
Alien still life: distilling the toxic logics of the Rocky Flats National Wildlife Refuge

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Abstract. “Alien still life” examines the conversion of Rocky Flats, a plutonium factory located near Denver, Colorado, from a nuclear weapons plant to a national wildlife refuge. It argues that the territorial and administrative category of ‘wildlife refuge’ aided an incentives-based cleanup and accelerated turnover of the site to the public as a limited-use recreational space, in the process ‘fixing’ waste to external wilderness. Simultaneously, the technique of ‘legacy management’, a response to the growing number of decommissioned and remediated US Department of Energy nuclear facilities, mobilizes the reduction, containment, and/or denial of Rocky Flats’s history and toxicity through discursive and territorial means, such as the portrayal of nature as purity. The resultant ‘alien still life’ marks the voids in the public record, the alienation of the environment from former Rocky Flats workers, and the reconceptualization of ethics necessary to challenge the suspension of politics achieved by the nature refuge fix. The paper tracks subtle shifts in the memory, rhetoric, and politics needed to convert the industrial territory of Rocky Flats to a ‘wild’ space. In an effort to counteract the spectacle of nature as purity, and to reimagine an environmental ethics and political ecology attentive to waste, the layered narrative approach seeks to ‘put waste back into nature’, confronting the radioactive legacies of the Cold War.

Introduction

“Alien still life” explores the conversion of former plutonium plant Rocky Flats into a wildlife refuge. Once distinguished for hosting one of the world’s most contaminated buildings and for instigating the first FBI raid on a federal agency for environmental violations in US history, Rocky Flats was given a clean slate in 2005 after remediation eliminated all signs of industrial production. The complex now appears to be a giant tract of grassland overrun with mule deer and prairie dogs. With the transfer of large portions of the land from the Department of Energy (DOE) to the Fish and Wildlife Service (FWS), Rocky Flats suggests the possibility of returning wasteland to refuge. The site now serves as a model applicable to other decommissioned nuclear facilities across the US.

This case study tracks the transition from weapons factory to nature refuge.⁽¹⁾ The territorial and administrative category of ‘wildlife refuge’ facilitated the accelerated cleanup and turnover of the site to the public as a limited-use recreational space, in the process ‘fixing’ waste to external wilderness. Simultaneously, the technique of

⁽¹⁾ This paper responds to ongoing research within the discipline of geography on militarism and the environment, including the special 2007 issue of *GeoJournal* entitled “Military natures: militarism and the environment”. This geographical literature notably intersects with anthropology [see Hugh Gusterson’s (2007) review of nuclear ethnography and militarism], environmental cultural studies, and atomic history in investigating such topics as the rhetorical uses of history and heritage within the US nuclear complex and military sector, the political ecology and futurity of radioactive and hazardous natures, and the closures and conversions of decommissioned Cold War facilities to other uses, including wildlife refuge hosting, long-term stewardship, and real estate development, among others. This interdisciplinary work provides insight on the emergent project of the Department of Defense (DOD) and DOE, abetted by private industry, to environmentally reinterpret the history of the vast US nuclear and military landscape—areas

‘legacy management’, a response to the growing number of decommissioned and remediated DOE nuclear facilities, mobilizes the reduction, containment, and/or denial of Rocky Flats’s history and toxicity through discursive and territorial means, such as the presentation of nature as purity. This has resulted in an ‘alien still life’, which marks the voids in the public record maintained by the government administration entrusted with managing the legacy of the nuclear facility, the alienation of the environment from former Rocky Flats workers, who are no longer able to recognize the landscape where they once labored yet who live with environmental knowledge and history of the site, often in the form of embodied waste, and the necessary reconceptualization of ethics to challenge the suspension of politics achieved by the nature refuge fix.

The paper is relevant to those interested in conceptual arrangements of nature and the human, nature and technology, ‘naturecultures’ or social nature. The case study aims to ‘put waste back into nature’ in order to question the purity and priority of nature or the human and consider ethical relationships with waste. This is an effort to confront the radioactive legacies of the Cold War, and to contribute to environmental justice work, an area where scholarship and activism have pioneered ways of challenging toxicity and navigating public health in hazardous environments. The paper sheds light on the divisions between waste and humans erected at Rocky Flats and the economy of appearances established by post-cleanup site management that now marks the former industrial territory as manageable wilderness. The case study outlines the implications of treating nature as voidspace and waste container and arrives at fundamental questions about human sovereignty and the technoscientific and aesthetic framing of the environment. This is not an effort to reveal what is actually there at the site; securing knowledge of radioactive nature is ultimately impossible (Petryna, 2002). Rather, the paper proposes that the emergence of the postnuclear nature refuge and military-to-wildlife recreation demands a reimagined environmental ethics and political ecology attentive to waste—an ethics attentive to the radioactive legacies and ongoing (re/de)materialization of processes of material transformation of the Cold War.

Refuge fix

In the early 1990s the Denver-based newspaper *Westword* offered to help the DOE find a new name for the recently closed Rocky Flats nuclear complex. A flood of entries came in, ranging from “civic-minded sobriquets to obscenities deemed unsuitable for nuclear families” (<http://www.westword.com/1994-01-05/news/up-and-atom>). The winner was declared: “Boom Town!” Although the DOE never adopted the satirical title, Boom Town! captures the rapid development of Denver in the mid-20th century, when federal dollars to establish a series of military facilities flooded Colorado. One of these was the

⁽¹⁾ continued.

of secrecy and exception—as evidence of environmental stewardship, in spite of the waste and devastation wrought by privately contracted Cold War weapons production, military testing, etc. Refer to: Brown and Kanouse (2008), Havlick (2007a; 2007b), Kirsch (2007; 2009), Kosek (2006), J Krupar (2007), J Krupar and Depoe (2007), S R Krupar (2007), Masco (2004; 2006), Nader and Gusterson (2007), Pezzullo and Depoe (2010), Taylor (2003), van Wyck (2005), and the Center for Land Use Interpretation’s documentation of the Nevada Test Site (1996). As this paper argues, the rehabilitation of arsenals and plutonium production facilities as wildlife refuges plays a significant role in rationalizing current environmental security concerns, aligning the nature preserve with the military enclosure and waste container/brownfield. This obscures the profound and ongoing material transformations embedded in these sites; it also, as J S Davis (2007a; 2007b), M Davis (1993), and Kuletz (1998; 2001) have pointed out, maintains a form of military colonialism that evacuates the natural history and social life existing prior to, during, and after military occupation.

plutonium plant Rocky Flats, constructed in 1951 and operational by 1952. Originally under the control of the US Atomic Energy Commission (later replaced by the DOE in 1977) and managed by government contractor Dow Chemical Company (succeeded by Rockwell International in 1975), Rocky Flats was built for the purposes of recovering and recycling scrap plutonium, manufacturing plutonium and highly enriched uranium components, and producing nuclear bomb ‘pits’—trigger devices for nuclear warheads.

