

“Such Infinite Distances”: Visualizing Embedded Narratives in the Tacoma Smelter Plume

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Abstract

“Such Infinite Distances”: Visualizing Embedded Narratives in the Tacoma Smelter Plume

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For nearly 100 years, the Asarco copper smelter in Ruston, Washington operated on the shore of Tacoma’s Commencement Bay, refining ore with high concentrations of arsenic. The smelter’s 562-foot smokestack — the tallest of its kind at the time — was intended to disperse the smelter’s arsenic- and lead-laden emissions across “such infinite distances” as to be rendered harmless, as claimed by Asarco’s director of agricultural research in 1951. In reality, the smokestack’s height dramatically extended the reach of its toxic emissions, creating a 1,000 mi² region of contaminated topsoil in the South Puget Sound. Three decades after the notorious smokestack was demolished, the Washington State Department of Ecology continues to excavate and replace the most toxic soils in parks, schools, and residential yards within the Tacoma Smelter Plume. This thesis examines the legacy of the Asarco Tacoma Smelter from a landscape narrative perspective, exploring the power of representation to inscribe toxicity into the landscape. The resulting book—a series of Anthropocenic landscape paintings—integrates landscape architectural theory, contemporary digital tools, and culturally entrenched pictorial conventions to communicate the complex narratives that shape our contemporary landscape. By eschewing conventional disciplinary boundaries between scientific research, historical inquiry, art and design, this book tells a diffuse story of industrial heritage through the common language of landscape to set the stage for a more resilient environmental ethic.

"SUCH INFINITE DISTANCES"

Visualizing embedded narratives in the Tacoma Smelter Plume

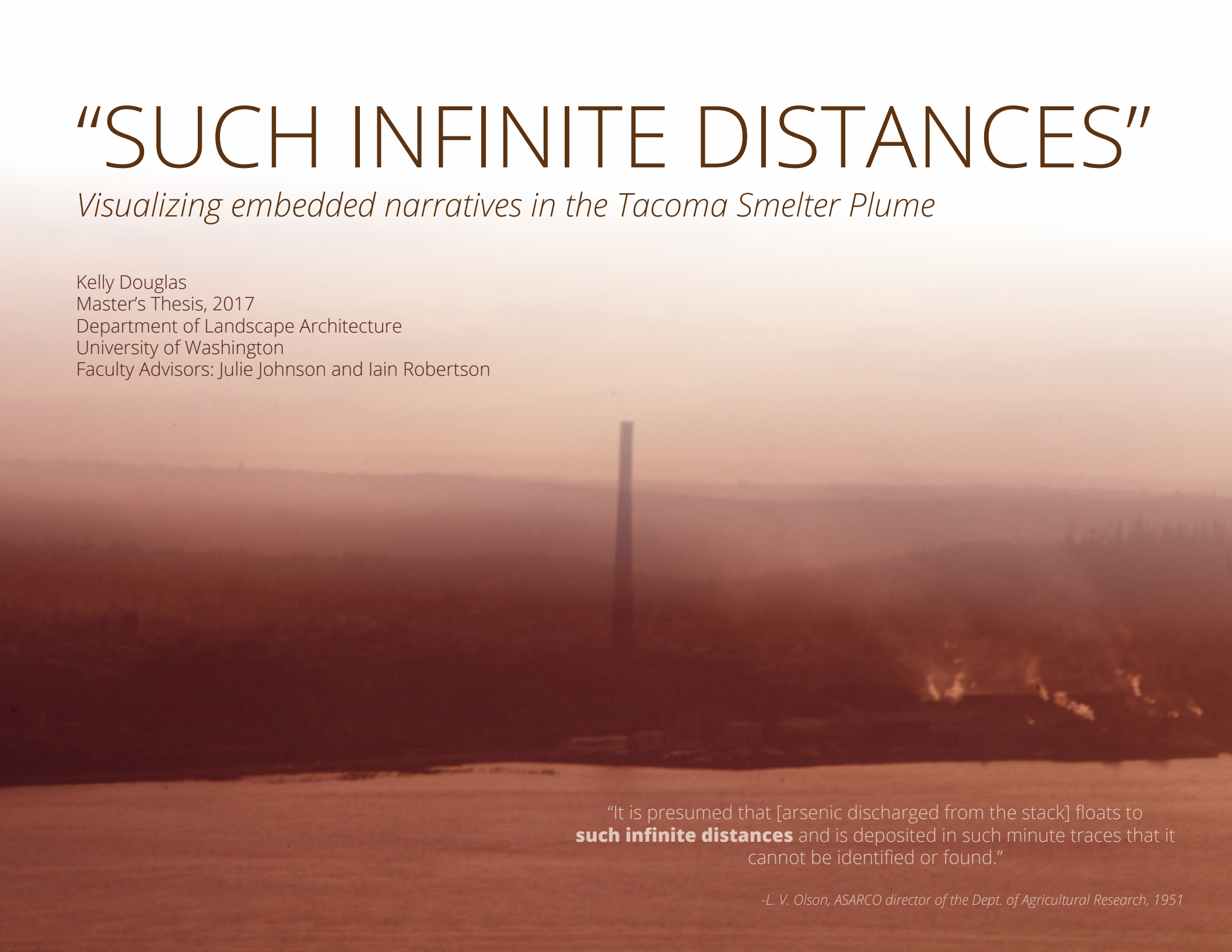
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"It is presumed that [arsenic discharged from the stack] floats to **such infinite distances** and is deposited in such minute traces that it cannot be identified or found."

-L. V. Olson, ASARCO director of the Dept. of Agricultural Research, 1951

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INTRODUCTION

There is something in us, as storytellers and as listeners to stories, that demands the redemptive act, that demands that what falls at least be offered the chance to be restored. The reader of today looks for this motion, and rightly so, but what he has forgotten is the cost of it. His sense of evil is diluted or lacking altogether, and so he has forgotten the price of restoration.

- Flannery O'Connor ¹

The first time I set foot on Point Ruston, I was greeted by a spectacle of freshly developed suburban wonder. Cheery pastel stripes on pedal-powered trams lined up in neat rows against the pearlescent grays of the south Puget Sound. Two children traced lazy training wheel-enabled loops around a freshly decorated patch of asphalt, its neon green paint merging seamlessly with the fertilized hues of the surrounding lawn. Sandwich boards promised grilled salmon salads and mango margaritas; expensively detailed paving led to the gated entries of luxury condos.

This tableau of multi-use bliss sparked a familiar sense of unease within me—my hackles raised at the turpitude that certainly lurked nearby.

If my upbringing in the worlds of O'Connor and Faulkner taught me anything, it is to never take comfort in the outward appearance of normalcy. I learned to interpret the landscape through the skillful prose of these southern gothic frames in which the grotesque is not a perversion of reality but instead offers a more honest portrait of the world. These stories shaped my nascent worldview: the nefarious capacity of human nature lingered in the thick humidity and the deep red clay of my native landscape. This was a necessary haunting; I was assured that the more we attempt to deny our inherited evils, the more insidious these forces become.

So, as I surveyed the landscape of Point Ruston, I soon located the uncanny underbelly of this post-industrial promise land.

¹ Flannery O'Connor, *Mystery and Manners: Occasional Prose* (New York: Farrar, Straus & Giroux, 1969), 48.

In a sense, this underbelly is very much a literal condition: the remains of industrial giants are entombed just below Point Ruston's manicured veneer. These hermetically sealed crypts contain the toxic detritus of an expansive copper smelter that once occupied this shoreline. And while these contaminated catacombs certainly belie Point Ruston's promise of redemption from industrial legacy, this one site is but a hint of a larger landscape narrative.

If the limits of industrial heritage were confined to the boundaries of the industrial site, then perhaps this could be a simple ghost story. Yet the utter boundlessness of the smelter's hazardous imprint—airborne toxicity dispersed across a region landscape—offers a much more insidious antagonist. It is here, in the arsenic embedded inches beneath the front-yard lawn and the lead-tainted playground soils trucked to a distant landfill, where this story meets the grotesque.

I was drawn to landscape architecture with the intention of telling place-based stories with soil. The more deeply I explored the contamination story of the Tacoma smelter, however, the more I become convinced that the soil tells the story of us. We can choose to adhere to landscape narratives that obfuscate the revelations that scare us, or we can choose to confront the damning truths recorded in our ground.

*View of freshly painted plaza on Point Ruston waterfront.
Author's image.*





Faulkner writes:

I would think how words go straight up in a thin line, quick and harmless, and how terribly doing goes along the earth, clinging to it, so that after a while the two lines are too far apart for the same person to straddle from one to the other.²

View of contaminated soil as topography in Point Ruston development. Author's image.

The words of remediation are a tempting bait dangling from a line that promises to draw us up and away from the realities of our changing environment. I choose, instead, to cling to the earth.

This thesis tells the story of the landscape in a smelter plume through the medium of the earth itself. It resists the pull of conciliatory words and resolved narrative to remain steadfastly rooted in the “doing” of the landscape.

Too often, the grotesque is conflated with ugliness. My landscape vocabulary, however, was built upon the foundation of a literature that responds to terrible truths with narratives richly decadent, appallingly beautiful. I come from a tradition that does not shy away from representing the world replete with its horrific consequences.

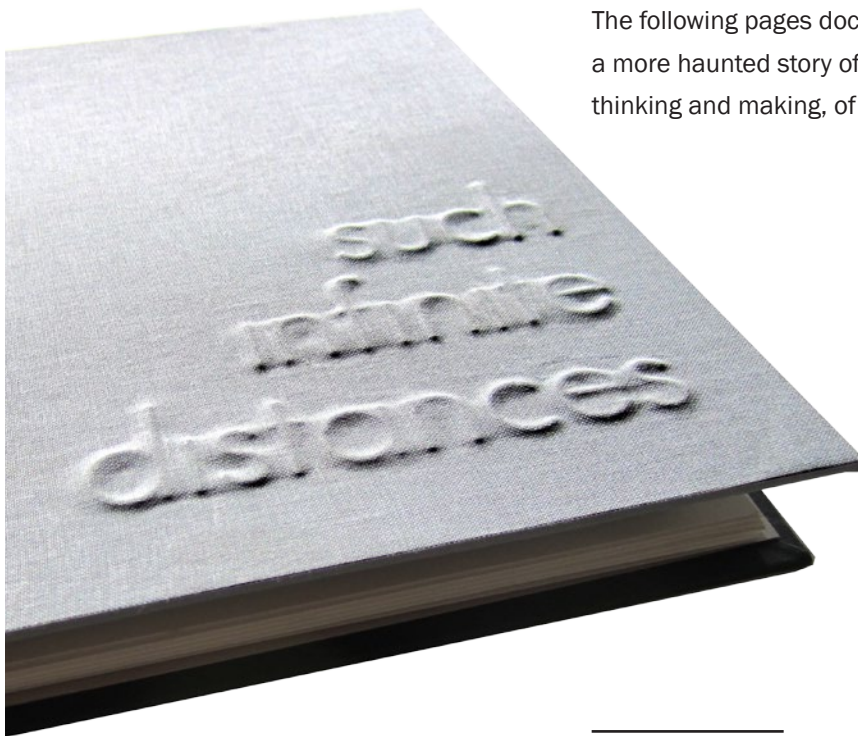
O'Connor refused to cave in to the pressure to offer tidy resolution to her world-weary audience:

² William Faulkner, *As I Lay Dying* (New York: Random House, 1964), 173.

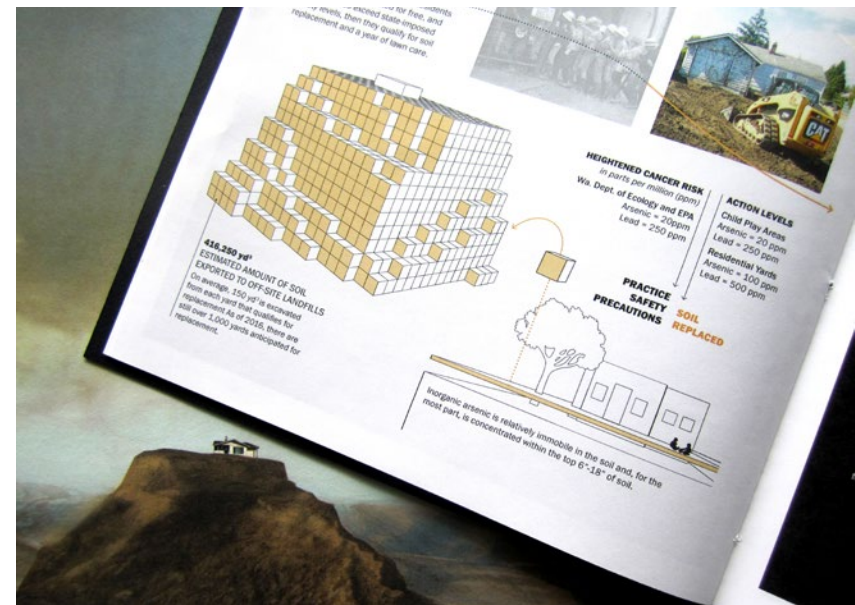
The Southern writer is forced from all sides to make his gaze extend beyond the surface, beyond mere problems, until it touches that realm which is the concern of prophets and poets. [...] I hate to think that in twenty years Southern writers too may be writing about men in gray-flannel suits and may have lost their ability to see that these gentlemen are even greater freaks than what we are writing about now. I hate to think of the day when the Southern writer will satisfy the tired reader.³

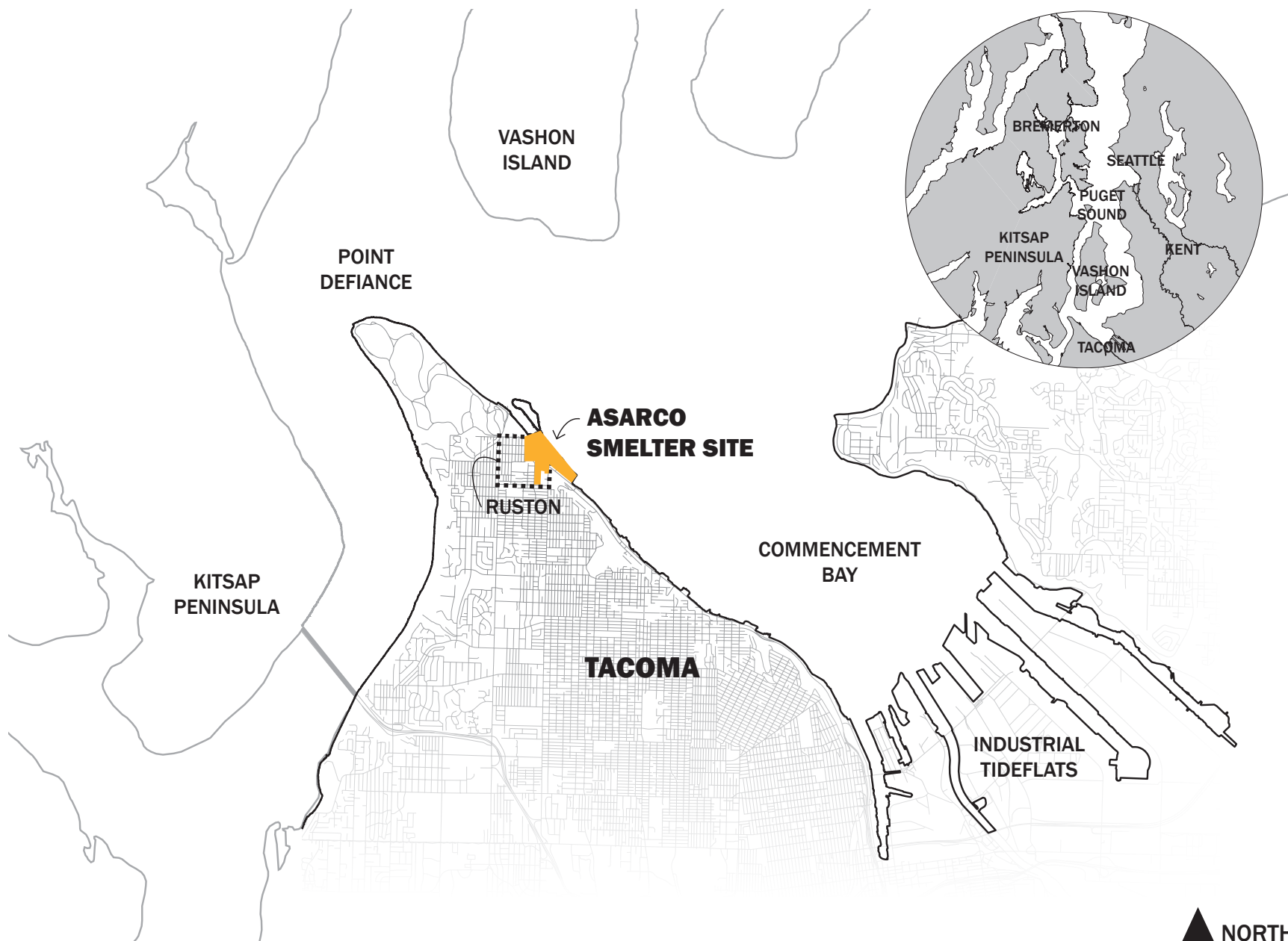
Though the “men in gray-flannel suits” of O’Connor’s world are, in my hands, yards in fertilized-green lawn, the sentiment resonates: the narrative that follows will not satisfy the tired reader. My role as a teller of landscape stories is not to offer respite from the consequences of unchecked human consumption, but rather to depict this irredeemable legacy with a poignant conviction. I fear that if we do not allow terror to converse with beauty, then we may lose our ability to see the grotesque in the landscapes we have irrevocably altered.

The following pages document my wanderings as I developed a landscape language for expressing a more haunted story of the Tacoma smelter plume. This thesis unfolds in a call and response of thinking and making, of theory and process.



3 O’Connor, *Mystery and Manners*, 50.





BACKGROUND: THE SMELTER PLUME

A standard telling of the Tacoma Smelter Plume story may sound something like this:

Tacoma's welcoming shoreline was a low-hanging fruit for industrial development during the dawn of the industrial revolution in the Puget Sound. With ideal access to the deep-water Commencement Bay and a critical railroad connection to Idaho's burgeoning mines, local businessmen spearheaded construction of a lead smelter on the site in 1887. By 1902, the plant was converted into a copper smelter and, in 1905, was purchased by the Guggenheim brothers' American Smelting and Refining Company (Asarco) in a strategic bid for ascendancy within the booming metal industry of the West.¹ Soon after, Asarco incorporated the growing community of wood-frame homes that housed immigrant smelter employees into the town of Ruston,² which remains an independent city to this day, though is now surrounded on all sides by the city of Tacoma.

From the outset, the Ruston copper smelter provoked concerns over the damaging smoke emitted during the smelting process.³ The widely accepted best practice at the turn of the twentieth century was to build smokestacks to the tallest extent to allow "natural diffusion to act upon the smoke steam in a way that, by the time its poisons reached the ground, they would be so diluted as to be practically harmless."⁴ Thus, Asarco raised its smokestack to 307 feet in 1903, to much applause from the local press. By 1917, Asarco constructed the 571-foot, 2.5-million-brick smokestack—the tallest of its kind at the time—that would become a prominent marker of Tacoma's skyline for nearly 100 years.⁵

1 Karen Pickett, "Environmental Battlefield: Ruston, Washington, Home to an Asarco Smelter and Superfund Site," *Mining History Journal* 7 (2000): 46.

2 Marianne Sullivan, *Tainted Earth : Smelters, Public Health, and the Environment* (New Brunswick, N.J.: Rutgers University Press, 2014), 17.

3 Ibid.

4 Ibid.

5 Pickett, "Environmental Battlefield," 73.

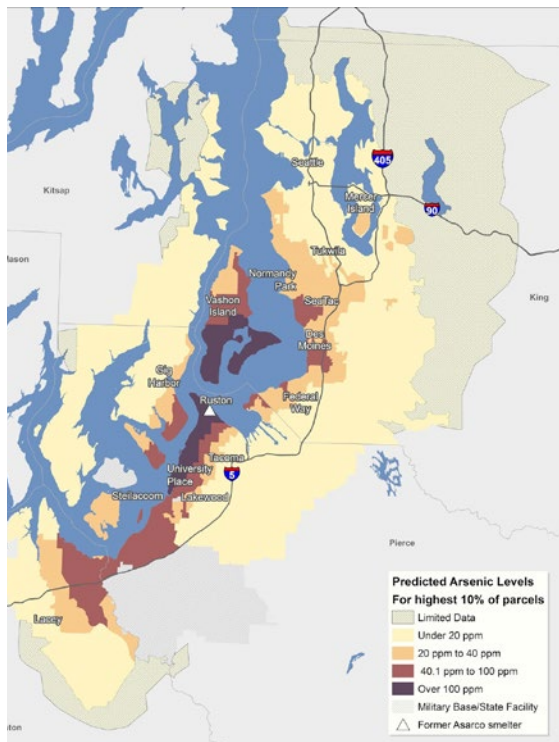


Aerial view of Asarco smelter and smokestack on Tacoma's shoreline. Image from Tacoma Public Library.

By 1927, the smelter produced 12 percent of the nation's copper.⁶ Indeed, the Asarco Smelter was the lifeblood of Ruston, providing much more than stable jobs and robust income to the families who worked for the company. A former union representative for smelter workers described the smelter as “a great part of the community,” going so far as to provide free lawn-mowing to residents.⁷ Furthermore, the smelter created a close-knit community of workers who “took care of each other; they looked out for each other; they helped one another.”⁸

Yet as early as 1907, scientists noticed that rather than diffusing harmful compounds, the taller smokestacks effectively spread the pollution throughout a much wider area.⁹ The extended reach of the smelter's noxious plume was further intensified by the smelter's niche market: it was the only smelter in the world prior to WWII capable of processing low-grade ore from mines in Lepanto, Philippines that were exceptionally high in arsenic—4% compared to 0.6% in other US smelters—as well as lead content.¹⁰ As a result, the Ruston smelter emitted staggering amounts of arsenic into the air, which traveled far distances throughout the Puget Sound, blanketing a 1,000-square-mile area over four counties with inorganic arsenic and lead that persists in the region's topsoil.¹¹

Despite the early indicators of nefarious toxicity, Asarco enjoyed license to pollute free of regulation or community resistance for nearly 70 years, save for an outcry during WWII when the notorious “arsenic showers”¹² burned residents' Victory Gardens.¹³ Interestingly, it was likely the smelter's location in residential Ruston that kept it free of legal battles for most of its existence: there were no farmers to demand compensation for destroyed produce, livestock, and pollinators.¹⁴ Additionally, prohibitive jurisdictional barriers between Tacoma and Ruston prevented neighboring Tacoma agencies from



Map of contaminated soils resulting from airborne emissions from the Tacoma smelter. Image from Washington State Department of Ecology.

6 Pickett, “Environmental Battlefield.” 51.

7 Angela Cookson and Michael K. Honey. University of Washington, Tacoma Community History Project. Oral History Interviews with Curtis Dungey and Chuck O’ Donahue, 1992. 1992.

8 Cookson, Oral History: Curtis, 7.

9 Sullivan, *Tainted Earth*. 17.

10 Sheldon Krinsky and Alonzo L Plough, *Environmental Hazards: Communicating Risks as a Social Process*, (Dover, Mass.: Auburn House, 1988), 183, 191.

