim Lrager, *In the Shadow of the Cloud*, 1988. Comparable work by independent filmmakers includes John Else, *The Day after Trinity* (1981); Dennis O'Rourke, *Half-Life* (1985); and Robert Stone, *Radio Bikini* (1988).

[36] Dorothea Lange and Paul Taylor, *An American Exodus*, New York 1938; James Agee and Walker Evans, *Let Us Now Praise Famous Men*, Boston 1941; Erskine Caldwell and Margaret Bourke-White, *You Have Seen Their Faces*, New York 1937.

[37] Gallagher, p. xxiii.

[38] Ibid, p. xxxii.

[39] Israel Torres and Robert Carter, in *ibid.*, pp. 61–62. Gallagher encountered the story about the charred human guinea-pigs (prisoners?) 'again and again from men who participated in shot Hood' (*ibid.*).

[40] Delayne Evans, in *ibid.*, p. 275.

[41] Issac Nelson, in *ibid.*, p. 134.

[42] Ina Iverson, pp. 141–143. Gallagher points out that molar pregnancies are also 'an all too common experience for the native women of the Marshall Islands in the pacific Testing Range after being exposed to the fallout from the detonations of hydrogen bombs' (*ibid.*).

[43] Jay Truman, p. 308.

[44] The literature is overwhelming. Cf. House Subcommittee on Oversight and Investigations, *The Forgotten Guinea Pigs*, 96th Congress, 2nd session, August 1980; Thomas Saffer and Orville Kelly, *Countdown Zero*, New York 1982; John Fuller, *The Day We Bombed Utah: America's Most Lethal Secret*, New York 1984; Richard Miller, *Under the Cloud: The Decades of Nuclear Testing*, New York 1986; Howard Ball, *Justice Downwind: America's Atomic Testing Program in the 1950s*, New York 1986; A. Costandina Titus, *Bombs in the Backyard: Atomic Testing and Atomic Politics*, Reno 1986; and Philip Fradkin, *Fallout: An American Nuclear Tragedy*, Tucson 1989.

[45] Gallagher, pp. xxxi–xxxii.

[46] Fradkin, pp. 57; Peterson, pp. 203 and 230 (fn. 49).

[47] See 'From the Editors', *The Bulletin of the Atomic Scientists*, September 1990, p. 2.

[48] Colonel Langford Harrison, in Gallagher, p. 97.

[49] A version of what follows was published in *Crossroads*, April 1993.

[50] Peterson, p. 204; also see Feshbach and Friendly, pp. 238–239.

[51] Western Shoshone leadership in the anti-nuclear movement has educated thousands of peace activists about traditional land rights. Many participants in nts actions, for example, have made pilgrimages to the remote northern Nevada ranch of Carrie and Mary Dann, two Western Shoshone sisters whose stubborn resistance to federal efforts to evict them from their land and confiscate their livestock have made them folk heroes. For more information, contact the Western Shoshone Defense Project, General Delivery, Crescent Valley, Nevada 89821, usa.

[52] For fuller accounts, cf. Jeanne McDermott, *The Killing Winds*, New York 1987; and Charles Piller and Keith Yamamoto, *Gene Wars: Military Control Over the New Genetic Technologies*, New York 1988.

[53] Steve Erickson, Downwinders, Inc., interviewed September, November 1992 and January 1993.

[54] Downwinders, Inc. vs Cheney and Stone, Civil No. 91-c-68ij, United States District Court, District of Utah, Central Division.

[55] Erickson refers to information revealed in December 1990 by Ted Jacobs, chief counsel to the House Subcommittee on Commerce, Consumer and Monetary Affairs.

[56] Ibid.

[57] Schulman, p. 7.

[58] Interview, September 1992.

[59] Calculated from figures in Schulman, appendix b.

[60] See his famous essay on 'Exterminism' nlr 121, May-June 1980.