Icon of the Cold War, economic powerhouse of the Denver and Front Range area, and popular target of peace and antimilitarism activists, the 6500-acre Rocky Flats Plant left behind a trail of contaminated buildings, soil, and water. During its years of operation from 1951 to 1989, Rocky Flats was riddled with fires, accidents, and an ignominious legacy of waste. The amount of waste and types of waste produced at Rocky Flats were staggering, and for decades there was no coherent plan for disposal of the toxic leftovers. Under the management of the site’s first contractor Dow Chemical Company, waste was put in barrels and stacked in hallways, then moved outside to loading docks and concrete slabs, and from there to the fields, where the barrels leaked into soil and groundwater or exploded due to unvented gases. Burial trenches and several solar evaporation ponds were built over the years, but leaks created a nearly 300-acre underground toxic plume. The plant caught fire twice, producing more waste; the 1969 fire resulted in the costliest industrial accident in the US at that time. Waste was infamously moved out of the way onto the 903 pad, at one time a prairie parking lot for more than 5000 barrels. But barrels at the 903 pad also leaked, the wind blowing their contents across the prairie until workers poured asphalt over the mess in 1963. Still, the waste kept coming (Fleming, 1994; Furuhashi, 2000; Welsome, 2000). Waste was shipped offsite, burned and buried, or sprayed over the surrounding buffer zone, not minding high winds or surface/subsurface water run-off, thereby endangering the municipal drinking water supplies of nearby Westminster, Northglenn, and Thornton. Rockwell International, the second DOE-hired manager of the site, notoriously tried to get rid of contaminated pond sludge by mixing it with concrete in ziplock bags and then burying it in cardboard boxes. Some 19 000 of the ‘pondcrete’ blocks were made between 1986 and 1989, until it was discovered that the mixture had not cured properly and was seeping from its containers. Such waste disposal practices resulted in widespread contamination not only within the approximately 384-acre core industrial area but also across off-site lands and into off-site water supplies. This prompted the first FBI raid on a federal agency for environmental violations in US history on June 6, 1989 (Ruwitch, 1990; K Schneider, 1990; M Schneider, 2005). As a result of the investigation named ‘Operation Desert Glow’, the DOE suspended production activities in order to correct safety and upgrade the aging facility. Rocky Flats was placed on the Superfund list and entered the post-Cold-War era as a liability, its weapons production mission terminated.⁽²⁾

⁽²⁾ In 1991 an interagency agreement between the DOE, Colorado Department of Public Health and Environment (CDPHE), and the US Environmental Protection Agency (EPA) was signed that outlined multiyear schedules for environmental restoration studies and remediation activities. Subsequently, Rocky Flats received a permit, issued by the CDPHE and required by the Resources Conservation and Recovery Act (RCRA), for the treatment and storage of nine hazardous and low-level mixed waste sites. This permit was the first of its kind issued in the US. The grand jury investigation of DOE contractors for criminal environmental violations revealed that plutonium had gone missing in exhaust ductwork of buildings. When the DOE surveyed its nuclear sites to identify where the weapons complex was vulnerable in terms of threats to the health and safety of workers, the public, and the environment, it found that Rocky Flats was responsible for five of the top ten most vulnerable buildings (US DOE, 1994a; 1994b; 1995).

In 1994 the name was changed to the Rocky Flats Environmental Technology Site and a new cleanup mission began.⁽³⁾ The challenges to cleaning up the site were vast. Nearly forty years of weapons production left behind more than 380 areas of suspected contamination and thousands of cubic meters of radioactive and hazardous wastes. When production activities were halted in 1989, the process lines at the facility came to an abrupt end. The plant anticipated that production would restart shortly and did not prepare for total shutdown. As a result, materials remained in configurations and conditions unsuitable for extended storage. Plutonium, in particular, was found in an array of forms, including raw material metal, finished product, oxides, and residues, and thereby required stabilization and consolidation. The situation was so grim that proposed plans for the shutdown of the site included constructing a concrete dome over the whole area. Original estimates for the cleanup said it would take seventy years and \$37 billion. Yet Kaiser-Hill Waste Disposal Services, the company DOE hired to remediate Rocky Flats, declared completion of the cleanup project on October 13, 2005 (Hartman and Vaughan, 2005a; 2005b). The company had concluded the cleanup fifty-six years ahead of schedule at a purported savings of \$29 billion (Powers, 2005; US DOE Office of Public Affairs, 2005).

The first dismantling of a nuclear weapons plant was also the DOE's first accelerated closure pilot project within the weapons complex. The cleanup implemented an incentives-based contract between the DOE and Kaiser-Hill that quickly converted an environmental liability to public use. The flexible incentives-based contract contained costs by fixing prices, cleanup completion dates, legally compliant risk levels, and future land use *before* actual cleanup and public input began.⁽⁴⁾ The first of its kind to be awarded at a major DOE program level, the contract created opportunities for Kaiser-Hill to earn rewards based on how much its costs came in under the target budget of \$3.96 billion and for beating a March 2006 deadline. As the management integrator of the cleanup, Kaiser-Hill was given the ability to fast-track the planning process, assign and integrate tasks among its subcontractors, projectivize⁽⁵⁾ the work, and incentivize the work force (Tuor, 2007). The company was able to institute what it called ASAP—the Accelerated Site Action Project—to put the finishing touches on Rocky Flats's clean surface thirteen months ahead of its already accelerated schedule and agreed-upon cleanup levels, for a bonus of \$355 million.

The accelerated cleanup scenario was enabled by a streamlined and 'collaborative' regulatory approach, the culmination of efforts, since the 1980s, to redefine original Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) legislation.⁽⁶⁾ Rather than employing traditional Superfund remedial actions, the Rocky Flats Cleanup Agreement operationalized the Superfund Accelerated Cleanup Model Process, which prioritized speed and efficiency (US DOE, EPA, and CO State, 1996). The agreement also successfully articulated a unified vision of Rocky Flats's

⁽³⁾'Cleanup' here refers to the process of addressing contaminated land, facilities, and materials in accordance with applicable requirements; it does not mean that all hazards have been removed. Refer to: US DOE, 1998; 2001.

⁽⁴⁾Refer to: US Government Accountability Office (1999; 2006) and Kirshenberg et al (2007).

⁽⁵⁾This method allowed for the sequencing of work by the cleanup manager, not DOE; Kaiser-Hill set its own cost and schedule boundaries by treating the contract as a project with a discrete end.

⁽⁶⁾Environmental investigators found that operations at the plant resulted in releases of hazardous substances, as defined by the CERCLA, RCRA, and the Colorado Hazardous Waste Act (CHWA). As a result, Rocky Flats was listed on the EPA's National Priorities List in 1989, popularly known as 'Superfund'. Superfund is the US federal government's program to clean up the nation's waste sites (<http://www.epa.gov/superfund/>). Under CERCLA and in accordance with

end-state as a wildlife refuge, thereby eliminating uncertainty about the appropriate level of cleanup. By deciding the site's future use and implementing risk assessment based on that end-state, the DOE tailored its remediation goals to meet legal requirements for the protection of the maximally exposed individual, in this case, the wildlife refuge worker. DOE and regulators, the Environmental Protection Agency (EPA), and the Colorado Department of Public Health and Environment (CDPHE) had to ensure that the cleanup met the level required to protect a wildlife refuge worker. The refuge worker provided a 'risk fix' essential to the successful turnover of the site (Moore, 2005). Compared with future use as housing or farming, wildlife refuge designation enabled a cheaper, faster cleanup due to the limited human contact entailed by this end-state scenario. All the more ironic that the previously mentioned *Westword* contest to rename Rocky Flats, unbeknownst to contestants at the time, would foretell the future of the defunct facility as a protected wilderness in such satirical entries as "Never-Dark Park", "Cover-Up Valley", "Plutonium National Monument", and "Half-Life National Park".

Numerous official and popular reports celebrated the cleanup as a 'fairy tale ending'. From FBI raid to 'field of dreams', the story of the site's cleanup entrenched a progress narrative of technological know-how and good housekeeping. Rocky Flats was purportedly 'all gone'! The cleanup signaled the end of an era and asserted DOE's dedication to domestic security. But the widely noted removal of this \$600 million per year liability obscured the continued presence of waste on-site, extensive geographies of waste mobilized by the cleanup, and ongoing practices of laying waste. For example, the cleanup arrangement provided incentives to turnover workers and equipment. Workers were encouraged by Kaiser-Hill management to "work yourself out of a job, proudly; the quicker the better". While the incentivized workforce strategy accrued profits for Kaiser-Hill for early completion of the job, neither Kaiser-Hill nor the US Congress extended benefits to many remediation workers, denying them their retirement for completing the job early—in some cases just months or mere days before their retirement qualification dates. Several workers blew the whistle in 2004, alleging Kaiser-Hill had thrown away massive volumes of unused equipment in the company's race to earn millions in bonuses for early completion. One worker filed a complaint that criticized the cleanup for its strategic wasting of labor and equipment: "Waste is wrong in government no matter what. But it's even worse when you waste it and watch fifty people struggle with medical insurance" (Hartman, 2006a; 2006b). The cleanup had allowed Kaiser-Hill to expeditiously dispose of property as a way to speed up closure, since delays would prolong the job and keep workers on the payroll.