11 Washington Department of Ecology Toxic Cleanup Program, “Tacoma Smelter Plume,” accessed June 2017, http://www.ecy.wa.gov/programs/tcp/sites_brochure/tacoma_smelter/2011/ts-hp.htm.

12 Sullivan, *Tainted Earth*, 21.

13 Ibid., 34.

14 Ibid., 26.

wielding any regulatory power over the smelter operations.¹⁵

The nefarious pollution did not emerge as part of the public dialogue until the 1970s, when environmentalists concerned about arsenic and sulfur dioxide that consistently rained from the smokestack began to publicly question the human and ecological health impacts of this toxic output. The subsequent involvement of the Environmental Protection Agency (EPA) marked the beginning of a decades-long battle to regulate the toxic emissions of the smelter, which was declared a Superfund site in 1983. A classic “jobs versus health” debate emerged, drawing distinct lines between Ruston residents who depended on the smelter for economic and psychological well-being¹⁶ and neighbors in Tacoma and Vashon Island who bore the brunt of the contamination with little emotional attachment to the smelter, Asarco, or its workforce.

In the face of increased pressure from the EPA and the public—and at the prospect of forced expensive mitigation equipment—coupled with construction of new smelters with regulatory technologies in place and a declining global copper market,¹⁷ Asarco shuttered its Ruston smelter in 1985. Eight years later—on January 17, 1993—the iconic smokestack was leveled, a spectacle attended by 100,000 spectators.¹⁸ The bricks of the emblematic smokestack, along with toxic rubble and soils from the razed smelter complex, were entombed in a massive on-site containment facility. Despite the significance of the smelter, little consideration was formally paid to any structural or landscape preservation or adaptive reuse. In the 1990 Record of Decision to “Remove all buildings and structures at the Site,”¹⁹ only a single mention of a preservation alternative to the demolition of the smelter is noted in the public record:

A few commenters expressed the opinion that the stack ought to be saved. Suggestions included: encasing in concrete, plugging it, painting it so it could be used as a tourist attraction or install elevators to convert the stack into an observation point for

¹⁵ Sullivan, *Tainted Earth*, 26.

¹⁶ Pickett, “Environmental Battlefield,” 56.

¹⁷ *Ibid.*, 58.

¹⁸ Derrick Nunnally, “Three Decades after the Asarco Smelter Shutdown, Its Toxic Legacy Surprises Tacoma Newcomers,” *The News Tribune*, Accessed December 12, 2016, <http://www.thenewstribune.com/news/local/article43503663.html>.

¹⁹ “Superfund Record of Decision (EPA Region 10): Commencement Bay-Nearshore/Tideflats (Operable Unit 7), Tacoma, WA. (Third Remedial Action), December 1990.” 1990. 30.



Ruston family with smokestack emitting arsenic-laden dust in background. Image from US National Archives.

Commencement Bay; or saving the lower 50 feet as a monument to the area's historic past.²⁰

Ultimately, the shoreline property was flattened and scrubbed of any visible reminder of an industrial past, ready for a new era of amnesiac development.

Today, the site of the former smelter is slowly veneered with pristine lawn in its transformation into "Point Ruston," a multi-use development including a movie theater, Wild Fin sea food restaurant, and luxury condos overlooking the stunning vista of Commencement Bay. With respect to memorializing the site's history, Point Ruston developer Loren Cohen explains it best:

We're not turning our backs to the history. We named our first building Copperline and our single family homes development Stack Hill to reflect the activities that happened on this site for so many decades.²¹



Luxury condos and waterfront recreational space developed on smelter's former site. Author's image.

In 2005, after years of strategic reorganization to protect of their corporate assets and holdings, Asarco filed for bankruptcy.²² The following four years of bankruptcy proceedings ended in a settlement that Asarco to sidestep any ongoing responsibility for the environmental destruction they had wrought in 54 sites across the US.²³ Though the \$1.79 billion they paid out to these sites was the largest environmental settlement of its kind, it fell fall short of the amount initially estimated for remediation costs ran as high as \$25 billion.²⁴

Today, the Washington State Department of Ecology is using the settlement money to continue a decades-long effort to excavate and replace the most intensely contaminated of these impacted soils throughout the Smelter Plume region. The cleanup effort consists of two primary focuses: (1) schools, daycares, and public parks through the Soil Replacement Program and (2) residential yards through the Yard Cleanup Program. The Soil Replacement Program is largely completed, while the yard cleanup effort is roughly midway through completion with an end date at least ten years out.

²⁰ "Superfund Record of Decision," AI-5.

²¹ Nunnally, "Three Decades after..."

²² Mara Kardas-Nelson, Lin Nelson, and Anne Fischel, "Bankruptcy as corporate makeover," *Dollars and Sense* 288 (2010): 21.

²³ *Ibid.*, 24.

²⁴ *Ibid.*, 25.

Put simply, the soil cleanup process entails the excavation of contaminated soils,²⁵ transport of the excavated soils to an off-site landfill, and subsequent refill of the site with “clean” soil from a third-party purveyor. The program includes—or, rather, boasts—of its inclusion of sod replacement and provides tips for returning yards to their aesthetic states before soil replacement.²⁶ For those yards that fall short of qualifying for replacement but measure above levels considered “safe,” the Dirt Alert program provides outreach materials that offer soil safety precautions including washing pets’ feet when entering the home, wearing gloves during yardwork, and gardening in raised beds.²⁷

This narrative of the Tacoma Smelter Plume illustrates a linear, digestible chronology of industrial history: unchecked industrial contamination eventually sparked a locally driven environmental backlash which led to a slow, methodical replacement of impacted soils. This simplistic tale offers a return to the care-free, contaminant-free, yesteryear of the American Dream as symbolized with a tidy, verdant lawn.

But what can be made of the threads of the story that weave through this chronology without respect to a structured storyline? Where is the permanence of heavy metals, the monumentality of displaced soils? How can we speak of the impact of arsenic byproducts dispersed across the landscape in tandem with the production of copper? Of our increasing demand for copper products? Of the ongoing destruction of ecosystems and communities in the developing world in the name of contemporary industry? How can this story be told in the present tense, as an active agent in shaping the future landscape?

The Tacoma Smelter Plume serves as the ground for this thesis: theoretical questions take root in its rich history, from which an attempt to find a new visual language for telling its story emerges. Throughout this document the Smelter Plume case study is an invocation for translate thinking to making.

25 Soil will not be removed if it is under and adjacent to permanent structures, concrete caps, permanent landscaping, large trees or shrubs, steep slopes, aquatic features, underground tanks, or livestock areas. Washington Department of Ecology, “Areas Excluded from Soil Cleanup,” June 2015.

26 Washington Department of Ecology. “Yard Sampling and Cleanup Program (Yard Program),” last updated September 2016., http://www.ecy.wa.gov/programs/tcp/sites_brochure/tacoma_smelter/yard/yardProgram.html.

27 Washington Department of Ecology, “Dirt Alert! Protect Your Family,” accessed June 2017, http://www.ecy.wa.gov/programs/tcp/sites_brochure/dirt_alert/2011/dirt-alert-outreach.html.



Residential yard receiving new, clean backfill after excavation of contaminated soils. Image from Washington State Department of Ecology.

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INDUSTRIAL HERITAGE: LAWN, SOIL AND ALL

“We live within worlds of stories, and we use stories to shape those worlds. In history, fiction, myth, or anecdote, stories tell of origins, explain causes, mark the boundaries of what is knowable, and explore the territories beyond.”

- Landscape Narratives: Design Practices for Telling Stories ¹

To interpret the landscape story of soil replacement in the Tacoma Smelter Plume through a critical lens, it is necessary to foreground that landscape—whether picturesque or industrial—is both a setting for and producer of narrative. As Potteiger and Purinton argue in their seminal work *Landscape Narratives*, is crucially important to scrutinize narratives because “they structure the meanings by which people live.”² In their interpretation, landscape narratives “combine two dimensions,” structured by chronological time and non-temporal spatial configurations, which work together to give meaning to the temporal and psychological experience of landscape. Importantly, the theory of landscape narrative does not place designers of landscapes nor even landscapes themselves as the sole creators of narrative, but rather position readers as agents of meaning, who “play a significant role in reworking and producing the meaning of a text.”³

The authors understand industrial landscapes, which they deem “wastelands,” as spaces that offer a narrative perpetually “caught in a tragic plot” in which industrial interests enact a “belligerent

¹ Matthew Potteiger and Jamie Purinton, *Landscape Narratives: Design Practices for Telling Stories*, (New York: John Wiley & Sons, 1998), 34.

² Potteiger and Purin, *Landscape Narrative*, 4.

³ Ibid., 33.



View of “Stack Hill,” framed as industrial wasteland. Image from US National Archives.

disruption of the natural course of events” with destructive impacts at a geologic scale.⁴ The culturally ingrained wasteland narrative conjures images of fenced-off, barren landscapes crowned with monumental remains of industrial structures. The authors hint at the more insidious wasteland narratives, in which radiation and toxicity invisibly seep through critical ecologic and geologic systems at a slow, unrelenting pace. The authors present such wastelands as embedded with a sense of the “uncanny,” drawing from Anthony Vidler’s definition of the uncanny as “an outgrowth of the horror story or the grotesque” which overturns the Romantic awe- and reverence-evoking notion of the sublime landscape with a “sickening estrangement from self, home, and nature”.⁵

The conventional narrative of the wasteland, however, is complicated by the narrative of restoration. Potteiger and Purinton explore six genres of restoration narratives—re-sequencing, retelling origins, juxtaposing, gathering, revealing, recycling—that all in some way attempt an “undoing” of the evil imprint of industry. Though the authors acknowledge that some restorationists challenge this “mantle of green” approach as obscuring a more nuanced tragic history of industrial site,⁶ they ultimately conclude that a narrative of optimistic return is a “necessary fiction” that can serve as a driver to imagine “the potential to reverse what seemed impossible only a few years ago.”⁷ Though *Landscape Narratives* is now decades-old, the wasteland remediation narratives outlined in this foundational work continue to emerge in high-profile design projects on post-industrial sites. The “necessary fiction” of restored landscapes, whether a public park atop a decommissioned landfill or luxury condos constructed over the tomb of a smelter—allows for a narrative of a more optimistic future in ways that the unmitigated wasteland does not.

While the remediation narrative continues to prevail in design practice, the idea that design intervention can catalyze a return to a more authentic ecology is increasingly challenged in theoretical

4 Potteiger and Purin, *Landscape Narrative*, 216.

5 Ibid., 214.

6 Ibid., 232.

7 Ibid., 235.

discourse surrounding layered landscapes. Layered landscape theory emphasizes the accumulated histories embedded in the landscape that resist a simplistic story in which “the re-creation of a single, historic layer to the exclusion of all others”⁸ is possible. Layered landscapes are thick with physical traces that comprises the “pot shards, [...], rusting factories, [...], and plumes of contaminated groundwater” as being as stratigraphically significant to a landscape’s history as soil horizons and bedrock layers.⁹ This notion of layering expands the potential for landscape narrative to “rich, thick descriptions of the values and meaning the sites hold”¹⁰ rather than to blindly embrace a pre-determined baseline of historic natural conditions.¹¹

With the understanding that narratives can serve as “a *repository or reminder of values* that individuals and communities hold,”¹² industrially layered landscape narratives become much more complex and nebulous than that of prior remediation stories. In fact, in the same essay collection, Matthew Gross argues that contemporary landscapes are embedded not with discrete, accessible social and natural histories, but with expanses of “nonknowledge” that are “not merely unknown unknowns (complete unknowns), but more or less clear knowledge of what is not known (e.g. it is unknown exactly what type of chemicals are in the ground, but it is known that they are there).”¹³ The inherent ambiguity around the composition and consequences of landscapes impacted by industry form the core of the larger narrative surrounding society’s ongoing attempt to understand how industry has shaped, continues to shape, and will irreversibly shape the landscape, from the most intimately experienced places to the farthest reaches of our environment.

8 David Havlick, “Introduction: Ecological Restoration and Layered Landscapes,” in *Restoring Layered Landscapes: History, Ecology, and Culture*, ed. Marion Hourdequin and David Havlick (Oxford: Oxford University Press, 2015), 2.

9 Havlick, “Introduction,” 1.

10 Marion Hourdequin, “Ecological Restoration, Continuity, and Change: Negotiating History and Meaning in Layered Landscapes,” in *Restoring Layered Landscapes: History, Ecology, and Culture*, ed. Marion Hourdequin and David Havlick (Oxford: Oxford University Press, 2015), 21.

11 Hourdequin, “Ecological Restoration,” 21.

12 Ibid., 23.

13 Matthias Gross, “Layered Industrial Sites: Experimental Landscapes and the Virtues of Ignorance,” in *Restoring Layered Landscapes: History, Ecology, and Culture*, ed. Marion Hourdequin and David Havlick (Oxford: Oxford University Press, 2015), 73.

To illustrate the fundamental uncertainty of industrial landscapes, in “Toxic Baggage,” Pezzullo points out: “As it does with most things that are bad for us, our cultural imaginary persistently perpetuates a love-hate relationship with toxins, both metaphorically and literally.”¹⁴ Pezzullo outlines how toxicity is communicated in popular culture, claiming “sometimes, citations of the mere scale of chemical production—toxic or not—can overwhelm us, like a horrifying, amorphous monster that seems too large to tackle or even to comprehend.”¹⁵ The sheer ubiquity of toxic contamination often obscures the ability for the general public to conceive of “what is happening annually to our bodies and to the body of the land surrounding us.”¹⁶ Pezzullo’s writing serves as a reminder that narratives of industrial landscapes have a more pressing responsibility than conceptually reconciling toxic legacies and ecological histories. Rather, narrative is a critical tool for dissemination, and one that must find a way to communicate the novel condition of contamination at a global, geologic scale to individuals at a comprehensible human scale.

Pezzullo does not simply identify the failure of predominant contamination narratives in communicating the terrifying scale of toxicity in our environment, but also argues that pollution stories both (1) make toxicity seem mundane and (2) work to transfer environmental responsibility from larger entities to individuals. In the first case, Pezzullo claims that the increasing availability of numerical costs associated with toxic chemicals has undermined a healthy repulsion toward toxicity: “when it is not fodder for fantasy, the toxic appears so incredibly banal that avoiding harm seems utterly impossible. Rather than extraordinary, toxins sometimes seem all too ordinary.”¹⁷ In the second case, by espousing personal actions such as recycling or composting, narratives about waste position individual agents as the arbiters of environmental responsibility. This narrative allows the more condemning, less digestible narrative of corporate- and state-driven contamination to go ignored.¹⁸

14 Phaedra C. Pezzullo, *Toxic Tourism: Rhetorics of Pollution, Travel, and Environmental Justice* (Tuscaloosa, US: University Alabama Press, 2007), ProQuest ebrary, 54.

15 Pezzullo, *Toxic Tourism*, 56.

16 Ibid., 60.

17 Ibid., 63.

18 Ibid., 63.

Perhaps the most important thesis in Pezzullo's critique of contamination narratives claims: "we may have declared our breakup with toxic *chemicals*, but we have yet to move on to reexamine our relationship with industrialization as a whole."¹⁹ There is a general recognition that toxic chemicals are bad for bodies and landscapes, but it has not gone so far as to catalyze an active repositioning of contemporary society's relationship to industry that continues to create toxic waste.

The discussion of landscape narratives as applied to toxic places reveals the culturally embedded story of an industrial "fall" and a remediated "return" to an ideal native ecology, and increasing discursive voices that strive to complicate—or even radically undermine—this narrational arc. If we are to understand narrative as both the content of story and the act of telling,²⁰ and consequently landscape as both a foundation from which stories emerge and a repository of narrative meaning, then it is increasingly clear that the substrate of our landscapes will forever reflect the story of industrial consumption. And while we grapple with a way to read the industrial narrative into even the most overt wastelands, we cannot ignore that toxicity haunts the edges of each story we tell to make meaning of our environment.

¹⁹ Pezzullo, *Toxic Tourism*, 62

²⁰ Potteiger and Purin, *Landscape Narrative*, 6.

View of contaminated slag on Tacoma waterfront with Mt. Rainier in background. Image from US National Archives.



CONTAMINATION AND WASTE AS INDUSTRIAL HERITAGE

“...in grappling with the profound public health menaces on polluted sites, we, too, would benefit from a sense of the ways in which our actions are prescribed by people who came before us while defining the social, cultural, and economic possibilities of people in the future.”

– Daniel Bluestone in “Toxic Sites as Places of Culture and Memory”²¹

Emergent landscape narratives must negotiate the intangible history of industrial legacies with the ongoing existence of physical contamination in the environment. An important discourse attempting to articulate a critical stance toward the tangible presence of industrial waste can be found in the historic preservation literature, wherein a growing dialogue among academics posits that any discussion of industrial heritage must necessarily encompass industrial byproducts. Though industrial heritage preservation frameworks traditionally center on a somewhat romantic view of rusted processing plants and weathered mining structures in the American West,²² a vocal cohort of preservationists argue that the field should “consider more deeply the values embodied or exhibited by [industrial] wastes on the cultural landscape.”²³

To these scholars, the remediation practices implemented by agencies such as the Environmental Protection Agency (EPA) and the Department of Ecology (DOE) all too often culminate in “an unfortunate exercise of cultural and historical amnesia.”²⁴ For the most part, Superfund sites slated for redevelopment are excavated and replaced to a degree that they are fully scrubbed of “any



Residential yard in Ruston in process of excavating contaminated soils. Image from Washington State Department of Ecology.

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- ²¹ Bluestone, Daniel, “Toxic Sites as Places of Culture and Memory: Adaptive Management for Citizenship” in *Reclaiming the Land: Rethinking Superfund Institutions, Methods and Practices*, ed. Gregg Macey and Jonathan Cannon (New York: Springer, 2007), 247.
- ²² Noble, Bruce J, Spude, Robert, and National Register of Historic Places, Guidelines for Identifying, Evaluating and Registering Historic Mining Properties, *National Register Bulletin 42*, Washington, D.C.: U.S. Dept. of the Interior, National Park Service, Interagency Resources Division, National Register of Historic Places, 1992.
- ²³ Quivik, Fredric L, “Integrating the Preservation of Cultural Resources with Remediation of Hazardous Materials: An Assessment of Superfund’s Record,” *The Public Historian* 23, no. 2 (2001): 35.
- ²⁴ Bluestone, “Toxic Sites,” 245.

physical trace of their history, of their pollution, or even of their cleanup.”²⁵ To this end, contamination is excised from the conversation of industrial heritage as a cultural resource. An alternate approach to remediation would position industrial waste landscapes as “more than just visual, physical, or chemical presences on the landscape; they embody powerful and important cultural meanings as well.”²⁶ Indeed, these imprints in the landscape are perhaps the most powerful way to challenge the predominant narrative that industrially contaminated landscapes are a relic of a distant history. While current preservation and remediation approaches tell “a simple, one-dimensional story of thoughtless disregard by industry”²⁷ that is bracketed in an outmoded past, the permanence of waste in the landscape can serve as a reminder of the ongoing industrial narrative at play in our landscapes.

Additionally, allowing industrial waste to stand as visible indicators of contamination can help sustain the story of environmental activism that is deeply intertwined with the legacy of contamination.²⁸ In this light, the toxic remnants of industry, such as tailings and slag, do not simply refer to the tragic plot of destructive industrial processes, but also memorialize waste’s role as a catalyst for the environmental movement. A deeper engagement with waste as a meaningful cultural resource offers “potential for thoughtful interpretation, which can help the public understand very palpably the contested history of industrial waste.”²⁹ The embedded power of industrial waste is utterly dependent on its preservation “as a real artifact in its original setting.”³⁰ Donald Hardesty envisions landscapes of hazard as “the setting, exhibits, and collections repository of an outdoor museum of science and industry”³¹ and Quivik argues that such interpretive spaces “can help citizens appreciate the importance of properly regulating, managing, and remediating industrial wastes.”³² Daniel Bluestone

25 Ibid.

26 Quivik, “Integrating the Preservation,” 35.

27 E. Franklin Dukes, “Rethinking community involvement for superfund site reuse” in *Reclaiming the Land: Rethinking Superfund Institutions, Methods and Practices*, ed. Gregg Macey and Jonathan Cannon (New York: Springer, 2007), 218.

28 Quivik, “Integrating the Preservation,” 45.

29 Ibid., 36.

30 Donald L. Hardesty, “Issues in Preserving Toxic Wastes as Heritage Sites.” *The Public Historian* 23, no. 2 (2001): 20.

31 Hardesty, “Issues in Preserving,” 26.

32 Quivik, “Integrating the Preservation,” 49.

further claims that such interpretation can serve as an “an important venue for learning about the use, abuse, and stewardship of the built and natural landscape.”³³

Of course, one cannot make the case for interpreting toxic waste as a cultural resource worthy of preservation without acknowledging the devastating health consequences of such contamination and the disproportionate impact these environmental injustices wield on underprivileged and minority communities. Industrial waste preservationists argue that preserving toxic landscapes is not at odds with remediation efforts aimed to improve ecological and human health; rather, they claim that preservation can align with and complement these remediation efforts by letting the story of industrial contamination have a visible presence in the landscape. Erasing the jarring and uncomfortable reminders of the ugly underbelly of resource extraction, threatens the continued urgency and drive of those working to protect fragile ecosystems and the underserved communities that bear the brunt of environmental contamination. It must be noted, however, that the case of waste preservation cannot be painted with a broad brush: preservation-remediation value decisions have high-stakes consequences that can impact public health in both the immediate and distant future.

Industrial contamination is fully interwoven with the history of industry, and as a persistent and nefarious presence in the landscape it defies any notion of “post-industrial” landscapes. Confronting contamination as an ongoing industrial story allows for the history of a place to be injected into present-day experiences of the landscape. It is critical that the narrative surrounding remediation not be allowed to claim to conclude a chapter of industrial history, but must invite continued reinterpretation of persistent toxic legacies to ensure that future generations understand the realities of their inherited cultural and material landscapes.³⁴

33 Bluestone, “Toxic Sites,” 245.

34 Brian Freer, “Future Remains: Industrial Heritage at the Hanford Plutonium Works,” (Ph.D. dissertation, York University, 2010), 30.

REASSESSING THE SCALE OF CONTAMINATION AND REMEDIATION

“A central reason for silence on urban ecological dilemmas is the staggering complexity of problems that are aggregated into large processes, but build from the disaggregated choice of individuals, each of whom is located within intricate physical and social systems”

*- Lawns and Toxins: An Ecology of the City*³⁵

Though the literature offers nuanced discourse surrounding the complex narratives of layered landscapes and the need to reconsider how toxic contamination is framed both in cultural perception and remediation practices, these discussions of industrial heritage often remain confined to barren mining landscapes or abandoned brownfield sites in urban settings. As obvious industrial scars with no economic value, these vacant landscapes are easily seen as blank slates that lend themselves to re-visioning as new developments and public parks. Such a correlation between industrial voids and design thinking, however, neglects to encompass the true scope of contamination, which is wholly indifferent to site boundaries or tidy land use designations. As is the case with the Tacoma Smelter Plume, the current and future legacy of industrial contamination infiltrates the most intimate landscape in the urban fabric: that of the residential front yard.

Numerous studies have researched the psychological impacts of residential contamination and remediation of private green spaces, and generally posit that the impact of remediation processes can be as psychologically damaging to residents as the contamination itself.³⁶ The stresses associated with residential contamination are bound with the uncertainty that surrounds the risk associated with contamination itself. Thus, not only is it imperative to investigate and communicate health impacts of exposure to toxicity, but also to consider the psychological implications of daily existence in a home that

³⁵ Paul Robbins, Annemarie Polderman and Trevor Birkenholtz, “Lawns and Toxins: An Ecology of the City.” *Cities* 18.6 (2001): 369-370.

³⁶ Frederic Vandermoere, “The Process of Soil Excavation in a Community: Site-specific Determinants of Stress Perception,” *Environment and Behavior* 38.5 (2006).



Yard receiving new sod after toxic soils excavated from Everett smelter contamination. Image from Washington State Department of Ecology.

is designated unsafe. In the context of the residential yard, contamination and remediation lose their meanings as part of an abstracted “wasteland” narrative, and instead are experienced in an acutely intimate way that directly contributes to one’s place-based identity. Through interviews with residents who recently underwent soil replacement in their homes, Vandermoere found that:

stress results from ambiguities about the often invisible physical agents (e.g. the concentration, diversity, and distribution of chemicals in the soil) and proposed solutions to mitigate the noxious consequences of these black boxes (e.g. phyto-remediation, soil excavation).³⁷

Thus, as contamination is discussed in terms of estimations and predicted consequences, such uncertainty manifests as actual, lived stress for people interacting daily with the contaminated landscapes of their own homes. Furthermore, Vandermoere identifies an intangible sense of loss that evidently accompanied soil replacement in residential yards, noting that residents felt “some aspects of their environment in everyday life before the decontamination could not be counterbalanced by material or financial compensation of whatever kind.”³⁸ It is easy to speak of reframing the industrial narrative from a theoretical perspective—and to an extent, through site design—but to craft landscape narratives that allow people to make sense of their own contaminated yards requires a complex sensitivity to the ways in which our private landscapes inform our personal identities.

For centuries, the manicured lawn has held a deeply symbolic significance in landscapes. The American understanding of the lawn as a landscape form can be attributed to such figures as Andrew Jackson Downing and Thomas Jefferson, “who envisioned landscape as wound up in the development of democracy, liberty, and the moral health of the yeoman farmer.”³⁹ Since the era of this nascent American ideology, the lawn-as-identity construct has only become more emboldened and present in the residential landscape. Feagan and Ripmeester, in “Reading Private Greenspace,” argue that the



Stacked sod prior to installation in newly replaced soil in Tacoma. Image from Washington State Department of Ecology.

³⁷ Vandermoere, “The Process of Soil Excavation,” 716

³⁸ Ibid., 735.

³⁹ Robert Feagan and Michael Ripmeester, “Reading private green space: competing geographic identities at the level of the lawn,” *Philosophy & Geography* 4.1 (2001): 83.

importance of the lawn is “is evident in terms of pervasiveness, the dedication and effort invested in its upkeep, and the significant role its maintenance plays in an industrial growth-centered economy.”⁴⁰ The lawn becomes a space for negotiating one’s identity within the larger cultural landscape.

Feagan and Ripmeester see the lawn as “an icon of communal order, a form of manufactured consent and a taken-for-granted cultural artifact,”⁴¹ an icon that is so deeply entrenched in the American consciousness that it cannot be disrupted simply by communicating the negative impacts that lawns wield on native ecosystems. In “Turfgrass Revolution,” Robbins and Birkenholtz explore the mechanisms that cement the front-yard lawn as a material manifestation of national values despite growing recognition of turf’s harmful environmental consequences. These authors comment on the sheer ubiquity of lawns in the urban fabric and the vast changes to “soil profile, stormwater runoff, water consumption, micro-fauna diversity, energy use, air quality, and opportunities and constraints for terrestrial wildlife and nesting birds”⁴² that result from such pervasiveness. Interestingly, the authors found that lawn-owners with high levels of income and education who “not only claim environmental concerns, but who also acknowledge the negative effects of their actions”⁴³ apply contaminating lawn inputs such as fertilizer and pesticides at disproportionately heavy volumes. This illogical correlation illustrates how significant the symbolic value of the lawn is to the typical US homeowner. Environmental logic is simply not enough to overturn the inherited relationship between owner and lawn: to disrupt the spread of high-input lawns across the national landscape calls for fundamental rewriting of culturally ingrained landscape narratives. As Robbins forebodes, “While seemingly innocuous, lawns represent problems of urban ecology on a vast scale.”⁴⁴

In the Tacoma Smelter Plume case, the yard presents itself as an individual unit that can be read

40 Feagan & Ripmeester, “Reading Private Green Space,” 80.

41 Ibid., 84.

42 Paul Robbins and Trevor Birkenholtz, “Turfgrass Revolution: measuring the expansion of the American lawn,” *Land Use Policy* 20 (2008): 181.

43 Robbins & Birkenholtz, “Turfgrass Revolution,” 183.

44 Robbins, Polderman & Birkenholtz, “Lawns and Toxins,” 370.



Sod being laid in a remediated yard in Ruston, WA. Image from Washington State Department of Ecology.

in terms of human experience and identity, while also functioning in aggregate to tell a story of vast geologic and ecologic shifts. The lawn is a contested space: a space of individual expression and ownership while also acting as a major building block of the urban fabric. As such, an understanding of the toxic industrial landscape as that of looming machinery and barren wastelands must be expanded to acknowledge the role of the front-yard lawn as industrial heritage.

GROUNDING

“Soils have long memories; they quietly record the history of natural and human impacts, with new changes laid down on those from the past”

*– Human–Soil Relations are Changing Rapidly*⁴⁵

Thus far, the literature examined here reflects three separate threads of the narratives at play in the landscape of the Tacoma Smelter Plume: layered industrial landscapes, toxic waste as industrial heritage, and the residential yard—and all the complex cultural connotations that embedded in it—as a landscape of industrial waste. Yet while these discursive frames provide distinct views into the story of soil replacement in the Smelter Plume, there lacks a substantive weft within which these discourses can meaningfully interweave. Theory hovers, ungrounded.

It is impossible to understand large-scale residential soil replacement in terms of narrative and cultural meaning without grappling with the soil as its own theoretical body. What happens when layered landscapes are “de-layered” and “re-layered”? What are we to make of the shifting substrates that lie at the core of the industrial cleanup process? What sort of meaning emerges from a landscape of patchwork geology?

In recent years, soil science has intentionally extended its reach into social science and cultural



Ore being fed through Tacoma smelter. Image from Tacoma Public Library.

⁴⁵ Daniel Richter et al., “Human–Soil Relations are Changing Rapidly: Proposals from SSSA’s Cross-Divisional Soil Change Working Group,” *Soil Science Society of America Journal* 75.6 (2011): 2080.

discourses. With the widening acknowledgement of the Anthropocene—our current era in which human activities have irreversibly and ubiquitously altered the global environment⁴⁶—soil science has been forced to confront its preoccupation with studying the origins and processes of undisturbed soils and instead acknowledge the inextricable human presence in soil. This understanding of “human beings as soil-forming agents,” rather than forces that simply disturb soil,⁴⁷ has spawned the field of Anthropolodology: the study of soil through the lens of human interaction. This emergent perspective provides “new opportunities for soil science to explore critical issues of societal relevance.”⁴⁸

The disruption of the long-held conventions of soil science creates new space in the literature for interpreting soil profiles in a way that serves as a model for interpreting the Anthropocene’s landscape reinvention more generally. Anthropolodologists consider the layers of human impact in the soil as fundamental components of the soil, rather than foreign intrusions within a natural soil profile. Humans have manipulated the soil since the first prehistoric populations, and have evolved to become “geological and geomorphological agents and the dominant factor in landscape evolution in the Anthropocene.”⁴⁹ Such an understanding of soil formation resonates with the concept of layered landscapes, which purports that any narrative of a return to undisturbed ecology is utterly false at best, and, at worst, actively prohibitive of more resilient change. The contemporary landscape must reckon with its very humanness, repositioning human intervention from a performance atop the soil’s surface to a structural element embedded in the landscape itself.

In *Architecture in the Anthropocene*, Seth Denizen charts the discourse surrounding “holes in the geologic present” that offer opportunities to question the role of soil in the Anthropocene. Denizen traces the history of soil science through graphic representations of soil, starting with the very first

46 Paul Robbins and Sarah Moore, “Ecological Anxiety Disorder: diagnosing the politics of the Anthropocene,” *Cultural Geographies* 20.1 (2012): 5.

47 Daniel Richter et al., “Soil in the Anthropocene” *IOP Conference Series: Earth and Environmental Science* 25.1 (2015): 1.

48 Richter et al., “Soil in the Anthropocene,” 2.

49 Simon Price et al., “Humans as major geological and geomorphological agents in the Anthropocene: the significance of artificial ground in Great Britain,” *Philosophical Transactions: Mathematical, Physical and Engineering Sciences* 369.1938 (2011): 1056-7.



Contaminated soils and slag create permanent topographical substrate along shore. Author's image.

depiction of soil as a thin and static crust atop a geologic cross section to contemporary three-dimensional mappings of soil composition. Denizen's discussion presents a shift from soil as "leftover detritus of rocks" to something that "is itself a body, complete with organs, something that grows and develops and is capable of being young or elderly."⁵⁰

Denizen locates the missing component in this chronological trajectory: a convention for representing urban soils. Despite fledgling attempts for cities to better survey their soil profiles, urban soils are often considered too degraded for systemized classification. Denizen argues that these deconstructive and invasive material presences, in fact, demand a unique taxonomy:

Things like trash, construction debris, coal ash, dredged sediments, petroleum contamination, green lawns, decomposing bodies, and rock ballast not only alter the formation of soil but themselves form soil bodies, and in this respect are taxonomically indistinguishable from soil. Thus the third hole in the anthropogenic geology of the present is also every hole in the soil survey that takes the shape and size of the city.⁵¹

⁵⁰ Seth Denizen, "Three Holes in the Geologic Present" in *Architecture in the Anthropocene : Encounters among Design, Deep Time, Science and Philosophy*, ed. Etienne Turpin (Ann Arbor: Open Humanities Press, 2013), 38.

⁵¹ Denizen, "Three Holes in the Geologic Present," 40.

Within this framework, soil as subject becomes a critical negotiator between the abstract and the material, the intimate scale and the geologic scale, the past and the future. Johannes Renes supports this move toward positioning soil as a living medium that tells us more about fluidly evolving social histories than about chronologically bound layers. Renes argues against a cleanly stratified interpretation of soil, claiming that by “distinguishing layers, the researcher brings structure in the complex (historic) landscape.”⁵² The application of distinct eras to the reading of soil gives a false tidiness to the “inextricable and dynamic palimpsests” that comprise the landscape.⁵³ To Renes, meaning and values are constantly re-negotiating with soil to create an ongoing “landscape biography” that is at once grounded in place and unbounded by time. The soil holds much more than the physical record of human existence; rather, it embodies an ever-evolving cultural consciousness.

In the Anthropocene, the claim that contaminated soils can simply be “cleaned up” rings hollow. Rather, each excavated yard and truckload of imported fill contribute to the ongoing production of meaning in the soil profile, to landscape narratives that increasingly bend toward the uncanny.

⁵² Johannes Renes, “Layered Landscapes: A Problematic Theme in Historic Landscape Research,” in *Landscape Biographies: Geographical, Historical and Archaeological Perspectives on the Production and Transmission of Landscapes*, ed. Jan Kolen, Johannes Renes and Rita Hermans (Amsterdam: Amsterdam University Press, 2015), 404.

⁵³ Renes, “Layered Landscapes,” 414.

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STORYTELLING IN A SMELTER PLUME

From a conceptual perspective, it is easy to make the case that the narratives embedded in the landscapes of the Tacoma Smelter Plume are far more diffuse than conventional discursive frameworks can support. This, of course, begs the question: how can we tell such a complex, nebulous story in a compelling and comprehensible way? If we are to critique simplistic contamination narratives, what can we offer in their stead?

The following pages chart my attempt to create a more expansive narrative framework to encompass the stories at play in the Tacoma Smelter Plume.

First, however, it is important to outline the dominant story of the Tacoma Smelter Plume provided to the general public. We must explore why the story is told, who is authoring, and how it shapes the cultural and physical landscapes. Then, we can attempt a re-telling.

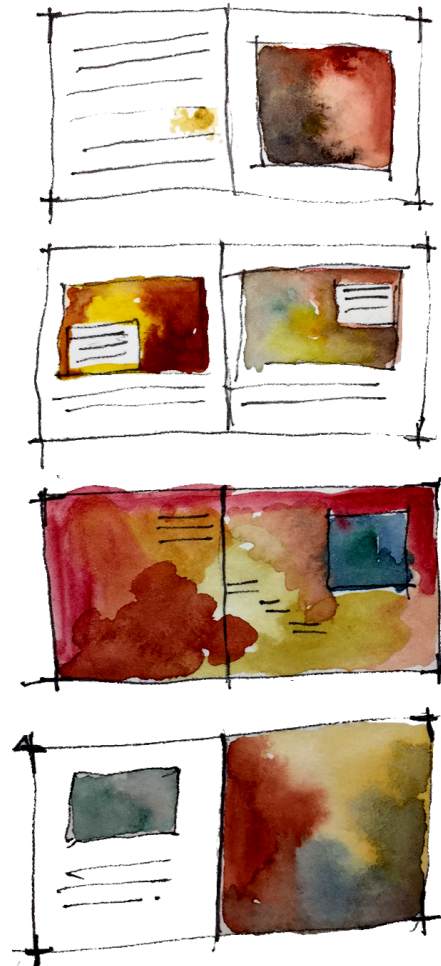
AN IMPOSSIBLE TASK

“Ecology is working with other local governments (e.g., planning departments) to improve institutional capabilities – that is to find ways to address arsenic and lead pollution as part of day-to-day business.”

– Implementation of Chapter 70.140 RCW: Area-wide Soil Contamination¹

To be quite clear, this critique is not intended to condemn the efforts of the Washington Department of Ecology (DOE) to mitigate the irreparable environmental degradation of a century of unapologetic

¹ Washington Dept. of Ecology, *Implementation of Chapter 70.140 RCW - Area-wide Soil Contamination Soil Safety Program Tacoma Smelter Plume - A Report to the Legislature*, Amy Hargrove, 09-09-127, Olympia, WA: 2009.



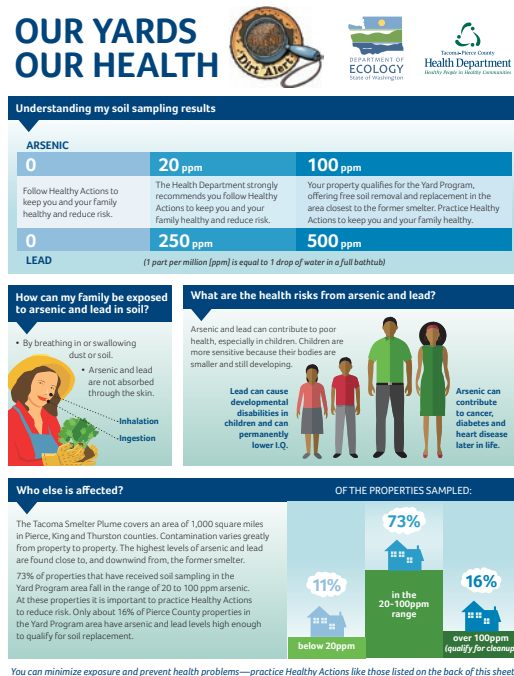
contamination. This agency inherited the impossible task of simultaneously quantifying, remediating, and communicating ASARCO's toxic wake. In a pattern that is all too familiar, ASARCO deftly avoided any ongoing responsibility for the remediation of their environmental damages by claiming bankruptcy and awarding the DOE—along with 54 other domestic sites—a finite settlement for a task rife with uncertainty. Tellingly, ASARCO now operates under the global mining giant Grupo Mexico, a corporation notorious for violently suppressing labor demonstrations and responsible for a staggering array of environmental disasters, including a devastating oil spill in Mexico's Sonora River in 2015.² The absence of ASARCO's voice in the contemporary contamination narrative is a silent undertow in every telling of the toxic story.

All in all, the DOE has become the accountable voice for framing the contaminated condition to the public while also planning and implementing remediation strategies. The DOE minces no words when it outlines its guiding goals: “Prevent pollution. Clean up pollution. Support sustainable communities, and natural resources. Deliver efficient and effective services.”³ With such a clearly defined finish line, narrative becomes a tool to set the stage for a specific intervention, which, in this case, is soil removal and replacement.

To accomplish the clean-up goal with as little disruption to established community values and identities:

The agencies set a goal to create a positive, incentive-based program – a program that meets the requirements of the law while conveying an overall positive message to the school and childcare communities.⁴

It is entirely understandable that, as agents tasked with intervening in the most personal and sensitive landscapes —i.e., schools, playgrounds, and yards — the resulting narrational strategy is



Sample of “Dirt Alert!” graphic communication. Image from Washington State Department of Ecology.

- 2 David Bacon, “When the River Turned Yellow,” *The American Prospect* | *Longform*, July 13, 2016, accessed June 1, 2017, <http://prospect.org/article/when-river-turned-yellow>.
- 3 “Overview of the Washington Department of Ecology,” Washington Dept. of Ecology, accessed June 1, 2017, <http://www.ecy.wa.gov/about/overview.html>.
- 4 Washington Dept. of Ecology, *Implementation of Chapter 70.140 RCW*, vii.

to imbue the remediation with optimism. It is to the DOE's credit that this strategy attempts to avoid stigmatization, and to resist falling into the "jobs versus health" polarities that have long drawn lines between the working-class residents of Ruston and neighboring communities who bore the brunt of the contamination without any economic or social ties to the smelter. In fact, the DOE's efforts to create a positive and accessible narrative can be read as a tense history of agency-community communications that centered on the smelter in its turbulent closing days. Indeed, the origins of this agency-led narrative begin in the early 1980s, in the shadow of the soon-to-be-demolished smokestack.

It was during this era that a vocal group of residents placed increasing pressure on local and federal agencies to regulate ASARCO's arsenic emissions. At the time, there were no official limits delineated for airborne arsenic. In an unprecedented move, the EPA decided to instigate a community process to determine the critical point at which increased cancer risks outweigh the value of the smelter operations.⁵ This community participatory approach — which came to be known as the "Tacoma Process" — gained national attention, sparking a heated exchange between EPA director William Ruckelshaus and the editorial staff of the *New York Times* over the ethics of asking a community to select its own cancer risk.^{6,7}

In this moment, the narratives of toxic contamination, industrial heritage, private space, and public responsibility were thrust into the civic discourse. Suddenly, the community became storytelling agents. Not unexpectedly, the process became tense and volatile as distinct authorial perspectives fought to control the narrative: solid cultural values positioning themselves upon unstable scientific grounds. ASARCO shuttered its Ruston operations before a consensus could be reached; no arsenic limits were ever defined.⁸

5 Karen Pickett, "Environmental Battlefield: Ruston, Washington, Home to an Asarco Smelter and Superfund Site," *Mining History Journal* 7 (2000): 58-61.

6 New York Times Editorial board, "Mr. Ruckelshaus as Caesar," *New York Times*, July 16, 1983.

7 William Ruckelshaus, "Letter: On Tacoma's Air; How E.P.A. Faces the Arsenic Risk," *New York Times*, July 23, 1983.

8 Sheldon Krinsky and Alonzo L. Plough, *Environmental Hazards: Communicating Risks as a Social Process* (Dover, Mass.: Auburn House, 1988).



Union workers striking at Asarco copper smelter in Ruston.
Image from Tacoma Public Library.

Once the skies cleared, the focus of the contamination narrative shifted from overhead to the ground below. Agencies and researchers worked to assess and quantify the extent and consequences of the soil contamination, while a company town struggled to craft its own post-industrial identity. During this liminal period, the smokestack stood tall: a looming sentinel watching over the authors of its elegy. The story settled into a mournful tone as residents attempted to make sense of the more insidious legacies of contamination, while to those whose identities were inextricably linked to the smelter, the silent smokestack “symbolized the larger community’s rejection of the industrial base that had built not only Ruston, but Tacoma as well.”⁹

Once the smelter grounds were razed and entombed in an on-site landfill, packed with soil excavated from the most egregiously contaminated Ruston yards, the scraped and leveled shoreline was as clear an illustration as any of the uncertain future of this landscape’s narrative. When the DOE set out to rewrite the contamination story in South Puget Sound—with limited funds and an staggering scope of responsibility—this expunged surface acted as a substrate for the next emerging narrative.

This is to say that the DOE’s official story has a clear and intentional purpose: to pave the way for a standard, agency-defined remediation process that has been deemed the best solution for mitigating the most toxic spaces in the urban fabric.

The agencies had to forge a way to tell a story of contamination that would grant the agency entry into private yards, in the interest of public health. As Ruston yard cleanup manager explained, “The job that I have been tasked with is to convince people to let us clean up their property.”¹⁰ It is no surprise, then, that such a specifically targeted story has been carefully crafted with two overarching strategies: (1) to appeal to residents’ existing landscape aesthetics and values and (2) to establish a sense of closure in regards to industrial legacies with minimal disruption to personal narratives.



Asarco smelter site after being razed and capped. Image from US Environmental Protection Agency.

⁹ Pickett, “Environmental Battlefield,” 58.

¹⁰ Bob Carson, “Asarco: The cleanup holdouts in Ruston,” *The News Tribune*, February 9, 2010, accessed June, 1 2017, <http://www.thenewstribune.com/topstories/v-printerfriendly/story/1041785.html>.



Video captures from Washington State Department of Ecology's Yard Cleanup Program digital outreach collateral. "Tacoma Smelter Plume: Yard Cleanup Program (Part 3)," published January 20, 2015.