(6) continued.

Executive Order 12580, the DOE is responsible for the response action to hazardous substance releases at Rocky Flats, with the EPA and CDPHE serving as support agencies (<http://www.cdphpe.state.co.us/hm/rf/activities.htm>). Executive Order 12580, signed into effect by President Reagan in 1987, removed the EPA from its position as enforcer/supervisor/administrator of Superfund regulations for federal facilities. Instead, the order places agencies directly responsible for causing contamination in charge of their own cleanups. In September 1993 the Clinton Administration directed federal agencies to reuse cleaned up federal facilities, making land parcels available for public recreational use. In response, the EPA, DOD, and DOE collaboratively developed accelerated Superfund models that fast-tracked remediation, including the DOD's "Fast-track clean up" under the Base Realignment and Closure Program (US EPA, no date-b) and the DOE's "Accelerating cleanup: paths to closure" (1998) and "Accelerated site action project" (US DOE EM, 1995). These efforts prioritized putting federal Superfund sites into reuse as expeditiously as possible (US EPA, no date-a; US EPA, RCRA, Superfund, and EPCRA Hotline Training Module, 1998).

The spectacle of the cleanup also worked to cover up the fact that the plant's legacy of nuclear and hazardous waste was by no means gone; it had been redistributed on the interstate nuclear highway for burial across the US nuclear landscape in a massive federally choreographed shift in the spatial division of waste.⁽⁷⁾ Between 2000 and 2005, 62 000 shipments of waste departed Rocky Flats; the company Material Stewardship, which was in charge of transporting waste, sent a shipment of waste off-site by truck or rail on average once every seven minutes in 2004; more than 600 000 cubic meters of radioactive waste were swept off site, enough to fill a railcar 90 miles long. Shipments included 30 000 liters of plutonium and enriched uranium solution that had been stored in tanks and piping prior to cleanup, 21 tons of weapons-grade nuclear material improperly stored before cleanup, 106 metric tons of high-content plutonium residues, and 512 000 tons of miscellaneous waste, such as asphalt, wood, and concrete, for disposal in regular landfills. More than 3.6 million square feet of buildings, including more than a million square feet of highly contaminated nuclear production facilities, were demolished, eradicating the former 800 buildings that once functioned as a small city at Rocky Flats.⁽⁸⁾

The cleanup was also accomplished by purposefully burying waste on site. The designated end-state of 'wildlife refuge' enabled the installment of separate remediation standards and contaminated soil action levels for the surface and subsurface of the site. Waste was allowed, at times purposefully buried, on site according to a surface/subsurface hierarchy: a conservative allowance of radioactivity for the top three feet of ground, a 2000% increase of radioactivity 3–6 feet below, and beyond 6 feet anything is allowed since contamination at that depth, according to the DOE Rocky Flats site manager at the time, did not pose a danger to the surface.⁽⁹⁾ Building foundations, sewer piping, and old plutonium processing lines were dumped for a major savings; in the end, only 7% of the total budget went toward cleanup of the soil and water.⁽¹⁰⁾

The climatic, geologic, chemical, and structural aspects of the site helped to justify minimizing the scope and complexity of the cleanup. According to DOE, the dry Colorado climate and alluvial fan on which Rocky Flats is situated would reduce erosion and inhibit the offsite migration of contaminants; thick shale and clay stone underlying the site would prevent contaminants from seeping into the deep aquifer that supplies drinking water to the area. Natural attenuation would lessen the impact of all but the most highly contaminated parts of Rocky Flats (Whicker et al, 2004). A discourse of environmental protection additionally justified the less-intensive cleanup.

⁽⁷⁾ For a map of the redistribution of Rocky Flats waste, refer to the US Government Accountability Office (1999, page 39).

⁽⁸⁾ Figures quoted in this section are assembled from: Anon (2004, pages 1, 3), Hartman (2005), Hartman and Vaughan (2005a), and US DOE EM (2005).

⁽⁹⁾ The cleanup contract set the allowable levels of radioactivity in the top three feet of soil at 50 picocuries of plutonium per gram of soil. For the 3–6 feet area underground, radioactivity was allowed to rise to 1000 picocuries per gram. Below 6 feet there would be no limit to how much plutonium was allowed to remain (US DOE, EPA, and CO State, 1996; Moore, 1998; Rosner, 2005). Rocky Flats Manager Frazer Lockhart went on record: "To move plutonium offsite—it's not very soluble anyway—it either flows off in surface water sediment which is going to be your top layer eroding, or the wind blows it, which again is your top layer. So arguably, it's only the top couple of inches that will spread the contamination. If you look at plutonium lasting eons, three feet is, in our mind, a pretty conservative top layer. Down below three feet, that stuff is not going anywhere" (Schneider, 2005).

⁽¹⁰⁾ Most of the designated \$7 billion went to site security, relocation of weapons-grade material, removal of bomb-production waste, and demolition of buildings. The actual soil and water cleanup was to be done with the remaining money: approximately \$473 million, or about 7% of the total.

The prairie that had been purchased over the years by the DOE as a buffer zone to shield the plant's activities and creeping contamination would now restrict human access in order to buffer nature from urban sprawl. Human contact was considered more immediately toxic than residual radioactive and hazardous materials. This is how the video "Rocky Flats: Weapons to Wildlife" explains why humans are not granted access to the DOE-retained land: to protect the environmental remedies from humans, rather than to protect humans from contamination (wn.com/rock_flats_weapons_to_wildlife_part_1_of_4). Alleging that the majority of the site is able to support residential and industrial use, the Rocky Flats Stewardship Council similarly suggests that wildlife refuge status "would protect this important resource from future development" (http://www.rockyflatssc.org/fact_sheets.html).

In June of 2007 the DOE transferred 3953 acres of the site's former buffer zone to the Department of Interior's FWS to manage as the Rocky Flats National Wildlife Refuge. The former industrial area remains under DOE custody for long-term monitoring and maintenance, but the FWS will exercise natural resource management and upkeep an 'overlay refuge' across the entire area by agreement with the DOE (US DOE and US DOI FWS, 2005). FWS goals for the Rocky Flats Wildlife Refuge are detailed in the Comprehensive Conservation Plan (<http://www.fws.gov/rockyflats/overview.htm>). Visitor use facilities will include multiuse and hiking trails, a visitor contact station, interpretive overlooks, and viewing blinds. Public use programs will offer environmental education for high school and college students and a limited hunting program (two weekends per year) for youth and disabled visitors. The conversion of the site to wildlife refuge normalizes Rocky Flats as just another chunk of open space along the Front Range, effectively legitimating the DOE's original enclosure of the land as a form of resource management and environmental conservation (Ackland, 2005). The discovery of numerous 'hot spots' of contaminated soil during the DOE's verification of the adequacy of the cleanup, however, threw such claims of untouched wilderness into suspicion. A series of tests performed by DOE-hired consultants found spots of low-level contamination, elevated above sanctioned cleanup standards. The first test discovered thirteen hot spots near the former 903 pad area where plutonium-contaminated oil was once stored. Another test of the boundaries of the same area found that 28 of 178 sites checked had elevated levels of contamination; retesting subsequently brought the number down to 5. A third test, done by a helicopter that performed 44 000 readings, even found one unexpected low-level hot spot south of the site on nearby cattle pasture (Gonzalez, 2005). DOE officials initially downplayed the contamination as an anomaly, but later orchestrated the cleanup of the five boundary hot spots in August 2005 (Imse, 2005; McGuire, 2005a).