As such, the tidy, green lawn has been cast as the remediation protagonist. The Yard Cleanup Program offers the following introduction to their video regarding post-soil replacement lawn care: “Congratulations! Your new yard is installed and the grass is bright, green, and alive.”¹¹

The lawn, as previously discussed, remains a paramount symbol in the American identity, and a comforting indicator of continuity and familiarity in the landscape. The lawn speaks to the scale of the family home and a nostalgic appeal to the idealized American neighborhood. It is a critical bridge that grants access to the private realm for remediation, inspiring a reassuring sense that the more difficult abstractness of industrial pollution exists only in landscapes that fall outside of the boundaries of the personal home. And certainly, using the lawn as a negotiator between remediation objectives and public acceptance is not always powerful enough to revise residents’ personal landscape narratives:

“For me, this isn’t just my house, it’s my world,” [a local homeowner] said. “I don’t want people coming in here ripping it up, and I don’t think there’s a rational reason to do that. I’ve spent the last 12 years of my life doing this garden. I don’t want to start over. I’m too old to start over.”¹²

Yet, the longer that the region’s landscape evolves without the visible reminder of the ASARCO smokestack, and as new residents move to the region without an inherited history of the place, the industrial story is written afresh. As the industrial fabric of the city is covered with new development and a thin veneer of manicured lawn, narrative is the only tool for reading toxicity into the landscape. As one new resident asked: “How many people my age would even know what a smelter is?”¹³

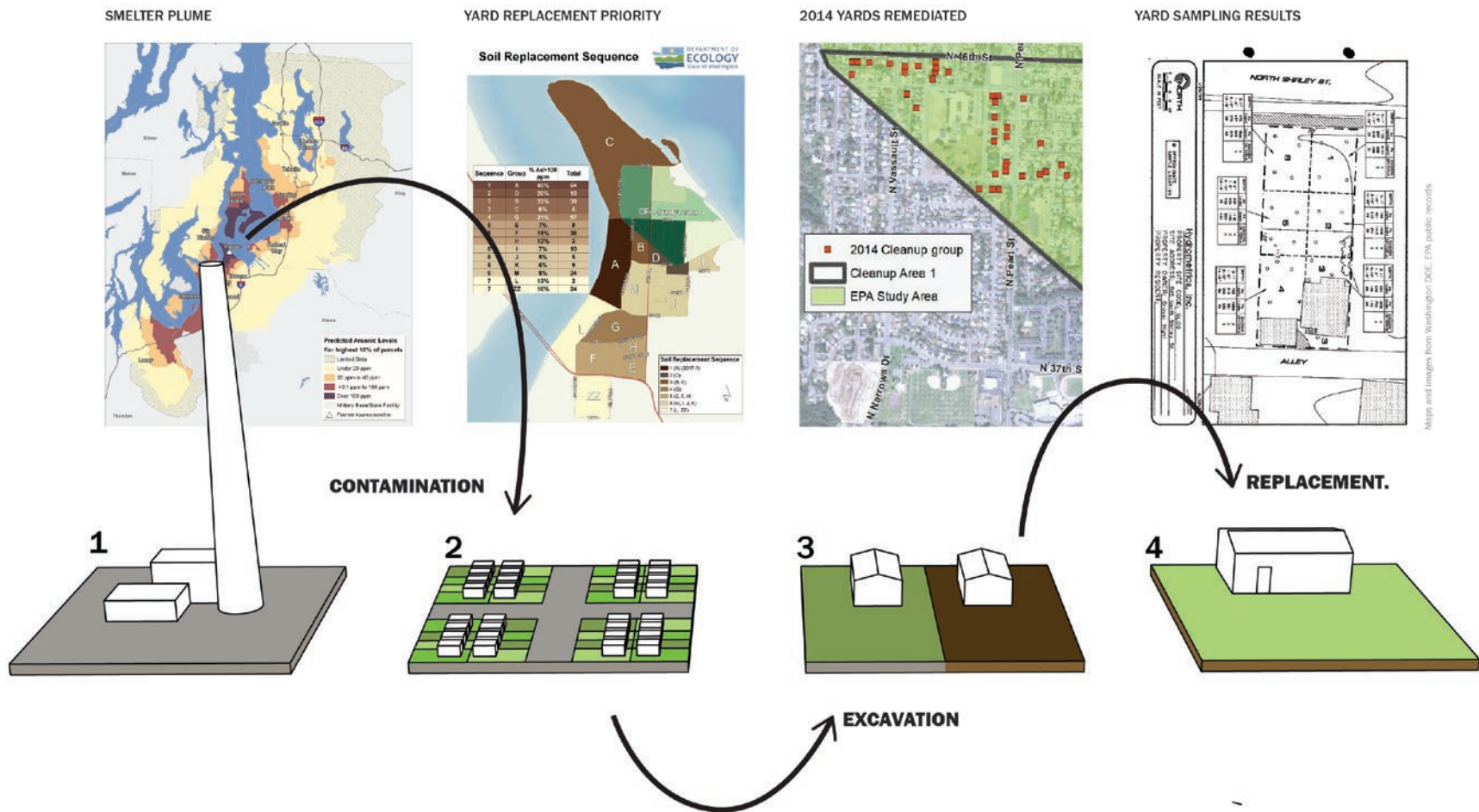


Excavator poised to remove contaminated soils from front yard. Image from Washington State Department of Ecology.

¹¹ “Cleanup in the Yard Program,” Washington Dept. of Ecology, accessed June 1, 2017, http://www.ecy.wa.gov/programs/tcp/sites_brochure/tacoma_smelter/yard/cleanup.html.

¹² Carson, “Asarco: The cleanup holdouts.”

¹³ Derrick Nunnally, “Three Decades after the Asarco Smelter Shutdown, Its Toxic Legacy Surprises Tacoma Newcomers,” *The News Tribune*, November 7, 2015, accessed December 12, 2016, <http://www.thenewstribune.com/news/local/>



The remediation narrative presented by public agencies uses tidy boundaries and increasing scale to set the stage for the excavation/replacement solution. All maps from Washington State Department of Ecology.

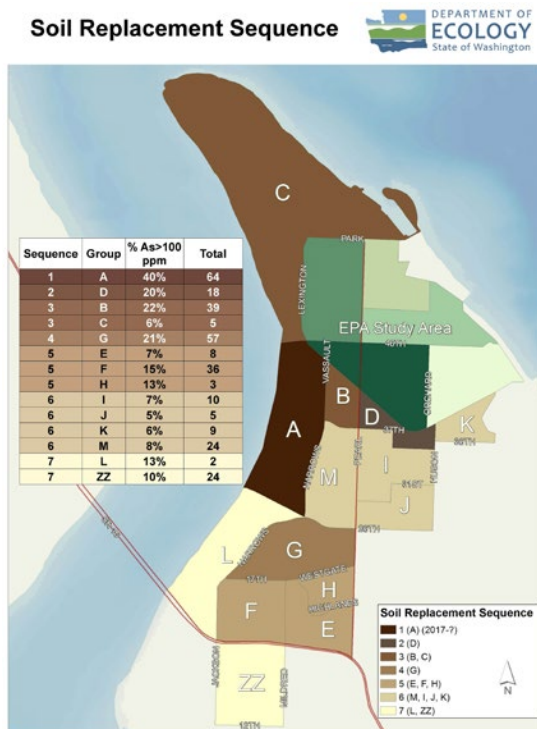
A DIDACTIC TALE

As we try to distance ourselves from the memory of industry, it is tempting to fold the agency-written story of contamination into our larger landscape narratives. The offered framing moves from expansive to intimate, from regional industrial contamination to personal safety. This story posits a conclusion; it offers salvation.

It begins with the abstract: a delineation of the smelter's toxic plume, a map whose clean boundaries belie the uncertainty and diffuseness of the actual toxicity. This bird's eye view neatly frames the scope of the plume, while a vaguely toxic color ramp evokes a sense of distanced disbelief for the reader. With increasing granularity, the boundaries of the story tighten around their final destination: the residential parcel. Within this frame, cleanup is possible.

The story moves in one direction; the progression from industrial contamination to residential remediation is digestible and convincing. The finality of a new lawn is so tempting, the cleanness of new topsoil so comforting, that it feels almost subversive to look back at the destruction we have left in our wake.

By adopting a narrative that only looks forward, we lose an opportunity to reflect on our past. To go to the site of the old smelter today, there is not a trace of the site's history above the ground. We are offered a playful fountain, movie theater, luxury condos, and a freshly tended lawn without any hint of the an industrial heritage physically entombed beneath our feet. A topography made entirely of arsenic-laced slag becomes the bedrock to a public park. When the stories we tell about remediation presuppose that we can close the chapter of toxicity, we lose the depth of the landscape narrative. We lose the fearsome adjacencies embedded in the ground. We risk erasing these origin stories from the cultural consciousness.



Distinctly delineated regions make the contamination narrative digestible. Image from Washington State Department of Ecology.

OUTLINING DIFFUSENESS

But what might an alternative to the sequential narrative of the Tacoma Smelter Plume look like?

How could this new story unfold in a way that embodies both the diffuseness and the permanence of the contamination itself?

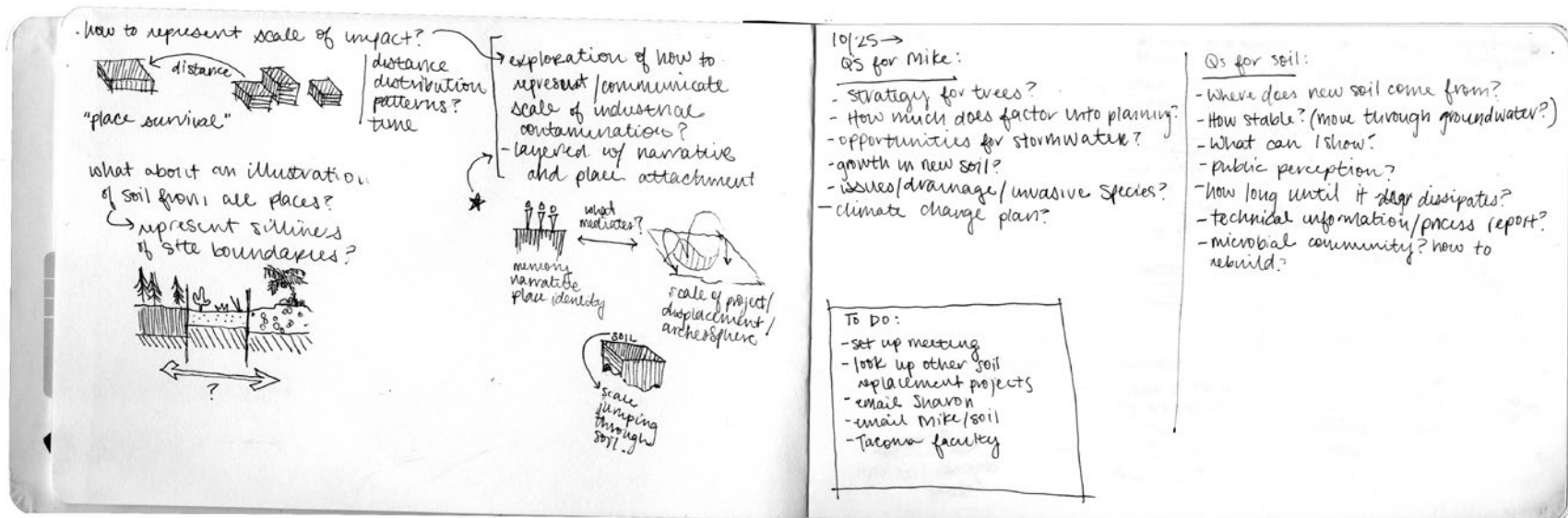
As a designer, I relished the prospect of translating my conceptual thinking into artifact. However, I quickly confronted the inherent irony in this effort as my linear pen attempted to outline a diffuse story. With each attempt to create a coherent narrative from my research, I became acutely aware of the nuance that was lost in this translation. As I attempted to establish order and structure among the threads of the smelter story, I found myself simply redrawing the boundaries of the story rather than erasing them.

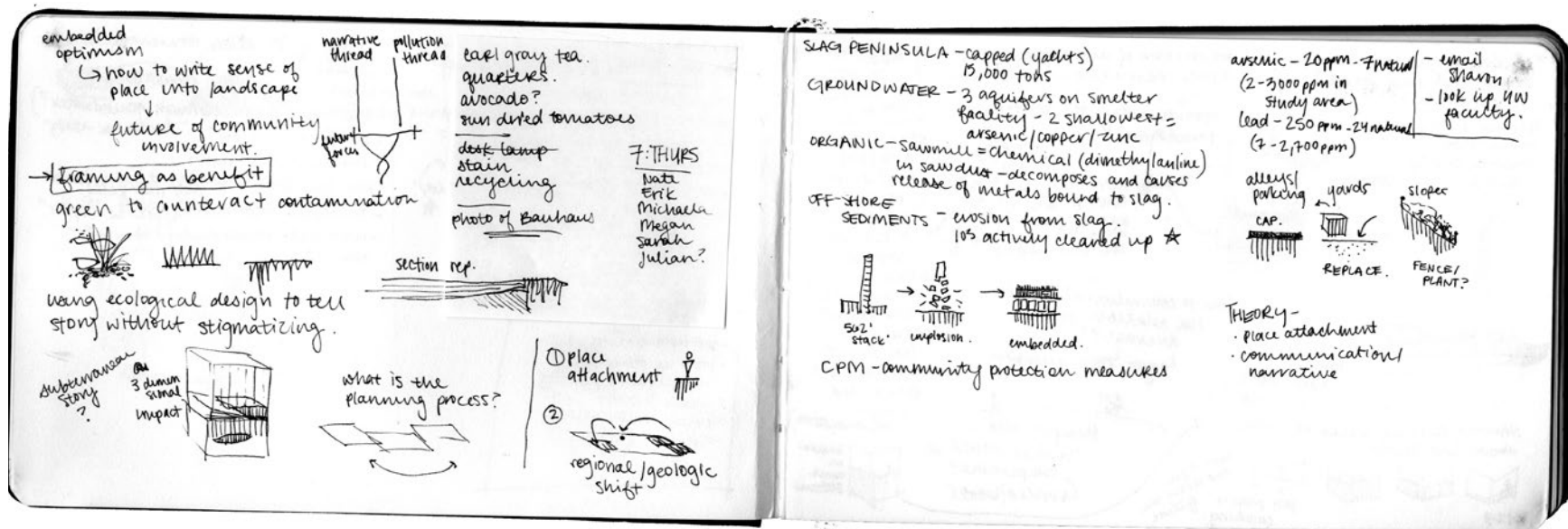
How to represent the scale of impact?

How can narrative and place attachment be layered onto the representation of industrial contamination?

What mediates between place memory and displacement? Can soil navigate between these scales?

How can we represent the futility of site boundaries in these Anthropocenic stories?





How to write a sense of place into the landscape?

How could ecological design be used as a tool to tell the story without stigmatizing?

How can representation weave the threads of industrial contamination and landscape narrative together?

Though I aspired to emulate a more creative agency through my own story-telling process, I struggled to break from a linear narrative as the story started to take shape on the page. My initial storyboard for the Tacoma smelter plume narrative simply re-positioned the remediation process as a continuation of the industrial saga rather than a conclusion. This was a subtle move, but by expanding the horizon of the smelter plume story—situating industrial contamination within a larger history and ongoing perspective—I began to find a more solid footing on the page.

I tentatively pushed at the conventional bookends of the contamination/remediation story. In place of the sequentially narrowing focus offered in the standard telling of this story, I sought to draw a narrational framework that would itself mirror the processes at play in the smelter's ongoing industrial legacy. Instead of allowing the story to narrow toward a digestible solution, I resisted this conclusion by tracing a more cyclic arc:

concentration (embedded ore)

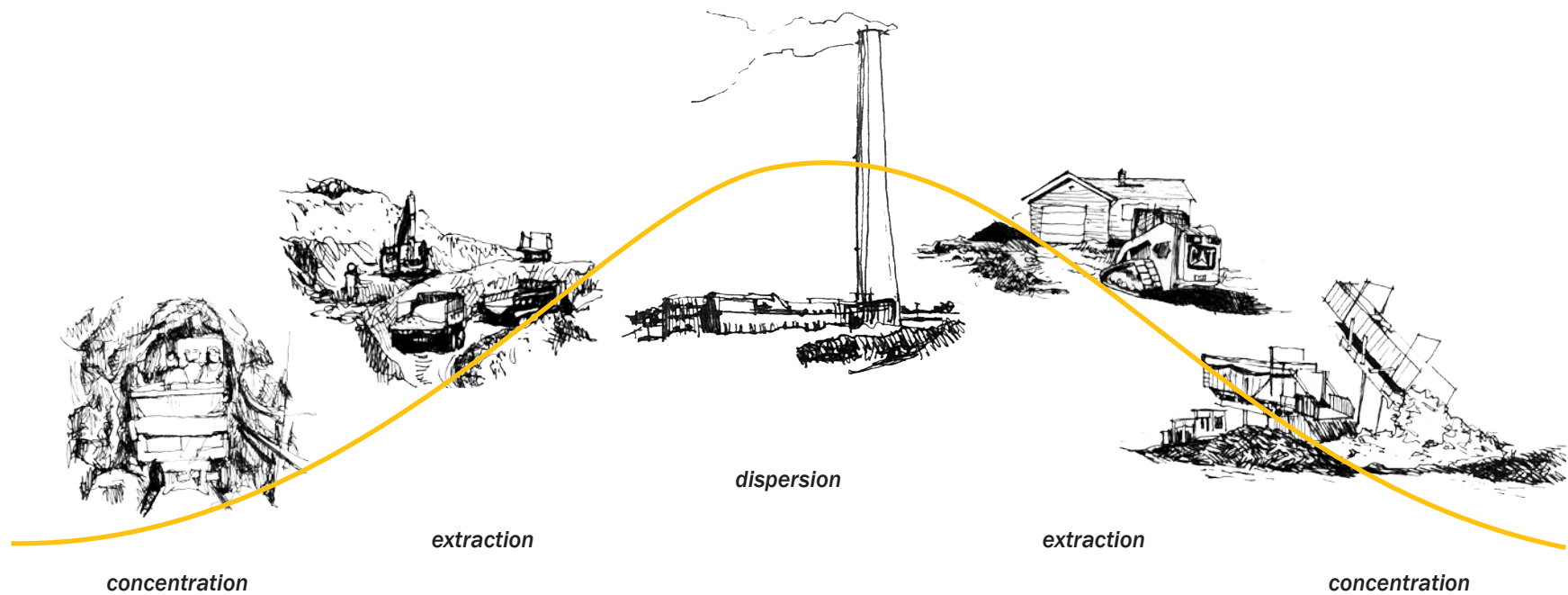
extraction (mining)

dispersion (toxic emissions)

extraction (topsoil excavation)

concentration (landfill)

The themes of concentration, extraction, and dispersal served as organizing pillars to support a dialogic exploration between image, text, and content. The narrative-forming process became an exercise in utilizing visual strategies — in both the images themselves and in the relationships between the elements on the page — to enact the workings of the story itself.



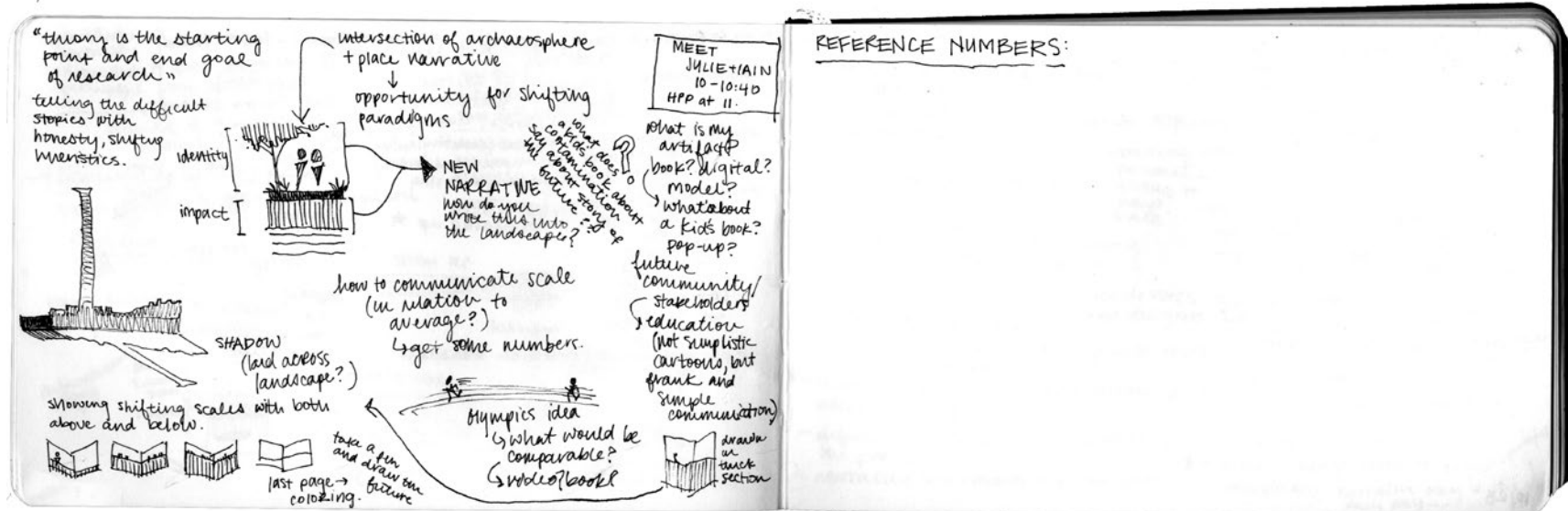
Though these initial attempts to craft an alternative smelter plume narrative fell short of matching the conceptual frame through which I approached them, this was nonetheless a critical stage of my project. As I reflect on these early sketches, I can trace the slow dissolution of my internal reservations toward expressing this story with full creative agency. I had to confront just how deeply the instinct to resolve stories was ingrained in my own psyche before I could find a creative rhythm; this part of the story is as much about overcoming my personal barriers as creating a more expansive contamination narrative.

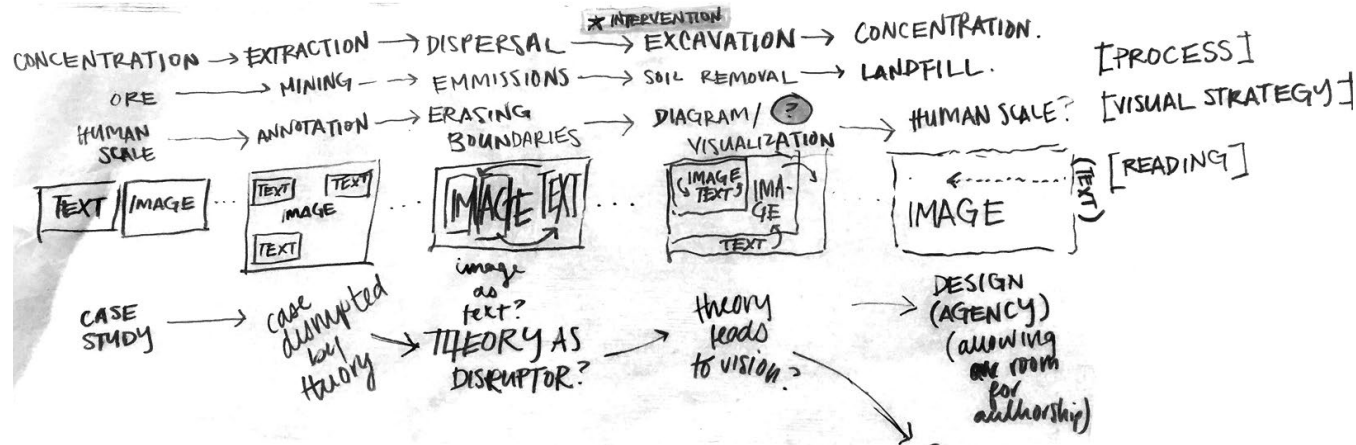
As I started grappling with my conceptual questions in my sketchbook, my initial impulse was to somehow link the human experience to the sheer scale of the remediation process. I continued to circle back to this tension between the intimacy of place attachment, memory, and identity that is largely performed aboveground and the regional scale of post-industrial displacement happening

The intersection of the archaeosphere and place narrative as an opportunity for shifting paradigms: what is this new narrative?

What would a picture book of this story look like? How can it relay shifting scales?

How can a story reach the future community in a simple and frank presentation without making a caricature of contamination?





below the surface. This juxtaposition seemed critical to telling a story that could write a more nuanced sense of place into a landscape that is physically embedded with such a striking legacy of contamination and remediation. I drew endless iterations of this thought in the section view: how could I navigate between the intimate and the geologic in this story? Each diagram sparked a question; each question sparked a diagram. Yet the question I had conspicuously neglected to ask myself the more fundamental questions: who was my audience for this story? Beyond disrupting the lawn-driven story, what did I envision the outcome of my contamination narrative to be?

Drawing from my instincts cultivated in the design studio, I was tempted to use my story-telling platform to offer landscape architectural solutions to the contaminated condition. This impulse hovered over the nascent stages of my project: what alternatives could I present to a future blanketed in fertilized lawns? Phytoremediation? Rain gardens? A way of physically memorializing the region's industrial legacy? A multi-modal path that traces the contours of the smelter plume?



[above] Illustrations from Elisha Cooper's *Beach* (2006) gracefully represent the passage of time at the scene scale.

[below] Cooper's book fluidly shifts from the landscape perspective to individual moments at the human scale.



A woman changes into her swimsuit under her towel.



Another woman spreads her towel on the sand.



The wind is not helping a man put up his umbrella.



A woman pushes and pulls a packed wagon.

I struggled to find a way to reconcile my training as a landscape architect with my intuition that this was a story that should inspire imagination rather than suggest an intervention. I wanted to offer a story that allowed the people living within the smelter plume—and, really, any contaminated landscape—to view the landscape as a space for agency and creation, as a space for reflection and narration. In short, I wanted the audience of this story to view the contaminated landscape as a medium, not a substrate.

It was not long until I asked myself the pivotal question: “What is my artifact?” Seeing this question written on the page served as an internal call to action. I began to envision how this narrative may play out on the page rather than in an abstract aspiration.

My intuitive response to the artifact question came in the form of a picture book. It was not long ago that, as a preschool teacher, I spent a significant portion of my time reading picture books. More importantly, I spent a significant portion of my time *re-reading* picture books. There is a special wonder that the picture book evokes: it draws you back to its pages again and again. It does not simply illustrate the textual story, but rather creates an entire world for the reader. There is a suspense of disbelief inherent in a picture book, which allows a unique way of reading that navigates between the real and the imaginary without resistance.

To me, the picture book offered a way to resist the didactic tendencies of infographics and the alienating language of professionalized discourse. Perhaps my willingness to embrace the picture book as a space to explore the darkest impacts of human consumption might appear incongruent to some. The picture book is so strongly associated with childhood whimsy that it seems absurd to suggest the form as a viable ground for exploring complex theoretical intersections. Perhaps we intuitively resist introducing damning subjects such as contamination into the child's imaginative space. Perhaps we forget the transformational power within these pages to shape a nascent worldview.

I refuse to believe that the powerful relationship between image and story and telling that unfolds in the picture book is exclusively beneficial to a young child.

I am not the only one to consider the picture book as a critical space. A fascinating academic discourse examines the way that meaning and agency is created through the active practice of reading a picture book. Postmodern picture books, in particular, “create a playing field where the reader explores and experiments with relationships between words and the pictures.”¹⁴ This act of reading image and text in a reciprocal way is framed as “interanimation,” in which the meaning produced in the relationships between words and illustration is much greater than the sum of its parts.¹⁵ Especially in relation to environmental issues and global systems, the capacity of picture books to navigate “across objects, time, and place” and to simultaneously present “evidence and possibility”¹⁶ positions the reader alongside the author and illustrator as a story-telling agent.

I curated a stack of picture books on my studio desk, and returned to them as a source for inspiration throughout the entirety of this project. I was continually struck at the ability of these stories to fluidly traverse between scales and across time without feeling the need to justify these conceits.

Elisha Cooper’s work,¹⁷ especially, expertly navigates between representations of temporal phenomena at the scene scale and individual moments in time. David Macauley’s *Black and White*¹⁸, too, resonated with my goals in telling a contamination story for the smelter plume. Macauley’s book presents four concurrent—and initially distinct—story lines that slowly interweave. As the narratives overlap, the drawn boundaries between these illustrations dissolve to reveal the larger web underlying these individual stories.

14 Carol Driggs Wolfenbarger and Lawrence Sipe, “A Unique Visual and Literary Art Form: Recent Research on Picturebooks,” *Language Arts* 83.3 (January 2007): 274.

15 David Lewis, *Reading contemporary picturebooks: picturing text* (New York: Routledge Falmer, 2001), 35-38.

16 Wolfenbarger & Sipe, “A Unique Visual,” 274.

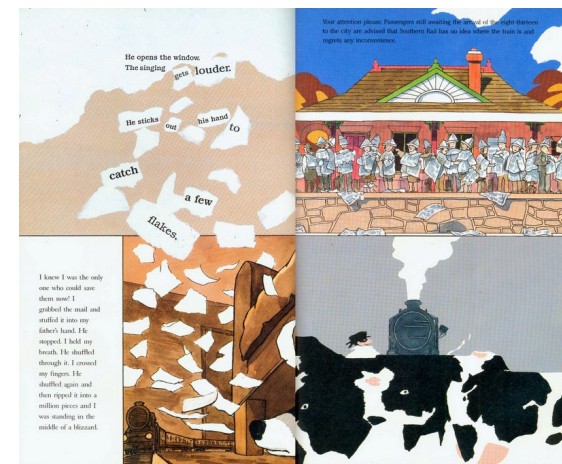
17 *Beach* (2006) and *Train* (2013) are especially lovely examples.

18 David Macauley, *Black and White* (Boston: Houghton Mifflin, 1990).



[above] Spreads from David Macauley’s *Black and White* (1990) present four simultaneously unfolding narratives.

[below] As the stories progress, the narratives intertwine and slowly escape the boundaries of their picture frames.



Beyond children's literature, the picture book has a unique position in landscape architectural representation. The picture book was a critical tool as landscape architecture began to assert itself as a specialized profession; the pinnacle of the landscape architectural picture books is undoubtedly found in Humphrey Repton's Red Books, tomes replete with beautifully illustrated landscapes strategically layered for a before-and-after reveal. Repton's "images *matter*, both materially and socially, as part of the fabric of the rooms they were designed to be admired in, rooms that often looked out on the places the red books re-visioned."¹⁹ These books not only negotiated between image and text, but situated its reader within the physical landscape, bridging the imagined world of the book to the tangible environment beyond the window. These illustrated views provided a language with which the reader could interpret her lived experience in the landscape.

The picture book creates a unique space for representing diffuseness and complexity without sacrificing simplicity; it offers a medium to bridge imagination and agency in the landscape.

STORYBOARDING TOXICITY

These books offered an armature upon which I could begin to sculpt a material narrative. Working from this foundation. I generated three concepts of how the words and text of the story might unfold in a performance that inspires a sort of creative imagination in reading the contamination story. Each of these concepts explores how text and image can interact on the page to model the processes at play in both the content of the book as well as the reading of the book. Each concept offered a way to invoke the agency of the reader by bringing different modes of communication in conversation with each other; each attempts sets the stage for a more resilient design ethic.

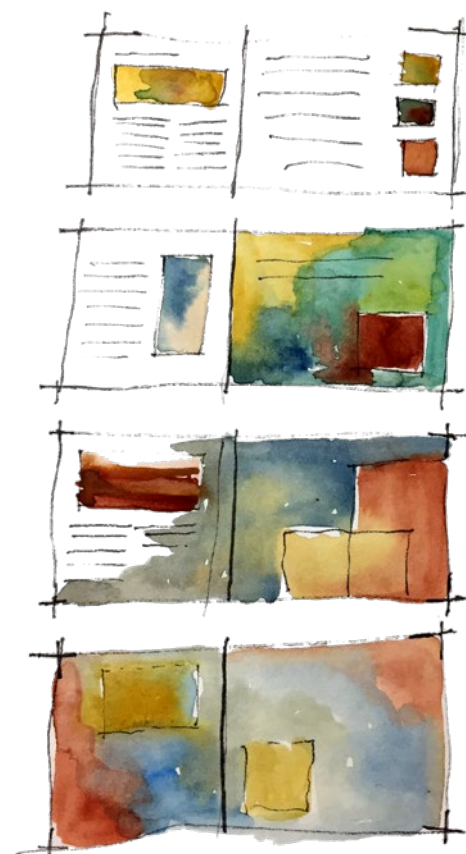


Humphry Repton's archetypal Red Books used the picture book format to communicate landscape agency. Images from the Public Domain.

¹⁹ Stephen Daniels, "Moveable Views: Repton's Composite Art of Landscape Gardening," in *Composite Landscapes: Photomontage and Landscape Architecture*, ed. Charles Waldheim and Andrea Hansen (Ostfildern, Germany: Hatje Cantz Verlag, 2014), 28.

CONCEPT ONE:

Tacoma's soil replacement story unfolds through an interweaving of image and text. Images become increasingly diffuse as the story's web widens. The narrative ends with adjacent images offering the DOE/EPA "clean up" version of the ending story, juxtaposed with images exploring permanence and the lasting impacts of contamination and remediation. This adjacency offers a choice in how one chooses to comprehend the conclusion of this story, and in a meta-literary move reveals the power of authorial framing to inform interpretation of content.



Conventional framing of story faces nuanced exploration.

Image gains prominence in conceptual exploration.

Image bleeds into facing page as conventional narrative "ends."

Story continues in series of image spreads.



Image and text begin as discrete pages.

Annotation begins to blur distinction between text and image.

Diffuse images consume text.

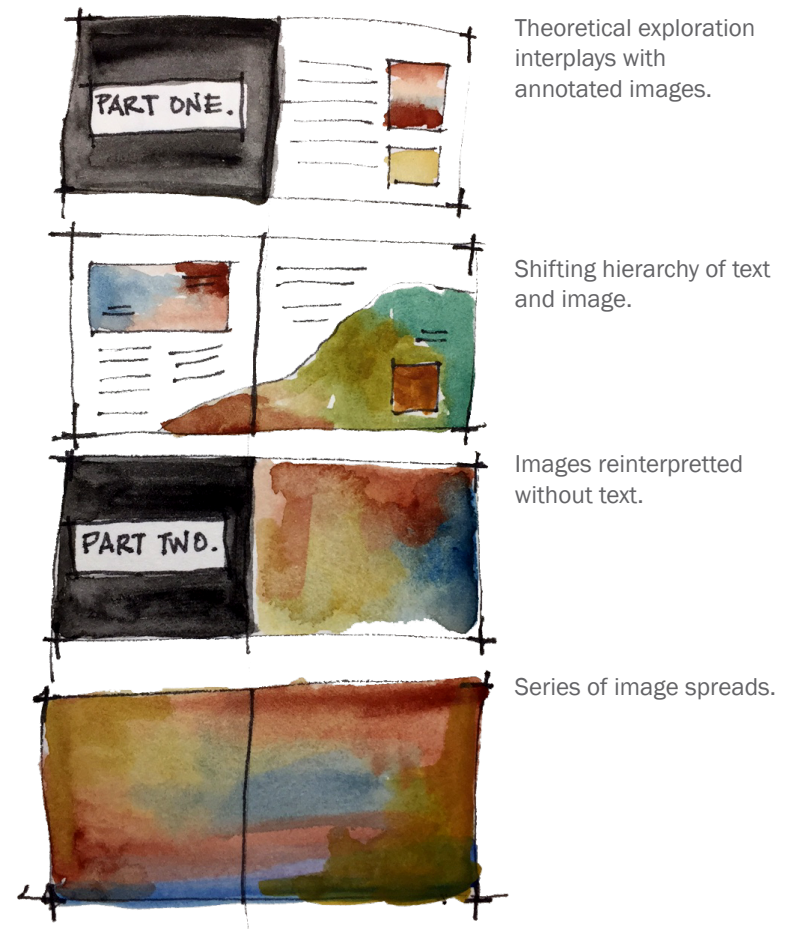
Distinct “clean up” narrative and diffuse agency narrative.

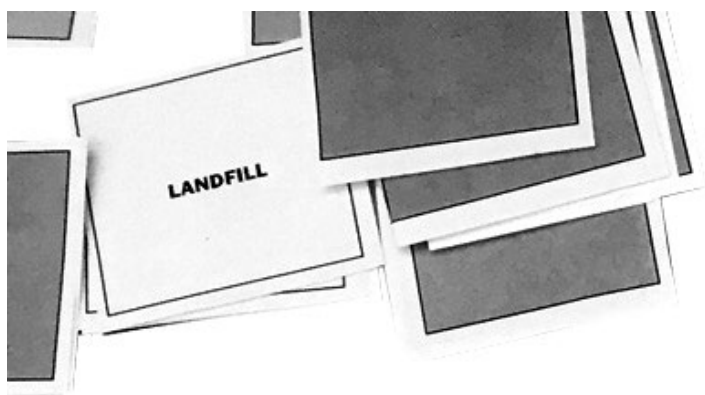
CONCEPT TWO

Two concurrent narratives of the soil replacement saga unfold alongside each other: the “clean-up” story put forth by agencies, and the interpretation of Tacoma as told through the intersection of theoretical frameworks. The exploratory side of the story becomes more diffuse as contamination is examined through expanding perspectives, becoming more diffuse and unbounded by graphic conventions. When the cleanup narrative “ends,” the evolving narrative takes over, so the reader is left with an unmediated image. This structure takes a more critical stance toward soil replacement solutions, allowing ambiguous image to consume the presupposition that we can choose when this story ends.

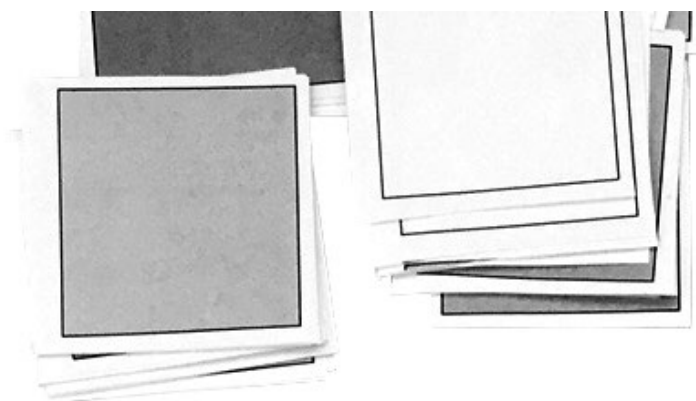
CONCEPT THREE

In the final concept, the interplay of text and image arises in the adjacency between two alternative narratives—one with text explanation, the other without. By presenting a series of image with little to no text, the narrative is left to the reader to interpret. The same images will be present in both part, just rearranged, scaled, overlaid, and juxtaposed. This structure allows the audience to read the text into the part-two images with their own agency, and offers these readers unmitigated interpretive agency within the images.





"Swatches" with image concepts for the smelter plume narrative offered a way to iterate different storyboard concepts.

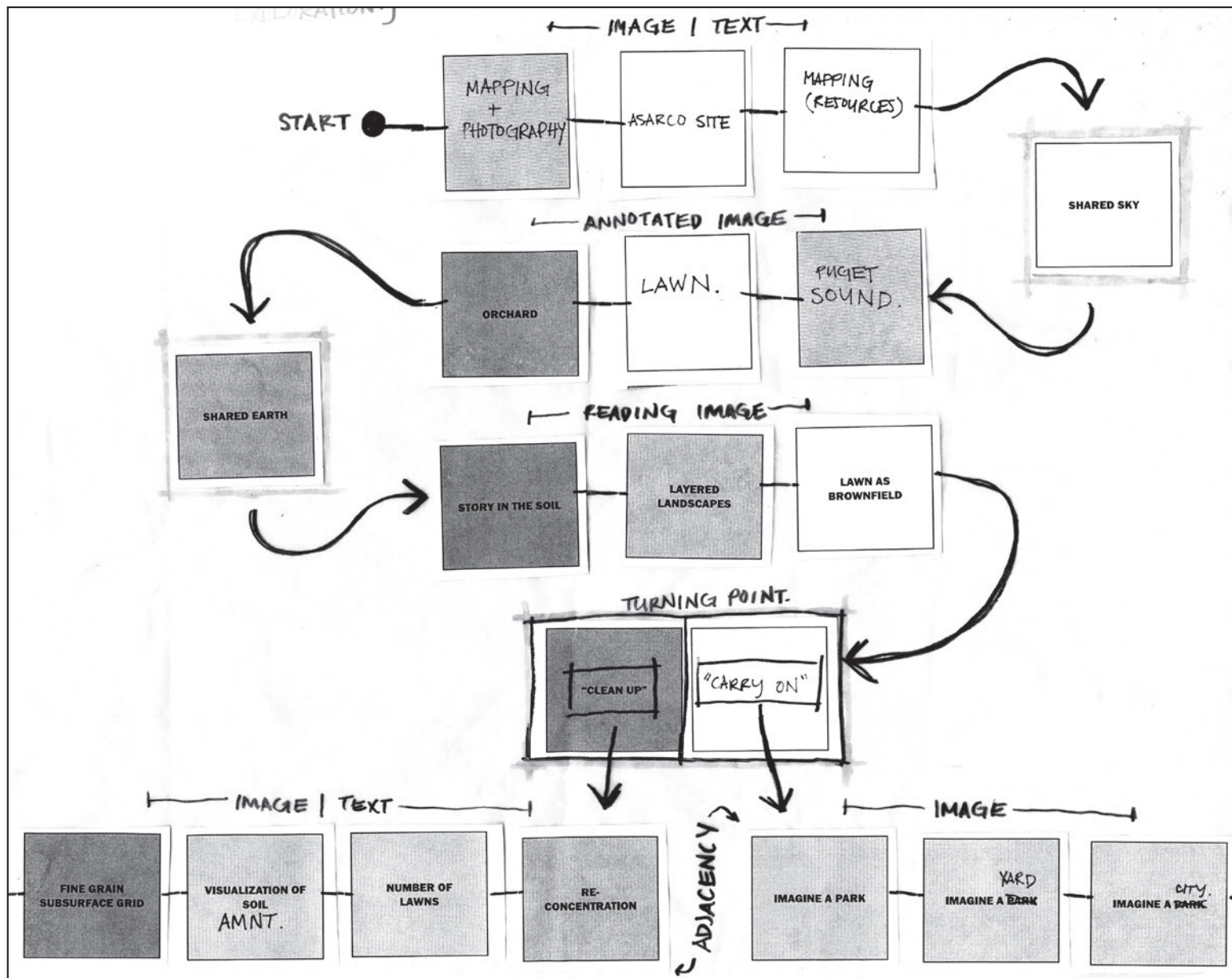


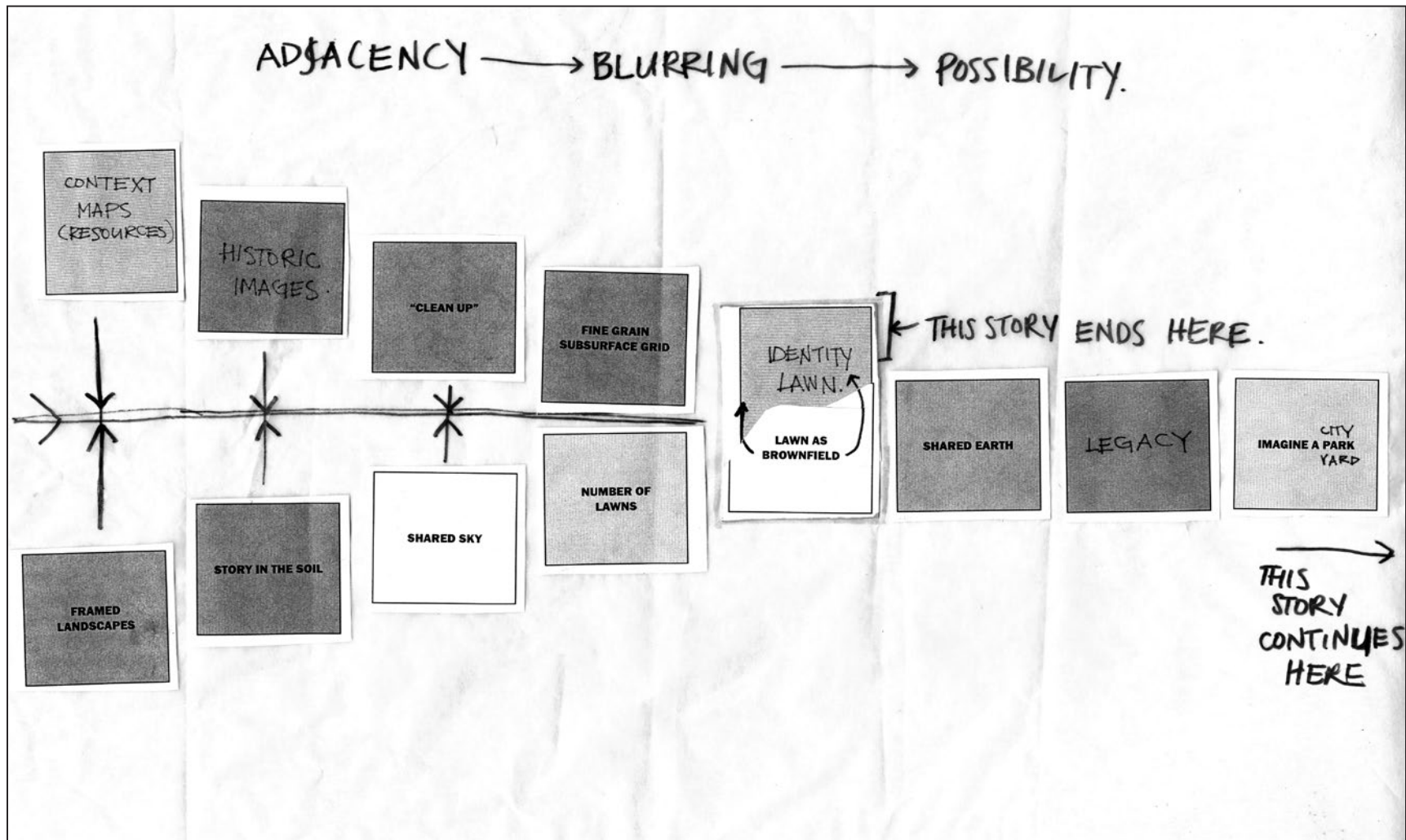
WEAVING CONTENT

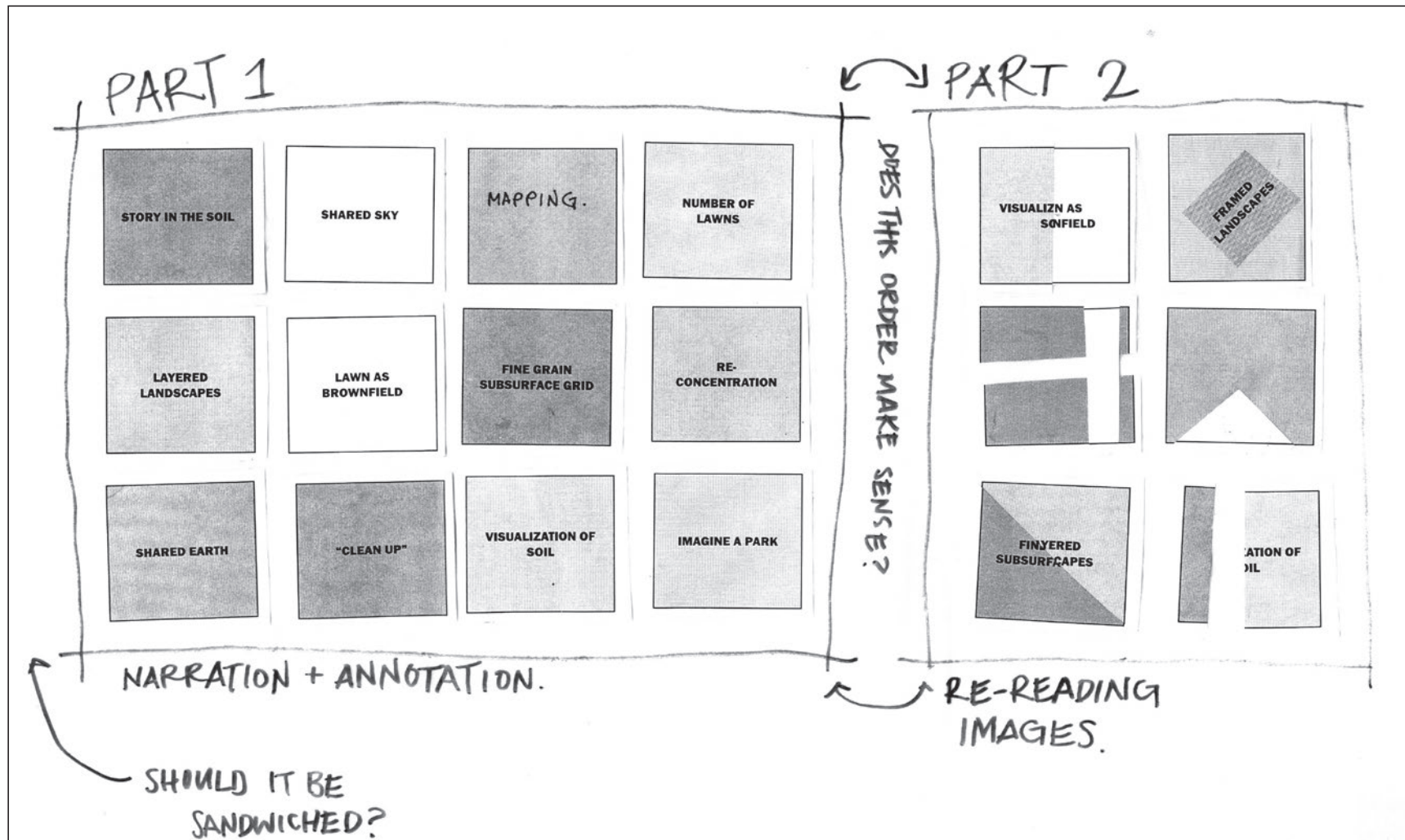
In my attempts to select a guiding concept, it proved impossible to select a strategy for telling a story through pictures without a sense of the content pictures themselves. I generated a matrix of potential images in order to flesh out the general strategies of my three concepts. These "swatches" were simply hints of future illustrations; at this point in my research I had collected a mental palette of ideas I wanted to explore through representation. These swatches ranged from themes such as "shared sky," which would haunt me throughout the entire project, to "fine-grained subsurface grid," which lost its inspirational pull shortly after I picked up my watercolors.