Such hot spots raise the question of how much contamination is still present. An incident involving the discovery of approximately 25 million gallons of radioactive pondwater vividly demonstrates that the cleanup effort itself mobilized the drift of waste in uncontrollable ways. Retention ponds at Rocky Flats were unexpectedly found holding water with americium (a plutonium derivative) and trace levels of plutonium at levels four times greater than what the cleanup plan called for; cleanup of the water required an additional \$2–3 million. Another kind of hot spot made a surprising appearance, blowing the pristine cover of wilderness. In consideration of a future hunting program to control the deer population at Rocky Flats, the FWS randomly culled twenty-six deer from the site in order to conduct tests for radioactive contaminants in the livers, kidneys, lungs, and bones, and therefore ascertain whether they were safe to eat. Two of the twenty-four deer contained trace levels of uranium and americium (Gerhardt, 2004; Todd and Sattelberg, 2005). This complex embodied geography of waste demonstrates that the legacy of former plutonium

production abounds at Rocky Flats; this includes the material transformations involved in the commodity production of plutonium pits *and* the ongoing materialization of those processes in place, such as in the bodies of deer or of former workers. The decommissioning and remediation of such sites therefore entail holding and releasing particular configurations of humans and waste, waste and nature, in order to generate profits from this temporary material ‘fix’.

Legacy management

The monumental efforts of workers to reduce decades worth of environmental contamination at Rocky Flats represent an important turning point in the history of US nuclear production (Burger et al, 2003). The cleanup demonstrates DOE’s recognition of the adverse environmental impact of Cold War nuclear weapons manufacturing. However, the celebratory cleanup focuses attention on the removal of waste and the security supposedly offered by the future use of the site as a wildlife refuge rather than the negative legacies: the ongoing contamination, injuries, misinformation, and litigation involving the site. These instabilities are as much a bureaucratic as a technoscientific problem for the US security state (Beck, 1995, pages 79–86). To support and sustain the accelerated cleanup model, the DOE has developed ‘legacy management’ as an institutional framework for the maintenance of the remedial actions taken at sites such as Rocky Flats, where portions of the land remain under DOE custody after cleanup. Formally, legacy management refers to all activities necessary to ensure the protection of human health and the environment following the completion of cleanup, disposal, or stabilization at a site in perpetuity (US DOE OLM, 2004). ‘Legacy’ in this context also refers to the reams of documents and huge clusters of former workers from DOE sites that have undergone closure and remediation. In practice, however, legacy management manages long-term *unaccountability* for the residual radioactive and chemical hazards of Cold War nuclear production. It does so by normalizing hazards in the bureaucratic language of ‘managing legacies’, monopolizing the perception of hazards and their definition, denying the embodied memories of accidents and injury of former workers and maintaining the appearance of safety and institutional control on limited means, even reducing its own staff and operational costs in order to do so. At the historical moment of the DOE’s decommissioning of former facilities, legacy management essentially ‘does less for less’ for sites turned over faster and faster via accelerated cleanup actions.

The paradoxical nature of legacy management can be partly explained as emerging from the risk-free environment and financial fallout created by historic indemnification clauses, which guaranteed that the federal government would cover any damages arising from nuclear weapons production, thereby releasing private contractors from liability. While it remains significant that private contractors at Rocky Flats actually admitted to environmental crimes involving improper storage and disposal of waste after the 1989 FBI raid on the plant and subsequent grand jury investigation, the monumental case was dissolved in March 1992 when a plea bargain was offered to Rockwell, dismissing the grand jury and its determination that eight individuals—some from Rockwell, some from DOE—should be charged with criminal environmental mismanagement (Ackland, 1999, pages 203–227; Imse, 2007). The company agreed to pay just \$18.5 million in fines in exchange for pleading guilty to ten environmental crimes, with no individual charged. When outraged grand jurors protested by writing a report that described an “ongoing criminal enterprise” at Rocky Flats and indicted the Department of Justice for obstructing justice, they were muzzled by a court order that refused them permission to make the report public or to speak about the grand jury proceedings.

Such courtroom dramas reveal a legacy of plant mismanagement and unaccountability that endangers the integrity and public perception of the accelerated remediation of Rocky Flats. Against the backdrop of the exorbitant costs accrued from indemnifying former plant operators and widespread criticism that the money spent defending Dow and Rockwell should have been used on a better cleanup, the DOE presents the claim that the accelerated cleanup has eliminated the burden of the site on taxpayers forever. Furthermore, the DOE has embarked on a massive damage control mission to sanitize Rocky Flats through a combination of physical and discursive controls. The DOE has developed the language and strategic concept of ‘legacy management’ to mitigate doubt about cleanups, cosmetically treat risks, and symbolically detoxify the legacy of irresponsibility revealed as a subtext of litigation involving former nuclear weapons sites. In 2003 the DOE established the Office of Legacy Management (OLM) at the federal level. The threat of administrative collapse antagonized by large-scale hazards and the impossible claims of safety elicited from the DOE prompted the Department to bureaucratically formalize an agency that appears to be responsible for the long-term containment and control of facilities following cleanup completion. The OLM manages DOE responsibility for these legacies by installing rationalities and distancing devices that give the appearance of order, such as regulatory frameworks, metrics to be employed in monitoring of the site, and mission statements about compliance. The OLM normalizes long-term material hazards as ‘manageable objects’ and treats their interpretation and monitoring as a technical and public relations issue. The OLM’s 2004 strategic plan emphasizes the importance of implementing such damage controls efficiently: “As more weapons facilities continue to close across the US and remediation is substantially completed, there is an even greater need to manage the Department’s legacy liabilities. Thus the Department has realigned its resources and created a sustainable, stand-alone Office of Legacy Management. This organization will allow for the optimum management of legacy responsibilities” (US DOE OLM, 2004). Originally charged with 37 sites in 2003 with a budget of \$48 million, the OLM has extended its managerial oversight to 105 sites in 2009, augmented its budget to \$186 million, and acquired its own separate appropriations account from Congress. Simultaneously, the OLM has reduced its own workforce and achieved the distinction of a High Performing Organization, the second office in the entire federal government to receive this distinction of ‘doing more for less’.⁽¹¹⁾

The strategic plan of the OLM enumerates a comprehensive list of actions. These include: protect human health and the environment at closed sites through effective surveillance and maintenance; manage the DOE’s environmental liability consistent with laws/regulations; track and use advances in science and technology to improve sustainability; return federal land and other assets to the most beneficial use; preserve key records/information and make them publicly accessible; sustain public trust through cooperative partnerships with state, tribal, and local governments; mitigate the impact of department work force restructuring and changes in the DOE’s mission. This dynamic vision of the OLM is more idealized than realized due to a number of contradictions that undermine the institution’s own self-proclaimed rationale.

First, the DOE has bifurcated legacy management from cleanup. Officially, the existence of the OLM enables the Office of Environmental Management (EM) to focus on remediation and the OLM to achieve efficiencies by consolidating programs and long-term functions in one office dedicated to legacy issues. The EM remains in charge of site decommissioning and cleanup, while the stand-alone OLM receives

⁽¹¹⁾ The OLM was awarded the distinction of High Performance Organization for efficiency, cost effectiveness, and staff reduction (<http://www.lm.doe.gov/default.aspx?id=2102>).

the material leftovers referred to as ‘legacy sites’ and plans/implements long-term maintenance. The split divorces the consideration of the long-term effectiveness of remedies from the selection of remediation options, and severs money for remediation from the funding of long-term efforts of maintenance and record keeping, resulting in the massive underfunding of such activities. While the OLM has requested and acquired an increased budget since its founding, the DOE’s and Congress’s insistence on funding stewardship through annual appropriations raises the possibility that funds may not be provided for the duration of contaminants (Energy Communities Alliance, 2004; 2006). The logic boils down to the following: if sites cannot actually be cleaned up to background levels or prenuclear production states, then they might be cleaned up less—and faster—to accelerate profits for private contractor waste management companies. The OLM then functions as DOE’s internal dumping ground for sites that have been cleaned up less than they could have been, allowing the administrative divide between cleanup and stewardship to dissolve the long-term accountability of the cleaners for their remedies.