As I arranged these swatches in accordance with each of my three concepts, a more robust portrait of the smelter—and its associated narratives—emerged. The linear arc that I had started with grew into a web of processes, products, and profits reaching out across the page.

With each day, my understanding of the smelter grew in complexity. With each day, I became more confident to begin making images. Until now, my drawing impulse had been somewhat restrained by an intrinsic sense that this was not my story to tell; who was I to presume a claim in this narrative? Yet the more I researched, the more I reconciled my voice as a story-teller. I found my contribution



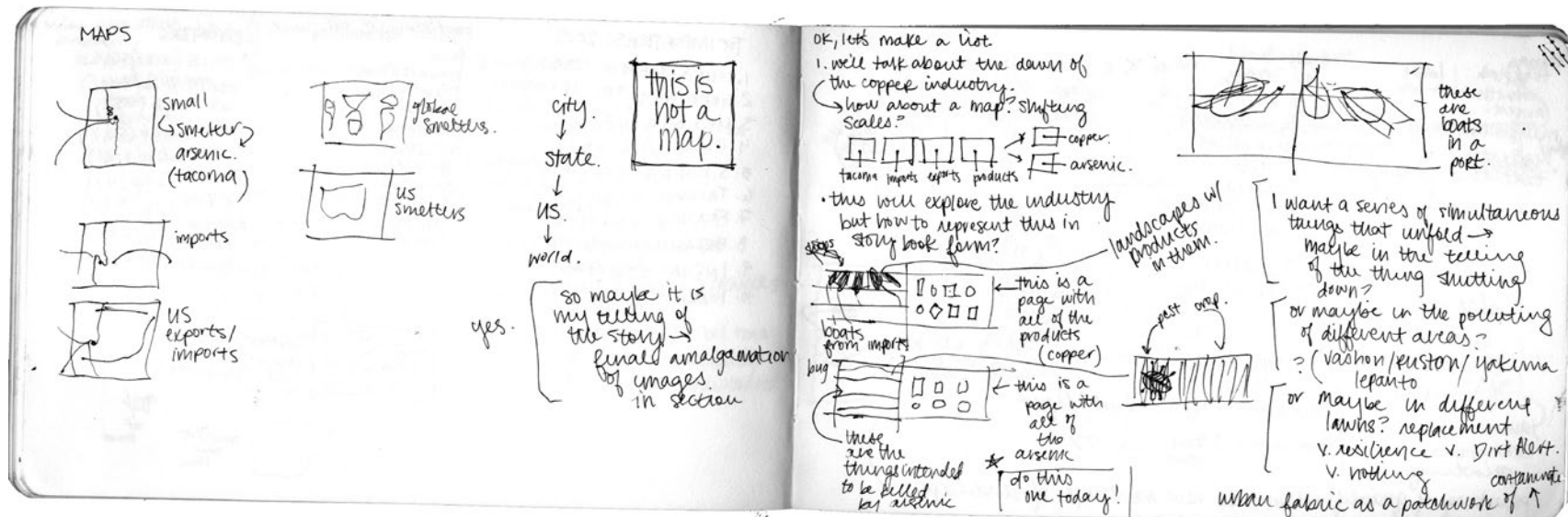




in the interstices of a growing nexus of scientific papers and oral histories, of elementary school curricula and archived USDA records. I embraced the value of widening horizons rather than asserting authority.

As I found my stride in this project, it became clear that I would need to more closely examine the role of image in the landscape. In diagrammatic form, the concepts I was weaving into a narrative were a helpful thought exercise, but in order to realize their expressive potential, I had to approach them from the pictorial perspective. How could images stake claim in the physical landscape?

The sprawling research begins to take form as a story book in the pages of my sketchbook.



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FRAMING A VIEW OF CONTAMINATION

THE PICTORIAL LANDSCAPE

“If we want to change the landscape in important ways we shall have to change the ideas that have created and sustained what we see”

- Reading Private Green Space ¹

If narrative powerfully shapes the way people make meaning in and of the landscape, then the media we use to tell these stories become invested with significant consequence. As critical thinkers across disciplines—including design, theory, science, and art—grapple with the inherent uncertainty and boundlessness of contamination in the Anthropocene, visual representation emerges as an integral tool for probing complexity in these novel landscape conditions.

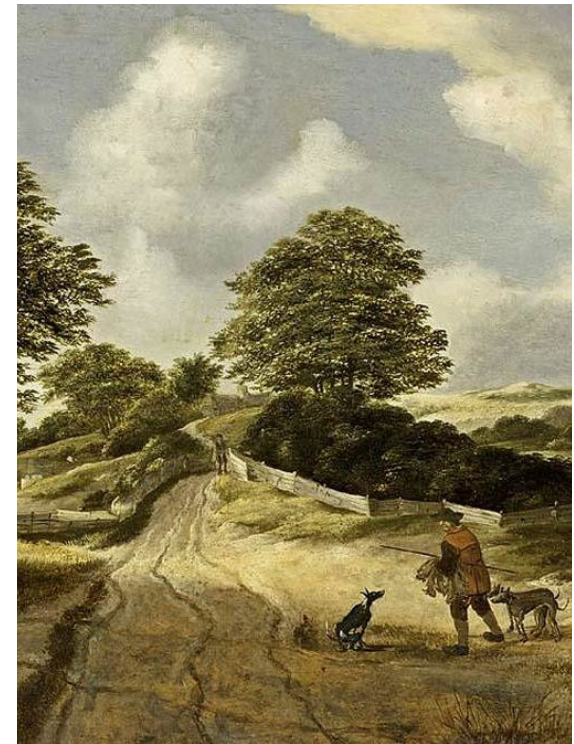
The entangled relationship between landscape as design medium and landscape as pictorial content persistently fuels an ongoing theoretical tendency to situate landscape architectural graphic representation in relation contemporary to cultural discourse. This ever-evolving inquiry into the power of the visual draws from a rich and deep-rooted history of representation in the field. Indeed, when landscape architecture emerged as its own “specialized practice,” it was fundamentally “woven into the arts.”² The concept of designed landscape, at its core, materialized from the tradition of landscape painting and, to this day, remains fundamentally and inextricably tied to the pictorial view.³

It is important to underscore that the relationship between landscape painting and landscape design is neither linear nor causal. The pursuits of the landscape designer and landscape picture maker

¹ Robert Feagan and Michael Ripmeester, “Reading private green space: competing geographic identities at the level of the lawn,” *Philosophy & Geography* 4.1 (2001): 79.

² Gina Crandell, *Nature Pictorialized: “the view” in landscape history* (Baltimore: Johns Hopkins University Press, 1993), 161.

³ Crandell, *Nature Pictorialized*, 161.



Dune Landscape by Nicolaes Hals, is an example of early 17th-century Dutch landscape painting. Image in the Public Domain.

are instead reciprocal and additive; the image has creative agency in the material world. Landscape architect and theorist Diana Balmori illustrates this formational capacity of representation by outlining a trajectory of the discipline in which “Landscape painting set the rules” for designing landscapes and ultimately created a condition in which “the representation became the real landscape.”⁴ The agency of image, however, goes far beyond the landscape architect’s translation of pictorial view into designed environment. Rather, painters engage in a process of shaping and framing the landscape that directly informs how the physical landscape at large is experienced. Balmori characterizes the image-making process as broadly transformational, claiming: “in bringing out features or qualities that may not be apparent to someone else looking at the same scene, the painter is also inventing a landscape.”⁵

The porous interface between painting and landscape architecture is evident in formal designs throughout the 18th and 19th centuries, with the “framed view” a central organizing feature in Western landscapes directly referencing Picturesque painting traditions.⁶ In fact, many of these nascent

Illustration from Humphry Repton’s 18th-century book The Art of Landscape Gardening, representing the importance of the view in the emerging field of landscape architecture
Image in the Public Domain..

4 Diana Balmori, *Drawing and Reinventing Landscape* (Chichester, West Sussex: John Wiley & Sons, 2014), 149.

5 Balmori, *Drawing and Reinventing Landscape*, 150.

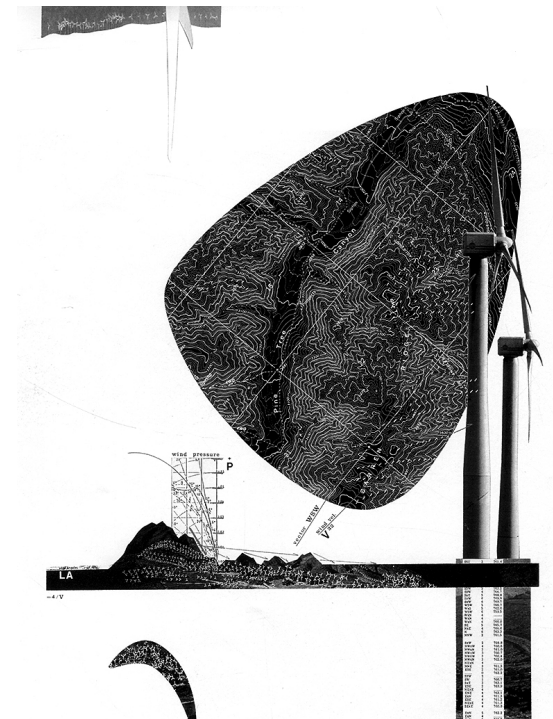
6 Andrea Hansen and Charles Waldheim, “Introduction: Photomontage and landscape architecture,” in *Composite Landscapes: Photomontage and Landscape Architecture*, ed. Charles Waldheim and Andrea Hansen (Ostfildern, Germany: Hatje Cantz Verlag, 2014), 15.



landscape designers had formal training in the fine arts, and celebrated the link between the canvas and the physical site.⁷ The link between the 18th century garden and the landscape painting pervaded the cultural consciousness, as evidenced in Alexander Pope's observation "All gardening is landscape painting. Just like a landscape hung up."⁸

In the twentieth century, however, landscape theorists began to question the value of the pictorial view. Influential writer and designer James Corner encapsulates this rejection of the scenic view, positing that "pictorial impulse denies deeper modes of existence, interrelationship and creativity."⁹ Corner's own mapping projects eschew conventional landscape composition in favor of abstracted adjacencies of images and text that prioritize systems and process over visual experience. Crandell bemoans the engrained presence of painting in the physical landscape, arguing the "landscape itself has become the repository of pictorial conventions and landscape architecture the perpetuator of the painterly vision."¹⁰ As theorists began to position abstract systems, ecological process and temporal experience as distinct from pictorial conventions, the boundary between landscape painting and landscape architecture has solidified in recent decades. Indeed, "a skeptical, or even hostile, attitude towards aesthetics"¹¹ has pervaded the field, as landscape architects increasingly assume the language of "science and rationality" to distinguish the discipline from the fine arts.¹²

The attempt to distance landscape architecture from the fine arts, however, is increasingly challenged in contemporary discourse. The dismissal of the visual as a simplistic and limiting framework denies the trans-temporal capacity of image as a mediator between imagination and experience. Indeed, this paradigm—that two-dimensional painting simply captures a view—is "outmoded within the visual



James Corner's mapping collage eschews the pictorial view in favor of imagery that evokes temporal process. From Corner's "Taking Measures Across The American Landscape," 1996.

7 Balmori, *Drawing and Reinventing Landscape*, 150.

8 Qtd. in Beth Diamond, "Landscape Cubism: parks that break the pictorial frame," *Journal of Landscape Architecture* 6.2 (February 2012): 20.

9 James Corner, "Eidetic operations and new landscapes" in *Recovering landscape : essays in contemporary landscape architecture* (New York: Princeton Architectural Press, 1999), 158.

10 Crandell, *Nature Pictorialized*, 165.

11 Rudi van Etteger, Ian H. Thompson and Vera Vicenzotti, "Aesthetic creation theory and landscape architecture," *Journal of Landscape Architecture* 11:1 (January 2016): 90.

12 van Etteger, Thompson & Vicenzotti, "Aesthetics creation theory," 80-81.

arts themselves.”¹³ Painters have long understood the canvas as a space that challenges perception, and operates with agency well outside of the visual realm. Cubism, for example, assumed that “the re-configuration of pictorial space could serve as a catalyst to changing the very structure of life.”¹⁴ Furthermore, the characterization of the conventional landscape perspective as a simplistic translation of visual sight ignores the fact that the perspectival view itself is “mathematical construct” that emerged from a culturally located moment.¹⁵ The idea that a pictorial landscape image is but a static translation of a visual view is a recent, and fundamentally flawed, assumption.

Anne Whiston Spirn is an important voice in the discourse surrounding the visual landscape. Her influential book *The Language of Landscape* (1998) articulates the importance of learning to read the “ongoing natural processes” at play within the landscape, offering “landscape literacy” as a fundamental skill for interpreting the environment.¹⁶ Her more recent work, *The Eye is a Door* (2014), offers landscape photography as a way to engage visual thinking and to reveal the interwoven processes and patterns that comprise the landscape. Spirn details her experiences teaching landscape literacy through photography, claiming that through an earnest visual experience, she sees the landscape as “a mutual shaping of people and place and a form of language born out of living, a language with which to tell new stories and to envision how to adapt human settlements in life-sustaining ways.”¹⁷ To Spirn, visual literacy and pictorial sensitivity are absolutely crucial to envisioning a more resilient landscape ethic.

Denis Cosgrove, who has spent decades writing about the link between the visual and landscape, offers an explanation of pictorial representation that encompasses the image’s “creative capacity that can transcend both space and time: it can denote foreseeing as well as seeing.”¹⁸ This concept emphasizes the human ability to “form mental images, especially of things not directly witnessed or experienced”¹⁹ as an inextricable element of visual experience, thereby affording graphic

¹³ Diamond, “Landscape Cubism,” 20.

¹⁴ Ibid.

¹⁵ Marc Trieb, “Moving the Eye,” in *Sites Unseen: Landscape and Vision*, ed. Dianne Harris and D. Fairchild Ruggles (Pittsburgh: University of Pittsburgh Press, 2007), 63.

¹⁶ Anne Whiston Spirn, *The Eye is a Door* (Wolf Tree Press: 2014), xii.

¹⁷ Spirn, *The Eye is a Door*, 121.

¹⁸ Denis Cosgrove, *Geography and Vision* (London: I.B.Tauris, 2008), 8.

¹⁹ Cosgrove, *Geography and Vision*, 8.

representation the power to fundamentally shape the way we conceive of our surroundings and our behaviors within them. To Cosgrove, the image conveys “forms and ideas, the hopes and fears that constitute imagined geographies.”²⁰ The physical image embeds itself into our imaginations, which then mediate our temporal experiences in the physical world.

Drawing from this alignment of representation and imagination, the landscape image and the physical landscape cannot be distinguished as two distinct realms. Harris and Ruggles expand on how the landscape is “perceived by an accumulation of observations in which not only optics but also memory come into play”.²¹ Pictorial representations contribute to the rich complexity of visual experience, visual memories that negotiate temporal phenomena.

Just as area contamination is not confined to the “wasteland” site property lines, images operate without regard to political boundaries or proprietary claims. While landscape architects can—and should—certainly intervene in contaminated spaces with evocative and innovative site designs, site experience alone is not enough to overturn entrenched perspectives in the cultural consciousness. Instead, the landscape must be interpreted more broadly, with picture making and site design celebrated as interrelated forces for shaping an Anthropocenic landscape perspective. As Elizabeth Meyers articulates in *Sustaining Beauty*;

We need multiple forms and forums for caring and learning about the impact of our actions on the planet: some visual, some textual, and some experiential. As Lawrence Buell noted in *Writing for an Endangered World*, we need more than reports and data, we also need products of culture, narratives, images, and places to move us to act.²²

In sum, the relationship between representation and landscape architecture is impossible to parse, as the origins of the concept of landscape rest squarely in the pictorial tradition. While theorists have attempted to discard the pictorial convention from the discourse of landscape architecture, the landscape image continues to assert itself as an irreducible part of the landscape experience. Despite

20 Ibid., 3.

21 Dianne Harris and D. Fairchild Ruggles, “Landscape and Vision,” in *Sites Unseen: Landscape and Vision*, ed. Dianne Harris and D. Fairchild Ruggles (Pittsburgh: University of Pittsburgh Press, 2007), 6.

22 Elizabeth K. Meyer, “Sustaining beauty. The performance of appearance,” *Journal of Landscape Architecture* 3.1 (Spring 2008): 21.

our shifting proclivities toward the pictorial tendencies of landscape architecture, it is perhaps the most powerful professional tool to provoke cultural shifts in the ways we interact with our landscape.

IMAGES OF CONTAMINATION

“The forces of nature and society are indeed about us. [...] We need a new image of nature, one that supplants the pictorial view that has for so many centuries illustrated (but only partially) Virgil’s Eclogues.”

- *Nature Pictorialized* ²³

Considering both the agency of landscape representation to inform experience and the pictorial foundations of the landscape concept, image is uniquely poised to fundamentally shake the bedrock of the Western landscape perspective. Yet, in practice, landscape architecture seems to find itself at an impassable crossroads. Crandell argues “The pictorial conception of nature has not helped us to develop environmental sensitivity, nor has it fostered the examination of the historical forms that gave rise to it.”²⁴ Likewise, Balmori asserts that while designed landscapes have created exciting and inspiring spaces, “none of them has engendered a major shift in people’s understanding of nature.”²⁵

What, then, needs to change about the way we represent and pictorialize the landscape if our goal is to catalyze a more resilient environmental ethic? In current landscape architectural discourse, this question often gets posed in the context of digital representation. Yet the assumption that digitally produced representations are somehow inherently different than analog mediums places undue agency in the medium rather than the mechanisms of the image itself. Cosgrove critiques the tendency to interpret image in terms of “of its production, circulation and reception” as a distraction from the “integrity of the image itself.”²⁶

Balmori argues that digital tools do not intrinsically produce novel representations, but simply offer a

²³ Crandell, *Nature Pictorialized*, 170

²⁴ Ibid., 169.

²⁵ Balmori, *Drawing and Reinventing Landscape*, 25.

²⁶ Cosgrove, *Geography and Vision*, 4.

new medium that engages the historic conventions of drawing and painting. In fact, she claims that rather than diverging from traditional modes of representation, computing actually “re-establishes the connection between landscape and painting.”²⁷ Landscape architect Karen M’Closkey complicates this notion, explaining that while digital tools, in practice, are applied to very limited and conventional ends, there is indeed untapped potential in computing software to fundamentally change the way we approach image-making in the field.²⁸ Discussions of representation often conflate “technology (i.e., pencil and computer) and technique (i.e., drawing type and image construction).”²⁹ This faulty equivalence is ultimately to blame for digital media’s tendency to be seen as “deficient”—we simply haven’t yet unleashed the formative power of these tools.

In addition to situating the capabilities of digital representation within the practice of landscape architecture, a persistent call for transdisciplinary approaches to landscape have increasingly identified representation as a crucial space for forging connections across disciplinary boundaries. Critical cartography is a salient example of a theoretic discourse that sees the act of image making as a way to layer knowledge, experience, and inquiry outside of conventional expressive norms. In the era of “digital humanities,” this move “from reading and critiquing to building and making”³⁰ is seen as an inevitable progression. Indeed, the process of making images becomes in itself a way to subvert structured ways of interpreting and representing knowledge, a process in which “shifts in scale and perspective actively contribute to the bridge between analysis, synthesis, formation, and action by forcing a constant re-orientation and re-configuration.”³¹ This characterization of image making can be read as a call to reclaim the pictorial space as a means not only for reframing the landscape perspective, but also for actively engaging scientific knowledge.

In “Textured Landscapes,” Catherine Dee delineates a methodology for “critical visual research” that challenges predominating “academic discourses on landscape, [in which] words are the currency

27 Balmore, *Drawing and Reinventing Landscape*, 36.

28 Karen M’Closkey, “Structuring relations: from montage to model in composite imaging” in *Composite Landscapes: Photomontage and Landscape Architecture*, ed. Charles Waldheim and Andrea Hansen (Ostfildern, Germany: Hatje Cantz Verlag, 2014), 125.

29 Ibid.

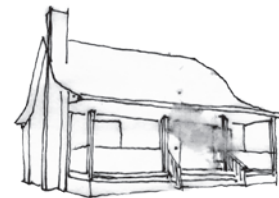
30 Tania Allen and Sara Queen, “Beyond the Map: Unpacking Critical Cartography in the Digital Humanities,” *Visible Language* 49.3 (December 2015): 80.

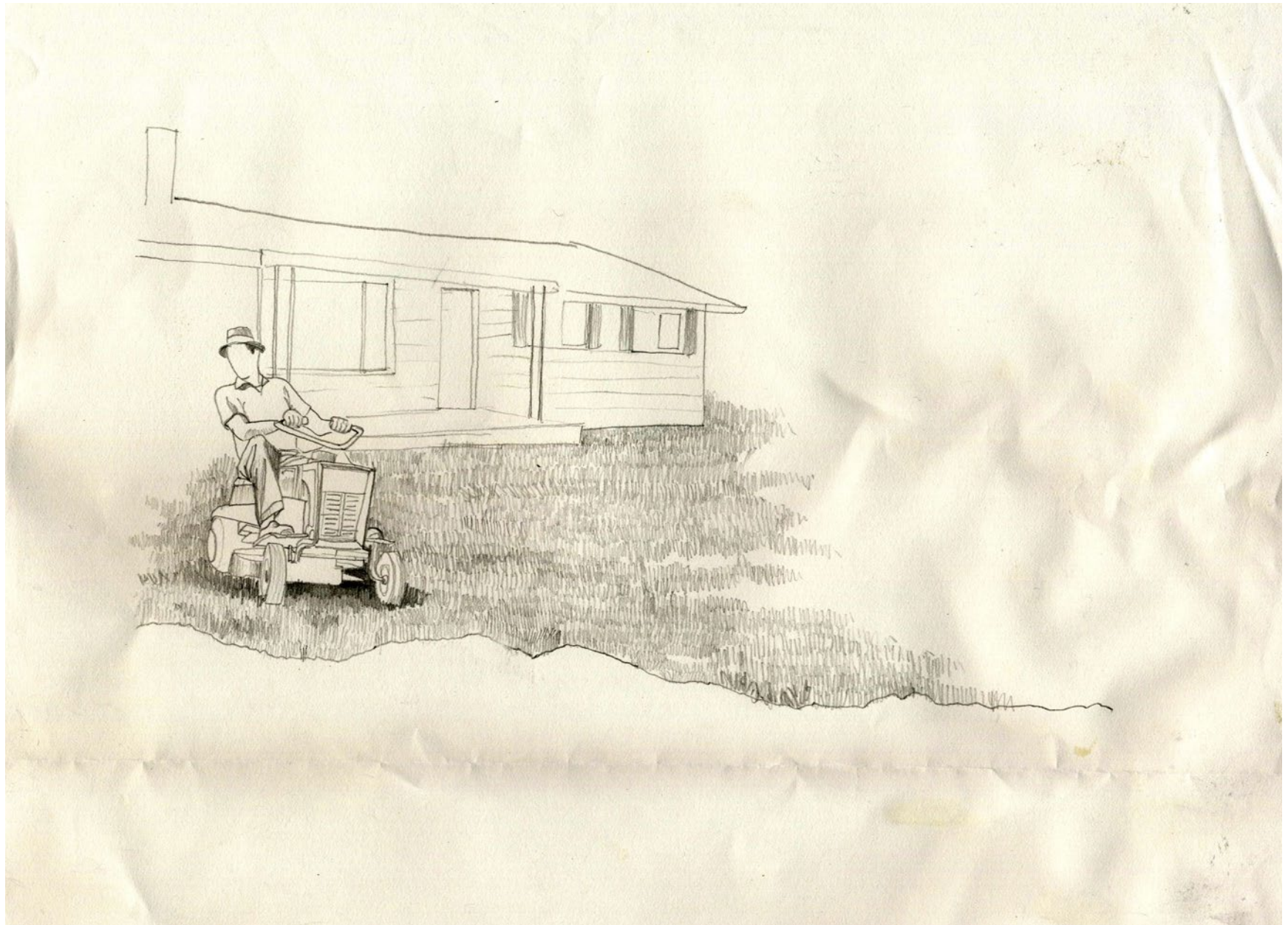
31 Allen & Queen, “Beyond the Map,” 88.

DRAWING TOXICITY

If images are critical to the way we experience--and therefore shape--the landscape, then what might constitute the pictures that fill the pages of a smelter plume picture book? With a general sense of the narrative structure in mind, I began to draw. These drawings build from the assumption that the pictorial view is a critical piece of the cultural imagination; what follows is an exploratory process of translating textual research into image.

From the outset, my drawings were driven by a desire to represent the nested scales of contamination, linking individual health perspectives to global systems of corporate wealth and resource extraction. I was not satisfied with the way that maps and diagrams communicated either the intimate or the global scale--or really anything in between--so I used the pictorial frame as a space





when landscape architecture was first recognized as an activity with its own specialized knowledge, it was woven into the arts; painting, above all, can be called the art that generated the designed landscape."

W.J.T. Mitchell - "landscape paintings produced the first unified picture of what before there were separate unconnected objects - such as trees, rivers, roads, rocks, and forests."

separation by start of the twentieth century -
 minimal character of the discipline, which allies itself with different fields at different times.
 "I have responded in different ways to the understanding that nature is constantly changing, and have engaged in different issues of rep."

pictorial conventions
 ↳ designed into everyday landscapes.
 perspective = distance from spectator

unnatural landscapes
 ↳ Mary Ellen Hauls.
 · Michael Zwack.
 · Mark Innerst.

→ why did so many mid-century American painters produce work that ignored or denied the conflict between the new industrial technologies and the beauty of the landscape?

VIEW.
 who is the spectator?
 ↳ expectation of framed view defines how we experience the landscape

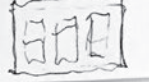
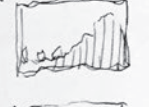


site composition



unexpected view of contamination

play w/ historic sequence
 ↳ what does modern urban soil look like through progression of representation?



VIEW.

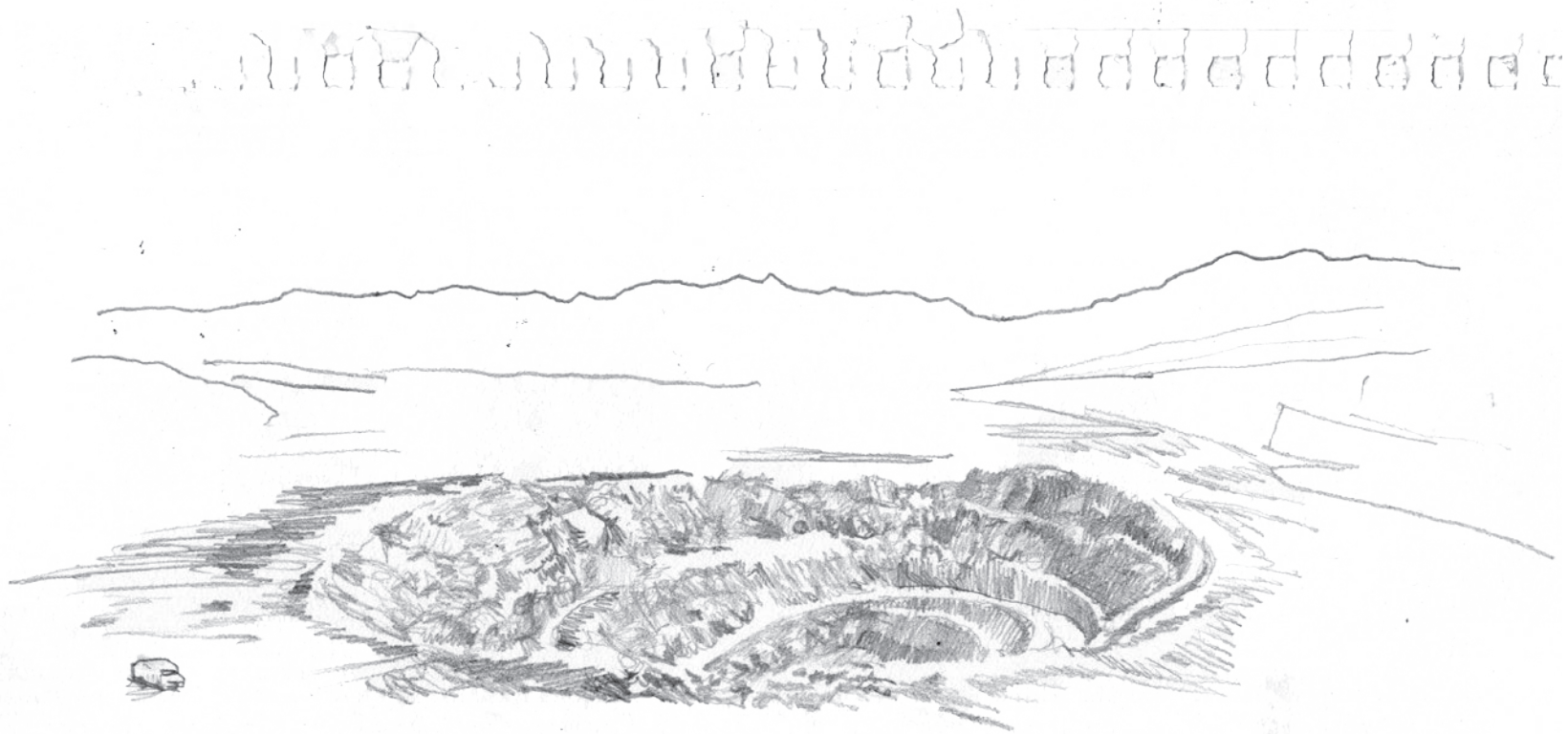
Who is the spectator?

Expectation of framed view defines how we experience the landscape.

to explore scale with an emotive, expressive lens. It was non-negotiable that each image offered entry to the viewer; the pictures needed to speak to the human perspective in order to shake our foundational view of the landscape.

Perhaps the two most recurrent pictorial strategies that persisted throughout this effort were (1) remaining anchored in the section cut and (2) communicating geographic scale through unexpected adjacencies.

The framed pictorial view presented a significant potential to disrupt expected scenes: by placing an idyllic single family home within the context of a contamination story, assumptions about the nature of contamination can begin to be questioned. The pictorial frame allows the artist to force adjacencies between distinct landscape typologies in the perspective view, prompting evocative revelation that gets lost in the flat colors of a map. I thought that if I could reveal the common smelter-arsenic soil horizon running through Yakima's apple orchards, University Place's playgrounds,



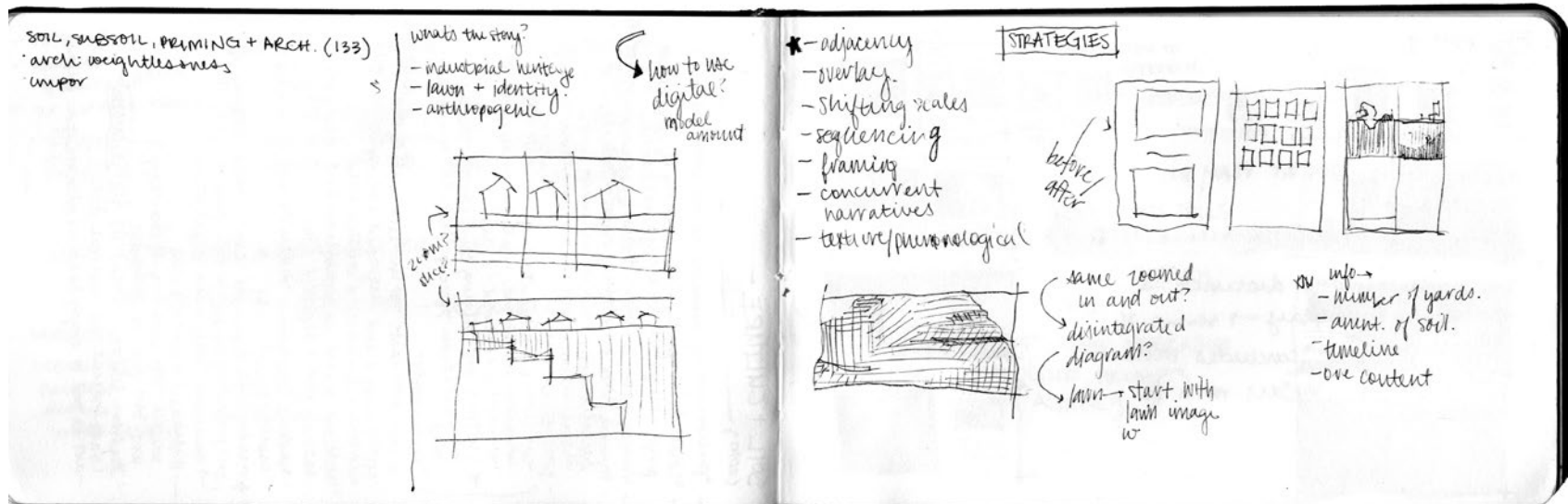
Early drawings explored landscapes – such as copper mines – that are a part of the larger narrative arc of the smelter plume, though not typically represented in conventional tellings that center on the smelter site.

Lake Ballinger's benthic layer, and Vashon Island's native forest, then I could begin to overturn conventional associations between industrial contamination and scenes of the wasteland. I could plant a seed that, perhaps, our contamination story is more insidious than we may want to believe.

My insistence that these images stay loosely framed with a comprehensible human view beget the question: who is this insistent spectator? The landscape view has a volatile political history, having rested in the eyes of the white male for most of Western history.¹ In this gaze, the landscape becomes a feminine subject, and the act of viewing laden with desire and pleasure.²

¹ Dianne Harris and D. Fairchild Ruggles, "Landscape and Vision" in *Sites Unseen: Landscape and Vision*, ed. Dianne Harris and D. Fairchild Ruggles (Pittsburgh: University of Pittsburgh Press, 2007), 18..

² Harris & Ruggles, "Landscape and Vision," 21.



This legacy presents an interesting dilemma for myself as an image maker: if the view is historically seen through a lens of conquest, then what happens when these domineering eyes are fixated on a scene of self-inflicted destruction? What if the gaze, demanding pleasure, is offered toxicity?

While a part of me found reason to make the images as condemning as possible, I was equally compelled to resist embedding the entire story with a sense of disgust. It is easy to present contaminated spaces as an unclean "other." I found something far more nefarious in this story: our industrial heritage, waste and all, is far less discerning than we like to admit. There is a fine line between decrying a contaminated space as forlorn and repellent, and presenting a nuanced view of the contemporary contaminated condition under which we all operate. I did not want these images to be an exercise in identifying a community as uniquely toxic; rather, I attempted to communicate a more insidious web of industry that implicates us all, regardless of our yard's arsenic content.

The persistent desire to ignore the ugly realities of humanity's imprint in the environment is a common theme throughout the history of landscape representation. Crandell poses the important question: "Why did so many mid-century American painters produce work that ignored or denied

Compositional techniques generated from an exploration of the history of landscape architectural representation included:

- adjacency
- overlay
- shifting scales
- sequencing
- framing
- concurrent narratives
- texture / phenomenological



the conflict between the new industrial technologies and the beauty of the landscape?"³ There is a recurrent impulse in landscape representation to shift the frame to obscure that which we would rather avoid confronting. My image-making process operated in the tense space between our inherent desire to frame a picturesque landscape view and the unrelenting presence of nefarious systems that we have catalyzed within these spaces.

I asked myself: is contamination our contemporary Sublime?

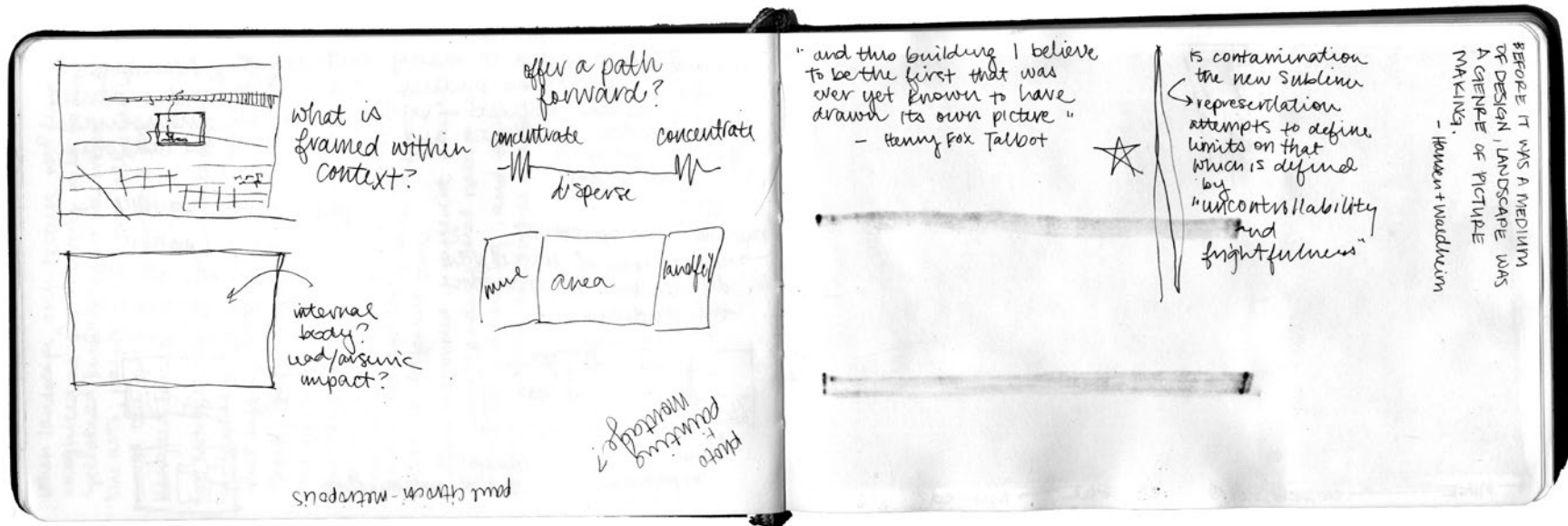
While these questions regarding framed views and the evocative space between beauty and fear simmered in the back of my mind, the images I drew in my sketchbook continued to manifest as section views. I fixated on the soil as the grounding force in the story—both literally and pictorially. I

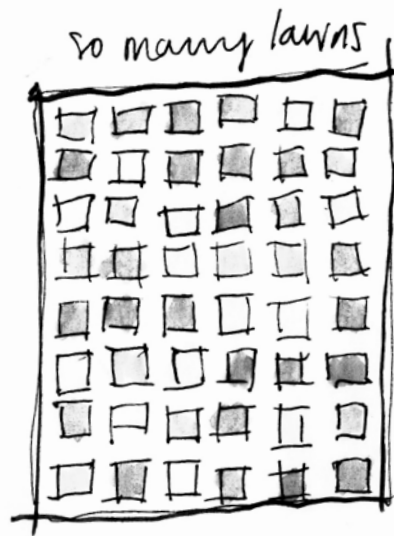
³ Crandell, *Nature Pictorialized*, 161.

[opposite page] Initial photoshop collages explored adjacencies between landscapes as well as above- and below-ground conditions.

Is contamination the new Sublime?

Representation attempts to define limits on that which is defined by "uncontrollability and frightfulness"





Five image concepts that persisted through early iterative sketching, exploring processes in the contamination narrative that resist conventional chronological tellings.

drafted endless iterations of the soil profile in my sketchbook: as a canvas for illustrating industry, as an honest record of the excavation remediation process, as an aggregated patchwork, I juxtaposed a copper mine with a hazardous land fill; I collected soil horizons under a shared, arsenic-saturated sky.

Soil, though unavoidably present in the landscape, is still largely unexamined in the landscape view. As such, it becomes a visual medium to reveal that which is hidden beneath the surface of our landscapes, repositioning our relationship to the ground. It speaks to a complexity that is easily ignored in daily experience, but can powerfully communicate the breadth of our unfamiliarity with depth in even the most familiar spaces. This is the mystery that drew me, time and again, to the cross-cut as a pictorial framework.

My enchantment with the section view, however, was tested as the thumbnail images in my sketchbook became more and more repetitious. I eventually had to admit that this story reached far beyond the soil profile; the section was an unnecessary constraint. Without this framework, my ideas sprawled across the page. Here is a sampling of the notions I worked through in the pages of my sketchbook:

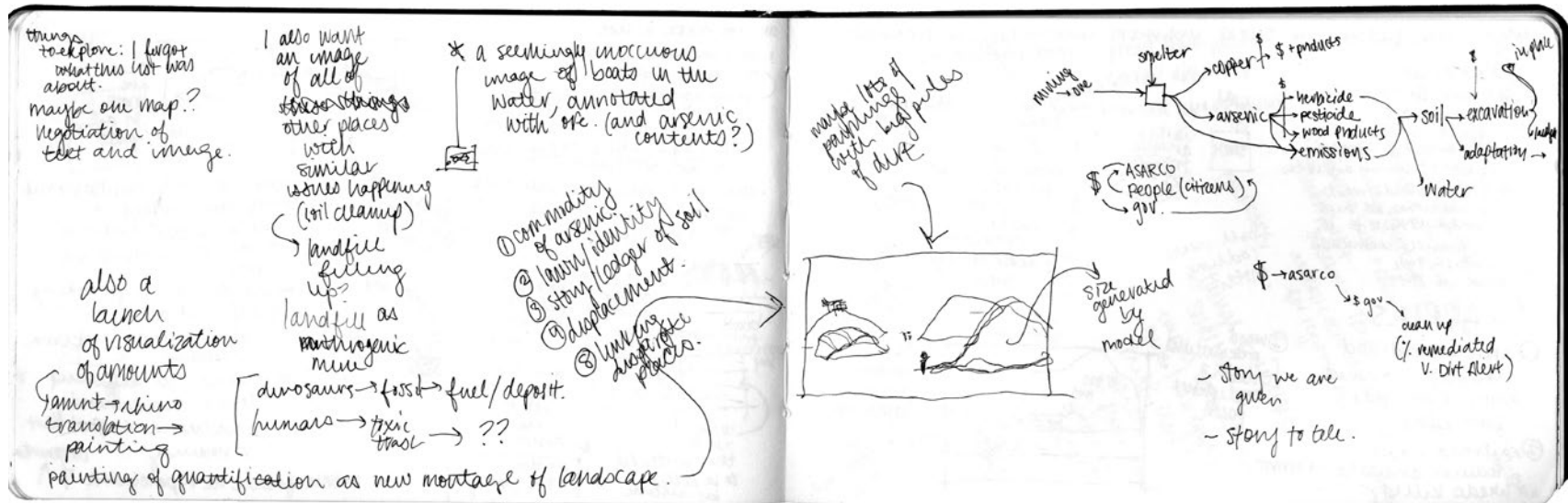
1. **So many lawns.** The number of lawns that have been and are slated to be replaced is quite remarkable—what is this new landscape we are creating by replacing contaminated soils? How could these lawns be presented simply and honestly to give a sense of scale and significance to these interventions that are typically framed within the bounds of a single yard?
2. **Re-concentration.** Arsenic is an immobile, irreducible metal: it continues to exist despite any attempt to erase it from the landscape. Remediation, then, is ultimately an effort to repack dispersed contamination back into a buried, compressed state, much like the ore from which it originated.
3. **Permanence.** How have we altered the geology of our landscapes in irreversible, tangible ways? What is the profile of a landfill? What about the arsenic-laden slag in the driveways, streets, and parks of a smelter town? Replaced soil, even, is not a return to native ecology but simply a new layer in our fragmented geology.