Second, DOE’s accelerated cleanups rely on technical land-use controls and containment measures to limit exposure to the contamination left in place. Yet environmental change requires that ongoing surveillance extend beyond the boundaries of contained sites and that continual improvements of the cleanup are made in relation to the life of the hazard. In the case of Rocky Flats, the OLM is responsible for oversight and containment of land where contamination requires long-term monitoring and protection after the cleanup. The Rocky Flats Legacy Management Agreement, which establishes the regulatory framework for ensuring that the remedy remains protective of human health and the environment, emphasizes physical land-use controls, monitoring, maintenance, and information management following the implementation of cleanup actions (US DOE, 2007). The OLM aims to restrict access to the former industrial interior through physical barriers and legal restrictions, surface covers, resource-use management, subsurface monitoring, site information systems, and data protection. However, it remains unclear how these physical institutional controls will be maintained and upgraded over time. The legacy management agreement stipulates that the OLM must review the site, excluding the large area deemed suitable for nature refuge use, no less than (*only*) every five years in relation to radioactive contaminants with extremely long half-lives.⁽¹²⁾ Yet security fences and land-use restrictions are not enforceable for the life of many contaminants. Ulrich Beck (1995, page 86) captures the central contradiction: “hazards which come into existence with the blessing of technological and state authority place authorities and policymakers under the permanent compulsion to assert that these hazards do not exist, and to defend themselves against penetrating questions and evidences to the contrary. The result is that politics is identified with the safety facades.” Legacy management in effect externalizes the damage done by weapons production and entrepreneurial remediation onto labor and the environment, to be essentially off the table as a matter of regulatory politics. The remainder—former workers, site records, environmental contamination—is materially contained and/or discursively sanitized.

Third, the trade-offs that the DOE and other stakeholders make between a more extensive cleanup and reliance on barriers and land-use controls are a matter not only of technical risk assessments but of political negotiations, trust, and the maintenance of historical knowledge of the plant’s prior existence. Part of the OLM’s

(12) The Rocky Flats Legacy Management Agreement establishes the regulatory framework for implementing the final response action and for ensuring that it remains protective of human health and the environment. This agreement coordinates all DOE obligations under CERCLA, RCRA, and CHWA (US DOE, 2007).

mandate is to foster community involvement and oversight in relation to DOE's custody of sites. But the OLM's reliance on physical institutional controls does not adequately allow for the future revision of current end-states based on the feedback and shifting needs of the public. Legacy management at Rocky Flats does not help facilitate any public health monitoring plan or distribute health information about possible disease outcomes related to residual contamination. Nor does the OLM incorporate social and cultural controls, such as consolidating and transmitting the environmental knowledge of former Rocky Flats workers, into its defense-in-depth strategies. Humanities-oriented approaches, including storytelling of worklife and environmental contamination at Rocky Flats, play no part in legacy management, regardless of the fact that organizations given authority over 'legacy' are inevitably producers of history. Legacy management fails to cultivate popular knowledge of residual waste, crucial for safeguarding future generations. The OLM claims it will maintain a continuous and long-term presence at Rocky Flats, but whether it will actually serve as a bulwark against the slow erosion of institutional memory is doubtful. Its appearance contradictorily dissolves its own mandate.

The OLM has withheld financial support for a museum dedicated to the site. During cleanup, the DOE eliminated potential visual memory triggers of the Rocky Flats Plant from the land, eradicating any sign of the industrial activity that took place at the plant. The DOE did nothing to preserve any of the 800 buildings that once inhabited the site, 64 of which the Colorado State Historic Preservation Office considered eligible heritage sites. Although a bill gave the DOE the authority to establish a Rocky Flats museum, it took no action (Steers, 2000). Concerned about the loss of history of the plant, a local group of representatives, activists, academics, and former workers, known as the Rocky Flats History Group, eagerly sought to preserve representative examples of the building complex, initiated a scholarly oral history and video project to document the stories of former plant workers and surrounding community members, and proposed to assist environmental education about ongoing contamination at the site, providing a repository of data to citizens in order to recruit future stewards (J Krupar, 2009). The group founded the Rocky Flats Cold War Museum and received a financial donation from the plant's cleanup contractor Kaiser-Hill, a State Historical Fund grant from the Colorado Historical Society, and a land donation near the former nuclear weapons production site. However, they struggle to raise the money needed to purchase and renovate a building for the museum. Steven Davis, the museum project's executive director, has compared the cost of cleanup with the cost of memorializing, in an effort to garner support for the museum: "When you're spending \$2 million-plus a day out there to tear down buildings and erase Rocky Flats from the landscape, we think \$10 million to \$13 million is a good investment" (Bunch, 2003). The OLM, by contrast, in a draft feasibility study completed in 2004, stated that the museum was not necessary and should not count on federal funds, completely ignoring the fact that the US National Park Service added Rocky Flats to the National Register of Historic Places in 1997 for "making a significant contribution to the broad patterns of US history" (US DOI National Park Service, 1997). This echoes a general trend of excluding the Cold War landscape from US heritage (Vanderbilt, 2002).

The OLM has also remained absent from debates about what text should be placed on information signage at the future Rocky Flats National Wildlife Refuge, leaving this task to the FWS (DIO FWS, 2005a; 2005b; 2007; Lowe, 2005). The OLM has done nothing to administer a release form, sign, or informational video about the potential risk still posed by residual waste on site. Plans to build a library to preserve the plant's checkered history remain unclear. Even though \$3 million was allocated for maintaining

reams of Rocky Flats documents, the OLM's strategy of information management has favored disposal actions rather than data retrieval. For example, an extensive list of geological-seismological, archaeological, and historical files and radiation surveys of Rocky Flats, spanning the early 1980s to the present, were nearly destroyed by the OLM in 2008 under the pretext of 'digital management'. Public protests stopped the proposed action. On the one hand, the OLM has advocated converting paper archives to digital records in order to reduce waste and secure information; on the other, the OLM has eliminated various digital records about the Rocky Flats cleanup that were once available on its own website. The organization has also successfully reduced its entire web-based presence, as well as its staff. For an organization dedicated to legacy management, the OLM is curiously absent from public view, especially at the legacy sites under its purview. The OLM signs initially posted along the fence line of Rocky Flats and bolted to the main gates after the completion of the cleanup have either blown away or been replaced by FWS demarcations of the Rocky Flats National Wildlife Refuge.

Alien still life

The cleanup and legacy management of Rocky Flats have obscured the historical production of waste and buried questions about responsibility for waste and injury under the cover of the nature refuge. The activity at the mesa has discouraged conversation about deep unresolved contradictions. Likewise, legacy management has endeavored to redistribute the burdens of proof and reconfigure the responsibility, causality, and guilt that underwrite the long-term legalization of contamination at the site. While the cleanup enabled an entrepreneurial remediation industry to profit from basically doing less cleanup for more money with less accountability, legacy management must find ways to maintain the appearance of control and safety—supposedly in perpetuity—over a mounting number of sites on a limited budget with downsized staff. The nature refuge gives the appearance of doing more, but the conversion of nuclear production facility to nature refuge also treats the land as alienable and natural in order to cut down on costs, circumscribe management, and enhance the appearance of safety and control. The cultural result of this institutional transfer of DOE land, and its reinscription as a nature refuge, is the emergence of an 'alien still life' landscape that externalizes nature, anonymizes waste, utilizes the management of open space as a way to avoid managing contaminants, and sustains the alienation of Rocky Flats workers from the land through environmental disorientation, cancer, and cultural amnesia. Ultimately, this bureaucratically enforced alien still life serves to suspend the political and ethical involvement of humans, effectively limiting responses in the name of security (Evernden, 1993; Heidegger, 1993; Smith, 2008).

The memorandum of understanding between the DOE and FWS states that the FWS will cooperate to maintain an overlay refuge on the DOE-retained property while the OLM will help wildlife find safe passage between the two containers of land at Rocky Flats (US DOE EM and DOI FWS, 2005). The contractual agreement to maintain an overlay refuge produces, in effect, the appearance of a seamless natural landscape that potentially hides the controls left in the environment after cleanup, such as the specially engineered caps, tanks, drains, and monitoring wells, in addition to the sewer systems, concrete foundations, and old processing lines that remain buried on site. As geographer Don Mitchell (1996, page 6) has observed, "One of the purposes of landscape is to make a scene appear unworked, to make it appear fully natural. So landscape is both a work and an erasure of work." Drawing on utopic pastoral scenes of nature, informational brochures on the Rocky Flats National Wildlife Refuge present images of hardy grasslands and untouched wilderness that occlude the historical production of the landscape and serve to naturalize its legacy

of contamination from nuclear weapons production. Nature has been rediscovered, recuperated, and protected, giving “the appearance of an outer limit, prescribed from within, to humanity’s perceived subjection to increasing hazards and self-destructiveness” (Beck, 1995, page 38). This self-negating concept of nature enables the projection of an external world that is purportedly a self-evident tautology, external and separate from humans; this is nature stilled—in suspended animation as an object.

This ‘externalized interior’ nature enmeshes with the boundary-making process of waste, which relies on a similar metadichotomy of inside–outside. Waste is that which poses a threat and must be placed outside the social body or contained within it (Baker, 1994). Historically, waste was often associated with uninhabited or uncultivated wilderness. By contrast, waste and valuelessness today are typically associated with postproduction residues and cast-offs. As such wilderness was increasingly encroached upon, a burgeoning literature and practice of conservation formed, including national parks, refuges, land management bureaus, and various cloistering and enclosure movements of nature.⁽¹³⁾ As the danger of postproduction waste rises, nostalgia for preproduction wilderness and the desire to distance, dispose of, and deny waste simultaneously increases (Hawkins, 2006, page 16). The unproductive, wild, and dangerous territory of ‘sacrifice zones’, where relatively uncontrolled wasting practices occurred, increases the attractiveness of fixing waste to wilderness. Nuclear sites too polluted for human habitation, such as Rocky Flats, are now being revalued as ‘postnuclear’ natural landscapes with flourishing signs of nature’s survival in the absence of humans (Kosek, 2006; Masco, 2004; 2006). Conservation projects such environments outwards; the environment is stabilized by the rules that allow something to be used as an exterior simply because of the impossibility of attribution and inequality of burdens of proof either of contamination or remediation (Beck, 1995, page 132). The postnuclear nature refuge anonymizes the residual contamination stemming from nuclear production and the cleanup, naturalizing pollution by foisting it on an external world of nature. Naturalism—the idea of an immutable uncontaminated ‘other’ such as wilderness—sustains nonliability, and vice versa, thereby making the nature refuge the most cost-effective, minimally managed nuclear waste container. While waste containment is at odds with the fluxes of natural processes, the territorial reinscription of former nuclear facility into wildlife refuge allows for the outsourcing of maintenance and safety to biophysical processes and natural attenuation while fixing attention on the spectacularly remediated surface of the closure site. The refuge overlay legitimates a permanent ration of collective standardized poison; nature becomes unpolluted because it *is* polluted, making the demand for nonpoisoning look like a utopic fantasy that endangers the remedy.

The Rocky Flats Wildlife Refuge is essentially a ‘brownfield’ in green guise—a space rededicated to nonhuman priorities and aesthetic value since it is too polluted to bear economically productive commercial or residential activities. The refuge overlay greenwashes a blighted venue, in the process reprocessing waste into profits and cultivating new biovalue (Havlick, 2007a). The conversion redefines the value and purpose of earlier nuclear weapons production as environmental conservation (Masco, 2004); it reinterprets the archipelago of devastation produced by decades of internal nuclear colonialism and environmental racism as an exhibition of ecological improvement.⁽¹⁴⁾

⁽¹³⁾ See Brinkley (2009), Brulle (2000), Fox (1986), Maher (2007), Wellock (2007). For the relations between conservation and class, gender, and race, see, for example, Moore et al (2003); on militarism, see Brown and Kanouse (2008).

⁽¹⁴⁾ See Kuletz (1998; 2001) and Davis (1993) on the enclosures of land in the US West and Southwest and the forced removal of American Indians. Both refer to the US nuclear landscape as “national sacrifice zones”.

This is accomplished in part by wildlife management of the refuge, which discursively erases the controversial history of the site by emphasizing ecological amenities and justifying restrictive access for reasons having to do with environmental protection rather than historical contamination. While the FWS does not deny the history of Rocky Flats as a plutonium production facility, it shrouds the place in the new management goals of fish, wildlife, and plant conservation (Havlick, 2007a). For example, the highly publicized and popular 'Bioblitz' event, which involved hunting for and documenting the many species of flora and fauna in part of the open space surrounding Rocky Flats, helped to uncover the rich environmental history of the area. By fostering a blithe public acceptance of the place as a haven for wildlife, the event also obscured the institutions, actors, and actions responsible for the site's contamination, and the indelible impact on bodies of land, animals, and people within and beyond the boundaries of the designated preserve.

Waste and industrial residues of the former plant essentially make exterior nature porous and therefore threatening to the nature spectacle. Workers are the most obvious reminder of the site's industrial environmental history. The nature refuge voids the environmental memories of these workers, a process aided by an environmental movement that has dichotomized industrial laborers and nature, pitting class-based knowledge and workplace interests against environmental concerns. Instead of acknowledging the ecological sensitivity among former Rocky Flats workers, which did not take place in opposition to the bomb factory but rather in confronting constant everyday hazards and accumulating workplace knowledge, the nature refuge recuperates pristine, pure nature spectacle and rejects any sign of the events and crises of the former life of the plant and the embodied environmental memories of the workers. Wildlife management of the nature refuge joins the cleanup and legacy management of Rocky Flats in enframing the landscape as an alien still life, wherein the 'alien' marks the alienation of the environment from former workers, who are no longer able to recognize the landscape where they once labored and, in some cases, were contaminated, *and* the silences in the public record and erasure of visible signs of the land's industrial past (Smith, 2008). In 2005 a former Rocky Flats worker, after carefully examining a series of DOE-circulated photographs of the site postcleanup, wrote that the former plant, where he had worked for more than a decade, looked alien, as if he were encountering the landscape for the first time.⁽¹⁵⁾ During a DOE tour of the site offered to former workers in the fall of 2004, a GPS instrument had to be used to locate the former protected area where they had once worked. A safety inspector from Rocky Flats was dumbfounded that he could not recognize the site of the notorious plutonium production building 771/774, where he had been contaminated in several incidents. Former workers typically react to the visual landscape, bereft of the former facility, with an emphatic 'there's nothing there!'

Worker knowledge of the ecology of Rocky Flats is rich. From exposure to plutonium via a leaky glovebox to the smell of stray cats living under offices or the divebombing of swallows nested in building entrances, workers are particularly aware of ecological hazards. The Rocky Flats National Wildlife Refuge serves as the dustbin of such industrial environmental history. Jean Baudrillard (2007 [1992]) captures the human tragedy of this process, "What is worse is not that we are submerged by the waste-products of industrial and urban concentration, but that *we ourselves are transformed into residues.*" In the case of former nuclear workers, the nature spectacle contributes to

⁽¹⁵⁾ In 2005 the author conducted a series of interviews by e-mail with former DOE Rocky Flats employees. The interview questions focused on their impressions of the site after cleanup, specifically the wildlife refuge plans for the site. Among those shared was the remarkable statement about 'alien still life' explored in this section.

the confounding of former plant workers with material waste, allowing their use as the raw material for a 'Cold War Warrior' discourse of sacrifice to the nation but not stewardship of bodily health and cellular memory, which were compromised by occupational exposure to radioactive and hazardous chemicals.⁽¹⁶⁾ While this discourse symbolically values the sacrifice of workers, it has done little to sustain their lives or question the larger issue of accountability for the irreparable damages incurred by nuclear weapons production.

The DOE, for example, has consistently tuned out the voices of Rocky Flats workers and relatives who have sought compensation for work-related exposure to toxins and radioactive elements, under the complicated multipart Energy Employee Occupational Illness Compensation Program (EEOICPA) instated by US Congress in 2000. The DOE took little action to compensate workers, leaving claimants to dissipate with old age and 'slow death'.⁽¹⁷⁾ By 2004 the DOE had granted only 31 of 25 000 claims filed under EEOICPA Part D, doing nothing for the vast majority of these workers even though the DOE had received \$92 million in appropriations to do something.⁽¹⁸⁾ Subsequently, the EEOICPA compensation program Part D was transferred to the Department of Labor (becoming a new Part E). The Department of Labor was expected to run the program more efficiently and effectively but is now implicated in what many workers describe as an industry of denial achieved through outsourcing dose reconstruction, a questionable science of reconstructing what dosages of radiation or other hazardous chemicals workers are likely to have received while on the job (Kessler, 2007). This is in stark contrast to the dedicated practice of gerontology of the bomb, exhibited in such efforts as the Reliable Replacement Warhead program or measures to 'green' aging nuclear weapons (Biello, 2007). By placing value on the visible adaptability of certain organisms to radioactive environments, the refuge pits signs of nature's survival against workers, who are then relegated to a visual register of impending death. Illness is a kind of environmental memory of Rocky Flats in the form of embodied waste or exposure to waste. The spectacle of nature, however, detaches biotic assets from a landscape of radioactive contamination, dividing and devaluing bodies still 'intoxicated' with nuclear history and nuclear materials. The Rocky Flats labor activist Terrie Barrie, whose husband worked as a machinist at the Rocky Flats Plant, suggests an intimate connection between the nature refuge, institutional denial of illness, and cultural amnesia about ongoing exposure: "I worry that people may forget about the workers now that it's [the Rocky Flats site] a big grassy field where deer play. That place made people sick, and we have to remember that. Never in a million years did I think the cleanup would be finished before my husband got paid" (McGuire, 2005b).

The emerging relations between land and labor at Rocky Flats render a landscape wherein the living condition of nature is as perpetual exception. Refuges have often been established in a crisis mode or state of emergency. The Rocky Flats National Wildlife Refuge functions as a culturally palatable voidspace, a still life, an external nature without history. The history of damage suffered by wildlife appears unnoticeable, unexceptional. This is achieved in part by environmental regulations and legally

⁽¹⁶⁾ The Cold War Warrior discourse is a celebratory narrative promoted by the DOE that portrays plant employees as having won the Cold War by building weapons that defended the US nation against the USSR (Ackland, 2005).

⁽¹⁷⁾ Lauren Berlant (2007) developed the analytic concept of "slow death", shifting attention from scenes of control and death under sovereign regimes to the dispersed *management* of threats posed against the reproduction of predictable life.

⁽¹⁸⁾ EEOICPA program statistics are well-documented by DOESickWorker.org. The Government Accountability Project (<http://www.1067.sslldomain.com/whistleblower/program/domestic.cfm>) provides a summary of the EEOICPA program and history.

binding performance agreements that offer up measures for the cost of managing environmental problems instead of investigating what's actually there or addressing the wrongdoing that historically took place. Relationship management units, such as the OLM, evaluate performance obligations on paper instead of the human impact of various actions; risk assessments and actuarial modes of maintenance implant short-term technical fixes instead of cultivating longer-term outcomes based on social justice, equity, and fairness. The impression of the refuge's fecund austerity and resilience allows state and private industries to remain insulated from the political and economic consequences of their own historic practices. "The managed void replaces eternal vigilance as the price of liberty" (LaPorte, 2009). It legitimates exclusion, diffuses responsibility, and rationalizes inaction by focusing on the upkeep of compliance in perpetuity (Crowley-Cyr, 2005).

The conversion implies the public recovery of land under newly enlightened environmental management. Social exclusions and the DOE's dispossession of the land are flipped around and celebrated as evidence of ecosensitivity, public inclusion, and conservation. The shift in institutional oversight of large portions of Rocky Flats, from the DOE to the Department of Interior's FWS, is fairly simple to orchestrate; the administrative process to convey land titles from the DOE to a sister federal agency is relatively streamlined. A long tradition of treating the Department of Interior as the institutional 'dumping ground' of the government lubricates the land transfer and suggests that dispossession of a contaminated obsolete nuclear facility is a matter of routine.⁽¹⁹⁾ Essentially, one department with very little power with respect to other departments within the US government—the DOE—is reducing its management responsibility by transferring liabilities to the Department of Interior (nicknamed the 'Department of Everything Else'), which, as the biggest landlord government agency, serves as an administrative void. The treatment of land, burdened with contamination and public damage, as an alienable territory that can simply be transferred between government agencies falsely suggests that waste can be circumscribed, in spite of the complex futurity and unpredictable ecology of the postnuclear nature refuge. The postcleanup regulatory framework of Rocky Flats stipulates that the DOE must maintain continuous monitoring of hazards in the internal OLM area only, not the refuge buffer zone. Basically, refuge delineation contains contaminant management. The refuge circumscribes liability while unbounding contamination. Where there is refuge, there is no refuge.

The refuge 'solution' signals less and less managing, or none at all, in order to secure more cost-effective impression management through inaction. The conservation of land and animals 'does more for less' to maintain environmental regulatory compliance. Inaction looks natural. Wildlife management instrumentally serves as a technique of managing nature as a void in order to avoid managing. This is not to say that the FWS does nothing as the steward of the Rocky Flats National Wildlife Refuge. However, a meager budget has made the opening of the refuge impossible at this time; the site is currently under the supervision of the neighboring Rocky Mountain Arsenal National Wildlife Refuge. The special needs of postnuclear nature refuges also raise questions about the competence and appropriateness of the FWS as a steward. Without specialized training, the FWS is unequipped to deal with the site's enduring toxicity.

⁽¹⁹⁾ For more on the DOI, see Utley and Mackintosh (1989). After recently celebrating its 160th anniversary, the DOI received \$3 billion from President Obama's signing of the American Recovery and Reinvestment Act. Colorado's wildlife refuges are earmarked to receive a boost in their funding, particularly since Interior Secretary Ken Salazar formerly served as Colorado Senator and helped spearhead the reuse of Rocky Flats land as a wildlife refuge.

Wildlife management of the nature refuge, where radioactive contamination remains indefinitely, becomes coterminous with maintaining an alien still life, where the site's past—and responsibility for the ongoing damaging effects of that past—is made alien in order to upkeep the illusion of nature as purity.

The naturalization of Rocky Flats erases the unique social–environmental struggles that characterize the individual site. The presence of natural entities, such as the rare grassland communities of Rocky Flats, is a formative component of ongoing social struggle. Legacy management and wildlife management work together to occlude major sociopolitical memories of the site and future social contestation by casting the Rocky Flats National Wildlife Refuge as a place of last resort without a past. While the site's Cold War mission is no longer active, it is still affected by the chemical, radioactive, infrastructural, and other residual wastes produced during its years of plutonium production. From the perspective of waste, the site's past is not over—it is not even past. The actual character of hazards that remains is ambiguous, open to interpretation, alien. Waste disorganizes the appearances of control installed by management activities. In the form of alien pasts in the present, waste remains, unassimilated and nagging. In this sense, the 'still' in alien still life means an unregulatable persistence, something 'in addition to' the apparent ending, a 'nevertheless' or 'after all' that abides regardless of attempts to evacuate or void the site. Rather than a still life of pictured objects in a state of suspended animation or rest, or the polarizing of subject and object by a chilling kind of vision that ruptures continuous life, radioactivity haunts the scene. Its invisibility can make any landscape seem otherworldly and strange. Radioactivity is real but only visible through symptoms or the extensions of laboratory science and medicine. It problematizes the linear perspective of technology that would position viewers outside the frame (Masco, 2006, pages 32–33). Radioactivity travels an unpredictable course through ecosystems and bodies, executing a form of manifest destiny. Exposure to radiation affects the molecular structure of living cells; radiation can make cells lose their memory, potentially leading to cancers, death, future genetic defects, and a variety of uncertain effects. Bodies assimilate to radioactive space, blurring self and environment. Privacy is nonexistent; sovereignty is challenged and irrevocably destabilized by the permeability of the body.

Bodies and nuclear technologies collide at a powerful site of intersection at which it is possible to explore questions of citizenship, environmental justice, and everyday life, to invent new kinds of memorials and institutions, and to reconceptualize an environmental ethics that attends to waste and challenges the depoliticizing effects of the nature refuge fix. David Havlick (2006, pages 289–293) has explored the implications of Richard Mistrach's Bravo 20 project for traditional categories of land and historical preservation practices in the US. Mistrach's project proposes that a new National Restoration Lands System be formed, composed with National Environmental Memorials of postindustrial military–industrial-complex debris. According to Havlick, Mistrach's Bravo 20 National Park, a stark landscape littered with craters, bomb casings, UFOs, and the charred remains of military targets, conjures up an association with national parks but with a blend of social and environmental legacies on display. The formalization of this type of environmental memorial would potentially lend more financial support to the FWS and/or additional bureaucratic allies and would invite the public to consider the strange beauty of the site as it combines violence, power, politics, and nature. This effort hinges on revealing and maintaining a certain transparency of the landscape's complex history, fixing visual signs of production in the landscape as markers and memorials. It attempts to remember by memorializing, securing a more 'safe' interpretation through documentation (van Wyck, 2005).

Radioactive half-lives problematize understandings of nature as external ‘other’ and require experimentation with forms of remembering outside the regime of the gaze. The history of the wildlife refuge system ironically resonates with radioactive sites, in that refuges often belie their pasts by allowing uses that existed prior to refuge designation, such as hunting or military overflights, to continue as secondary uses after territorial reinscription. While these ‘afterlives’ often compromise conservation goals, they also refute nature as an empty container or nature as purity; they estrange the accustomed way of seeing nature. Radioactivity similarly renders nature strange (Masco, 2004). It questions corporeal integrity and the purity of the human subject, making the human subject alien to itself by insisting on the porosity of nature and waste, humans and waste, at the level of bodies and institutions. Refuge designation of radioactive land presents an opportunity and responsibility to cultivate a relational environmental ethic. Such an ethic would address human sovereignty as a negotiation rather than a truth or container of value, as it is assumed to be by naturalistic and social constructivist views of nature and Cartesian dualisms of representation (ie self versus other). A refuge system informed by such an environmental ethic would, on the one hand, compel the rediscovery of human beings as natural entities—“there can be no social praxis without breathing”—and, on the other hand, insist that technoscientific solutions and naturalistic alarm systems are meaningless unless they take into account social structures of rationality, power, cultural norms, and bureaucracies (Beck, 1995, page 50). Rather than (re)producing ontologies of purity or hybridity of nature and society, this approach would utilize waste to remediate nature’s social and theoretical association with fixity, permanence, stasis, and conservatism. In place of a reactionary ecological fundamentalism or a turn to the liberatory potential of mutation (which potentially makes Rocky Flats workers ‘failed subjects’ or evacuates the human subject altogether), waste might be used to create new forms, technologies, and creative collectivities that reject claims to sovereignty, natural or political, in favor of exploring the constitutive openness of the world without romanticizing or depoliticizing it. As Gay Hawkins (2006, page 11) offers, “It might actually be *waste*, rather than ‘nature’ or ‘the environment,’ that triggers new actions, that inspires us.”

Risking the safety of the sovereign knowing subject, deemed separate from nature and natural landscapes, opens up the possibility of utilizing uncanny materials like plutonium for subject-forming experimentations, new actions, organic chance and transience, humor, and self-cultivation. Rather than upkeeping nature for the sake of morality, or nostalgia for pure nature and commodification processes accompanying nature as ruin, ‘conservation’ would focus on stewardship of networks of care and obligation in relation to embodied waste. For example, in place of minimalist plaques demarcating the boundary of the Rocky Flats National Wildlife Refuge and honoring former nuclear workers in statements about sacrifice, a cellular memory project might be initiated. Drawing on the oral histories of workers that have already been collected, such a project could enmesh the workers’s environmental memories of the site, their medical records of illness which recount strange encounters with waste and occupational hazards, and various official and other environmental archives of the land in a poignant nature walk or heritage trail of the everyday lives of workers, in a virtual overlay of the refuge surface using print-based media, or digital handheld GPS instrumentation, or both. Such a project would offer an alternative ethics of legacy to counter and complicate the failures of legacy management (Ehlers, 2010). Waste demands a *relational* ethics that recognizes and politicizes the permutations of waste and human, nature and waste, and that wrestles with our vulnerability to the legacies of the Cold War: the residues of the nuclear project and the suspension of ethics and politics in the name of security. In the case of Rocky Flats, this alternative ethics of

legacy is formed by ‘putting waste back into nature’, effectively challenging the purity and priority of nature or the human, and implicating our technoscientific and aesthetic framings in the environment.

Through a layered narrative, this paper has tracked subtle shifts in the memory, rhetoric, and politics needed to convert the industrial territory of Rocky Flats to a space marked as ‘wild’, cumulatively foregrounding the way this post-Cold-War landscape has been suspended from ethical response. In an effort to counteract the making of the postnuclear nature refuge, the figure of ‘alien still life’ defamiliarizes nature as purity, and the human as inviolable and self-contained. As opposed to attempting to fix a representational frame to Rocky Flats, alien still life works to conceptually dispel the certainty of the site’s representation, risking the safety of the site as bucolic nature refuge and rejecting the instrumentalization of security, which arrests social engagement and contestation. The ‘alien’ marks what is alienated by the abstraction of the nature refuge overlay and how that stilling is never complete; waste will always leak out, forcing our reckoning with the constitutive openness of the world and sovereignty—of the body, of nature, of the organic, etc—as a threshold (Wendt and Duvall, 2008). Instead of producing safety through political suspension and capture of the inhuman or alien or waste, the heuristic device of the alien (as waste) compels experimentation with different practices of legacy, such as memorializing tactics that attend to living with waste or methodologies that estrange the familiar and familiarize the strange to ensure that the legacy of the nuclear is not so much visibly and monumentally memorialized but persistently, naggingly itched or smelled, as the chemical symbol for plutonium—Pu—suggests.⁽²⁰⁾

This paper has at critical points enacted a form of criticism modeled on ‘distilling’, boiling down the toxic logics of the postnuclear nature refuge to their essence, concentrating the real in order to amplify the strange, *rendering essence ridiculous*. As more and more nuclear sites are converted to wilderness, resulting in less and less accountability and lower management costs, with just enough long-term stewardship of contamination to maintain appearances, the postnuclear nature refuge will continue to spill across the more than 3300 square miles of continental landmass composing the US nuclear landscape, depoliticizing the consequences of the Cold War and circumscribing what ‘legacy’—as a practice—might achieve (Schwartz, 1998). Other ethical legacies are still possible, indeed necessitated by this grim future. In the optimistic words of Jody Baker (1994, <http://eserver.org/cultronix/baker/>),

“The barrel of toxins ... can reach a critical threshold where its material can no longer be contained and bursts forth or slowly sweeps outward, into the crevices of social life. There are other thresholds: a cancer threshold when toxins accumulated in the cell cause its mutations, its mutinous growth ... There are political thresholds too: when the callous poisoning of the environment and the people who live there engenders political organization and political action that demands ... social change. We should not, then, separate out the leakage of toxins from barrels, the leakage of hegemonic legitimacy and (corporate) power, and the leakage of social change.”

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⁽²⁰⁾ The idea of ‘itching’ nuclear legacies references Beck (2008).

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