4. **Monumentality.** The sheer physicality of this story is often overlooked in conventional tellings. Numbers and volumes do little to create a mental image of contamination. Visualizing the size and presence of these interventions allows the viewer to comprehend quantities with a qualitative lens. When matter is displaced and buried, it is easy to maintain the belief that it has effectively disappeared. When toxicity is invisible, it is easy to ignore its presence. What happens when these conditions are given form?
5. **Shared skies.** Airborne contamination is understanding. What assumptions do we make about how pristine a landscape is based on its surface conditions? The smelter plume encompasses a staggering range of landscape typologies, from the aquatic reserve on Vashon's Maury Island to suburban strip malls along the interstate.

As my process orbited around these driving questions, perhaps the most pivotal moment in the project occurred as I reconsidered the role of digital tools in my image-making process. As I drew





conceptual sketches, I was simultaneously amassing a wealth of specific data about the smelter and its associated processes. These numbers accumulated on the page, while my images remained loose and exploratory. There seemed to be an uncrossable divide between the textual research and the image making process.

In revisiting M'Closkey's essay, her critique that landscape architects have largely neglected to exploit the formational power of digital tools suddenly resonated with my own process. M'Closkey writes: "We are left with an enormous gulf between the 'planner and the poet,' between analysis and design, because the methods used to translate information into physical formations remain largely unexamined."⁴ This is a powerful call. I had been approaching representation as a purely pictorial process rather than considering the tools I had that were capable of creating three-dimensional form. I was being both the "planner," by collecting and sorting data, and the "poet," by speaking with evocative imagery. How could I put these two parts of the process in dialogue with each other?

⁴ M'Closkey, "Structuring relations," 125.

The first emergence of the concept of visualizing quantities of contamination and remediation as a physical topography.

This idea sparked a renewed exploration of representational history and ultimately developed into my final painting framework.

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LANDSCAPE PAINTING IN THE ANTHROPOCENE

As visual representation has evolved throughout the trajectory of landscape architecture, a consistent drive to communicate process and temporal experience comes to the fore as a central concern.

Whether through the pervasive use of photomontage to communicate change over time,¹ or in the layered mappings promoted by Ian McHarg, much of representation has attempted to express the ephemerality—the very living nature—of the landscape.

But what happens when the conversation shifts toward permanence? It is one thing to attempt to represent the individual experience of moving through a landscape, or the maturation of seedlings into mature trees. In light of revelations about irreversible, radical changes to the environment, however, landscape architects must find a voice for portraying inevitability and profundity in the landscape. As Stephen Meyer writes in *The End of the Wild*,

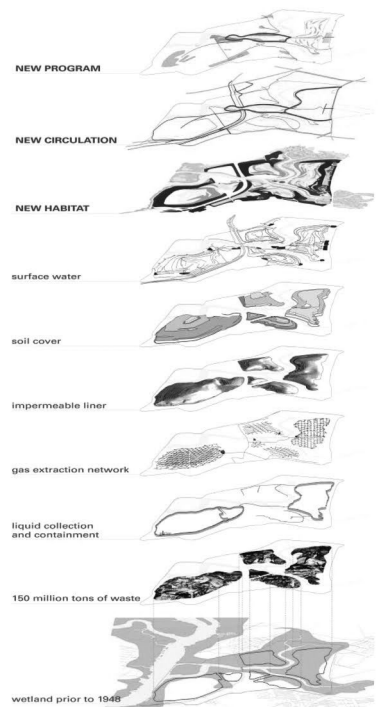
“Over the next 100 years or so as many as half of the Earth’s species, representing a quarter of the planet’s genetic stock, will functionally if not completely disappear. The land and oceans will continue to teem with life, but it will be a peculiarly homogenized assemblage of organisms selected for their compatibility with one fundamental force: us. Nothing—not national or international laws, global bioreserves, local sustainability schemes, or even “wildlands” fantasies—can change the current course. The broad path for biological evolution is now set for the next several million years. And in this sense the extinction crisis—the race to save the composition, structure, and organization of biodiversity as it exists today—is over, and we have lost.”²

From this perspective, it is perhaps no surprise that the pictorial view has yet to engender a significant shift in the cultural environmental ethic. Attempts to express the phenomenological landscape experiences and to delineate complex processes at play within the landscape, both work to challenge

¹ Andrea Hansen and Charles Waldheim, “Introduction: Photomontage and landscape architecture.”

² Stephen M. Meyer, *The End of the Wild* (Cambridge, Mass.: MIT Press, 2006), 405.

Diagrams from James Corner Field Operation's design for Fresh Kills Park, 2005, representing anthropogenic waste as a geologic layer in the park's subsurface composition.



the notion of site as subject. But in resisting the foundational pictorial view of a pristine, Edenic natural baseline, these representations allow that paradigm to persist.

While landscape architecture has a tradition of grappling with the post-industrial landscape through site intervention, this analysis focuses on the visual language with which Anthropocenic questions are approached. One early and high-profile example can be found in James Corner's public park design for the Fresh Kills former landfill site. Much has been written about the intervention as a question of design, but the project's representation of an anthropogenic geology is as critical to the landscape as the design itself.

The Fresh Kills design representations adopts the language of layers to represent the anthropogenic foundations of the landscape. In axonometric view, the project takes a geologic lens and represents the bedrock of landfill waste that substantiates the park's topography. This approach is continued in the park's interpretive signage, where the anthropogenic soil horizon is presented without apology. The representation has a non-confrontational tone: it offers the landfill soils as fact, and then situates a more habitable future atop it. This dispassionate, forward-looking visualization acknowledges, but does not dwell upon the forces that brought the landfill to the site or the continuing legacy of American waste.

The detached, scientific tone toward anthropogenic soil evident in representations of Fresh Kills is underscored in the state's efforts to categorize and catalog these conditions alongside native soil series. The "Fresh Kills Series," a part of the USDA Official Soil Series Descriptions database characterizes the Fresh Kills soils as: "a thick mantle of human transported material that includes loamy soil material over a geomembrane over a mixture of household garbage, construction debris and other discarded materials layered with human transported soil material."³ This recognition of the reality of anthropogenic soils as substrates with unique characteristics acknowledges the physical presence of human-shaped geology, but does little to evoke an emotive response that could disrupt these patterns of human behavior.

³ US Dept. of Agriculture, "Freshkills Series," National Cooperative Soil Survey, Official Soil Series Description Database, Accessed June 1, 2017, <https://soilseries.sc.egov.usda.gov/osdname.aspx>.

DIRT Studio, founded by Julie Bargmann, similarly understands urban soils as anthropogenic narratives. The 2007 project, “Post-Industrial Groundwork,” offers a “conceptual study” for an expanded Harvard campus that made visible an elaborate proposal to amend degraded urban soils with “excavated layers of peat and sand.”⁴ This, too, requires a frank assessment of urban soils in order to envision a more resilient future. As such, the project similarly turns toward the language of representation used in the soil sciences to visualize the urban soil profile. Rather than understanding contaminated soil at the geologic scale, however, these representations frame soil as a material process. It shifts the conversation from burying a contaminated past to understanding contamination as part of an ongoing human story.

The “Post-Industrial Groundwork” images operate in a diagrammatic capacity, in a move that echoes historic scientific representation techniques. It frames the soil as a subject of the objective scientific method, and, consequently, positions the landscape architectural intervention as a response to empirical conditions. By focusing on soil as process, rather than soil as material, the project adopts an active voice. In doing so, the project aligns with the era of soil science representation that persisted until the 1950s, when diagrammatic representation attempted to comprehend that movement and materiality of soil as a living body.

In perhaps the most obvious reference to soil science’s history of representation, the 2014 Reed Hilderbrand and Halvorson Design Partnership project, “The State of City Soils,” presents an effort to categorize urban soils in Boston to facilitate better decision making for urban planting schemes.⁵ The images in this study draw overtly from the visual language of Curtis Marbut’s seminal soil classification scheme adopted by the USDA in 1938. Marbut used painting to present soils rather than photograph to evoke the vitality of the soils themselves.⁶ By adopting this aesthetic “The State of City Soils” situates itself within the ongoing effort to curate unique soils with a global standard. Again, the landscape architect uses the visual language of science to imply a level of empirical authority to the project.

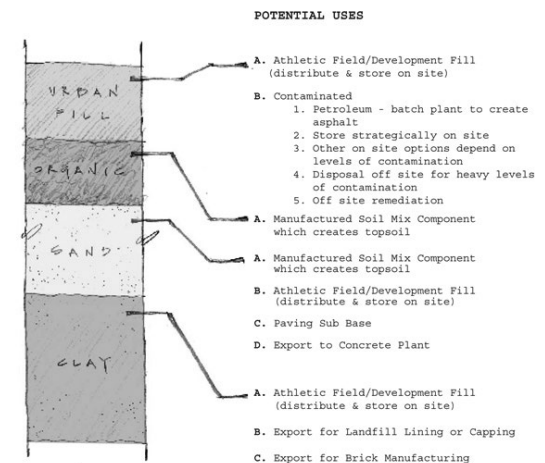
That these three examples all turn toward a history of soil science representation to communicate

4 DIRT studio, “Post-Industrial Groundwork,” Boston, Mass.: 2007. Accessed June 1, 2017. <http://www.dirtstudio.com/#postig>

5 Reed Hilderbrand, “State of City Soil,” 2015, Accessed June 1, 2017, http://www.reedhilderbrand.com/practice/state_of_city_soils.

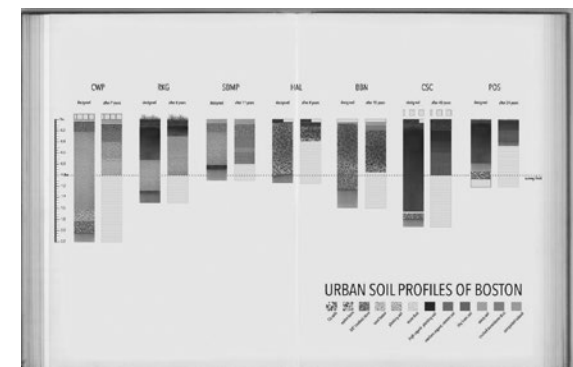
6 Denizen, “Three Holes in the Geologic Present,” 39.

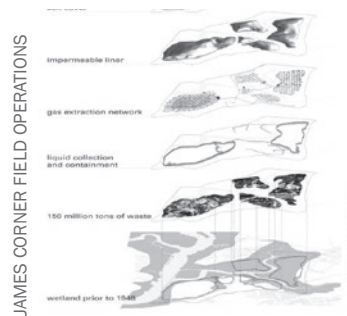
SOIL RE USE



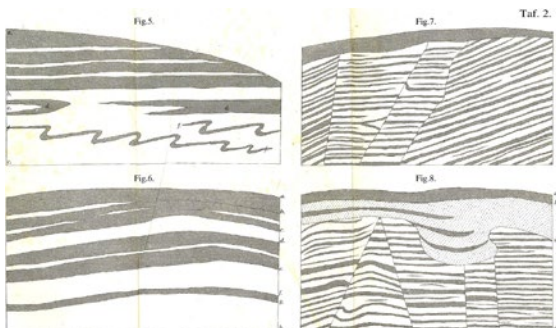
[above] Drawings from DIRT Studio’s “Post-Industrial Groundwork” (2007) echo diagrammatic explorations of soil processes in the nineteenth century.

[below] Reed Hilderbrand’s “State of City Soils” (2015) catalogs urban soil profiles in the style of seminal soil surveyor Curtis Marbut.

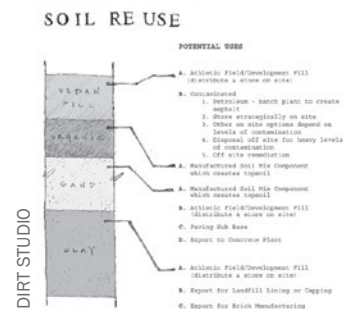




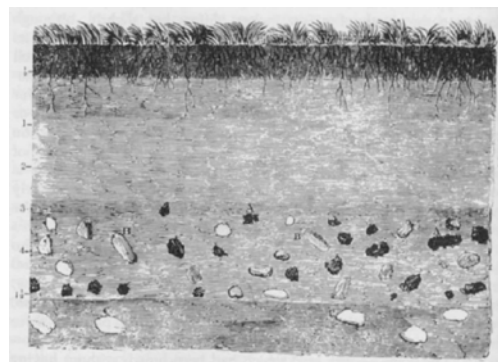
GEOLOGIC LAYERS



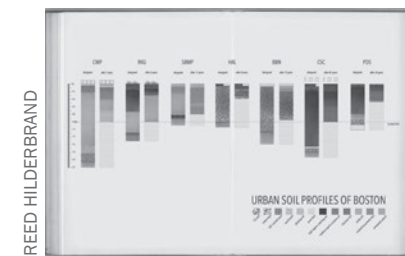
Geologic understanding of soil layers in Germany, from Fallou 1862. Image in the Public Domain.



SUBSURFACE PROCESS



Charles Darwin Illustration of processes and movement within the topsoil, from Formation of Vegetable Mould by Worms, 1881. Image in the Public Domain.



CURATED CATALOG



Painted soil profiles from Curtis Marbut's 1927 soil survey for the USDA. Image in the Public Domain.

the role of contaminated soils in the landscape illustrates the desire in the field to assume an air of scientific objectivity. Interestingly, the exact opposite trend is emerging in the soil science community.

SOIL REPRESENTATION FROM THE SCIENTIFIC PERSPECTIVE

To encourage more holistic approaches to soil protection, our soil science community must open the doors to develop new perspectives by investigating and initiating transdisciplinary projects. Art, history, anthropology, sociology, psychology, economics, and religious studies represent just a few fields for expanding the scope of soil protection and raising soil awareness.

- Case Studies of Soil in Art ⁷

With landscape architects frequently alluding to soil sciences in representation, it is appropriate to briefly consider the discourse toward representation within the soil sciences. While soils were depicted in art works from the earliest graphic traditions, any specific attention to soil operated as symbolic references to religious or agricultural cultural trends.⁸ In the seventeenth century, a closer study of soil as its own subject emerged in response to a growing mining industry.⁹ Initial graphic inquiries within the preliminary stages of soil-focused science represented soil at the geologic scale, attempting to make sense of sub-ground structures with a systematic methodology. This attempt to systemize and order the earth's mysteries dominated 18th-century images, eschewing religious connotations of the soil in favor of rational inquiry.

Soil science distinguished itself as a unique discipline from geology in the late 19th century, as scientists began to understand the soil as a living body rather than a structural layer.¹⁰ Initially, representation was used as a tool to survey and map agricultural soils as civilizations sought to expand land for cultivation. In these images, soil is illustrated as unique swatches, with color and

⁷ Christian Feller et al., "Case Studies of Soil in Art." *SOIL* 1.2 (2015): 543.

⁸ Christian Feller, Lydie Chapuis-Lardy, and Fiorenzo Ugolini, "The Representation of Soil in the Western Art: From Genesis to Pedogenesis," in *Soil and Culture*, ed. Edward Landa and Christian Feller (New York: Springer, 2010).

⁹ Alfred E. Hartemink, "The depiction of soil profiles since the late 1700s," *Catena* 79.2 (2009): 113.

¹⁰ Hartemink, "The depiction of soil," 114.

texture telling a story of soil identity. Agriculture remained central in soil science until the 1970s when the environmental movement prompted soil scientists to consider roles that soil play in larger ecological systems.¹¹ As a result, methods of sampling, recording, categorizing, and depicting soil has become more standardized in an effort to understand soil conditions at a global scale and assess the public health and environmental impacts of projected soil degradation.¹²

As soil scientists examine global soil health in the context of a changing climate with increasing urgency, current conservation efforts “rely almost exclusively on soil scientific principles”¹³ and are communicated in these scientific terms. Consequently, “the activities of the soil science community and its traditional partners have been insufficient in protecting our soils and landscapes.”¹⁴ These scientists promote “creative science-art collaboration” to speak a more emotive, culturally resonant story of the soil.¹⁵ While scientific inquiry has generated a wealth of knowledge about the critical state of soils, it remains confined to the scientific community until it can be expressed in a more broadly meaningful way.

Thus, we are left with an intriguing paradox: While landscape architects seek to embed their images with science, scientists strive to express their findings through art. In the face of seemingly insurmountable barriers for catalyzing change in consumption behaviors, disciplines turn toward each other for cues on how to visualize the exigency of the environmental condition.

LANDSCAPE PAINTING IN THE ANTHROPOCENE

It may be precisely the anti-academic impulse of a pan-European debate conducted with the power of images on the dissolution of the world that prompted natural scientists to provide the proofs which were hitherto lacking.” (Gehring 89)

¹¹ Ibid.

¹² Ibid., 123.

¹³ Alexandra R. Toland and Gerd Wessolek, “Soil art: bridging the communication gap,” *19th World Congress of Soil Science, Soil Solutions for a Changing World* (2010): 8.

¹⁴ Feller et al., “Case studies,” 543.

¹⁵ Toland & Wessolek, “Soil art,” 9.

As landscape disciplines search beyond their siloed discourses for a visual language that can interweave scientific knowledge with culturally resonant imagery, it is necessary to situate this moment of uncertainty into a larger historical context. In fact, when one takes a broader perspective of the representational histories of the landscape disciplines, it becomes clear that these trajectories do not exist in parallel; rather, they share a common foundation: seventeenth-century landscape painting.

Both soil sciences and landscape architecture — two of many landscape disciplines including cartography and geology — locate their origins in the landscape painting tradition that emerged in the Netherlands in the early 1600s. While these paintings have adopted a romantic, staid air in contemporary cultural associations, landscape painting was a radical development at its conception. When considered within its contemporaneous context, the landscape painting tradition offers a meaningful framework with which to explore the interdisciplinary trends of our current era.

To say that landscape architecture or soil science arose from the tradition of landscape painting does disservice to the truly profound revelation of those nascent landscape paintings. In fact, landscape paintings birthed the very notion of landscape itself: “landscape paintings produced the first unified picture of what before were separate unconnected objects—such as trees, rivers, roads, rocks, and forests.”¹⁶ By offering the landscape as a subject, rather than a background or setting, these canvases nurtured the seedlings of the Enlightenment,¹⁷ displaying threads of scientific inquiry and cultural cognition that ultimately developed into the landscape disciplines we know today.

While the history of seventeenth-century landscape painting has been written about in depth, the following discussion focuses on a few major trends in the pioneering landscape painting tradition that are particularly relevant to the discourse developing in the dawn of the Anthropocene. The contemporary quest for a visual language that can integrate interdisciplinary knowledge and visual expression to overturn cultural norms in fact echoes the forces at play in pre-Enlightenment landscape painting. The following discussion reflects on the era before disciplinary boundaries



Soil explored as local material in early Dutch landscape painted in 1655 by Jacob van Ruysdael. Image in the Public Domain.

¹⁶ Crandell, *Nature Pictorialized*, 161.

¹⁷ Julie Berger Hochstrasser, “Inroads to Seventeenth-Century Dutch Landscape Painting,” *Netherlands Yearbook for History of Art* 48 (1997): 193.



Rocky Landscape with a Waterfall
Joos de Momper and Jan Brueghel
Image in the Public Domain.

constrained the dissemination of knowledge, a time when “boundaries between maps and art, or between knowledge and decoration, would have puzzled the Dutch.”¹⁸ Indeed, the cultural moment that established our baseline view of the landscape—a moment when art, science, and design spoke a shared language—offers an armature for communicating our contemporary landscape narratives.

The repeating encounter with the monstrous aspects of the landscape is a salient trend in seventeenth-landscape painting that resonates with current cultural attitudes is. Though the Dutch landscape is remarkably flat, many of these seminal landscape paintings portray towering mountains that look “so very un-Dutch.”¹⁹ These imagined landforms spoke to “the attraction of the unusual, the peculiar, and perhaps also, more paradoxically, the lure of the terrifying.”²⁰ As international travel became feasible during this era, artists brought personal or second-hand encounters of more dramatic topographies to the canvas in a move that invoked a tense cultural relationship with mountains. In the discourse of the era, mountains were interpreted through one of two religious lenses: (1) as part of the original creation story or (2) as a product of the biblical flood.²¹ In both interpretations, mountains were associated with an omnipotent God, and contemporary authors often wrote of simultaneous delight in and aversion to these foreign landforms.²² Jongh even suggests that these early representations of mountains embody a fledgling iteration of the “Sublime” that would become central to eighteenth-century Romantic works.²³ This tension between awe and terror, between fascination and disgust, is aroused by topographic imagination. Though mountains no longer elicit such profound responses in contemporary iconography, an analagous cultural relationship exists with toxicity today.

In addition to provoking the development of cultural associations with landform, seventeenth-century landscape painters set the stage for scientific inquiry by developing foundational concepts within the picture plane. In fact, landscape painting worked dialogically and coherently with contemporaneous ventures such as cartography and hydraulic engineering to develop non-verbalized notions of space

¹⁸ Hochstrasser, “Inroads,” 197.

¹⁹ E. de Jongh and Michael Hoyle, *Theme and motif in Dutch seventeenth-century painting* (Leiden: Primavera, 2000), 168.

²⁰ Jongh and Hoyle, *Theme and motif*, 168.

²¹ Ibid., 172.

²² Ibid., 175.

²³ Ibid.

and matter.²⁴ These landscape views can be read as attempts to understand the nature of space between points on a map or destinations on a travel log, a vision that ultimately led to the scientific concept of infinity.²⁵ It is not that painters simply reflected scientific theorems on canvas, but rather, scientific revelation “stemmed from the reflective, cross-disciplinary application of handicraft tools, optical apparatuses and artistic methods of representation.”²⁶ The knowledge embedded in these paintings made the natural sciences possible, and the expressive artistry of these works offered entry to such knowledge by linking “the distance back to individual experience.”²⁷ The pictorial view offered ground to shape a worldview informed by knowledge and empowered by beauty.

This link between the personal and the expansive at play in many landscape paintings provides a lens into the mix of technical experimentation and cultural appeal that inspired these compositions. Much has been written about the widespread presence of roads in these paintings, as they provide an intriguing entry into the pictorial frame, mediating between prosaic scenes in the foreground and more revelatory landscapes in the background. Such compositions were generated by “primitive” surveyor telescopes, which “left the close foreground unfocused, which meant that the artist could use his own creativity to complete the painting, nevertheless keeping within its perspective.”²⁸ The presence of the road to pictorially and conceptually link these realms also “makes visible this oft-cited humanization of Dutch space and Dutch experience.”²⁹ The road reflects a continued attempt to situate the personal scale in relation to the larger landscape, and to interpret the landscape through a uniquely human perspective. Roads provide two important structural strategies: (1) provide entry for the individual to relate to the landscape and (2) allow technical tools to inform compositional decisions.

Lest the archetypal landscape painting be portrayed as a panacea for disciplinary woes, it is

24 Ulrike Gehring, “Painted topographies: a transdisciplinary approach to science and technology in Seventeenth century landscape painting” in *Networks of knowledge in seventeenth century landscape painting*, ed. Ulrike Gehring and Peter Weibe (Münich: Hirmer, 2014), 89.

25 Gehring, “Painted topographies,” 89.

26 Ibid.

27 Ibid.

28 Pieter Biesboer, “Beyond far horizons” in *Networks of knowledge in seventeenth century landscape painting*, ed. Ulrike Gehring and Peter Weibe (Münich: Hirmer, 2014), 239.

29 Hochstrasser, “Inroads,” 197.



Landscape with a View of Haarlem, ca. 1670-75
Jan Vermeer van Haarlem
Image in the Public Domain.



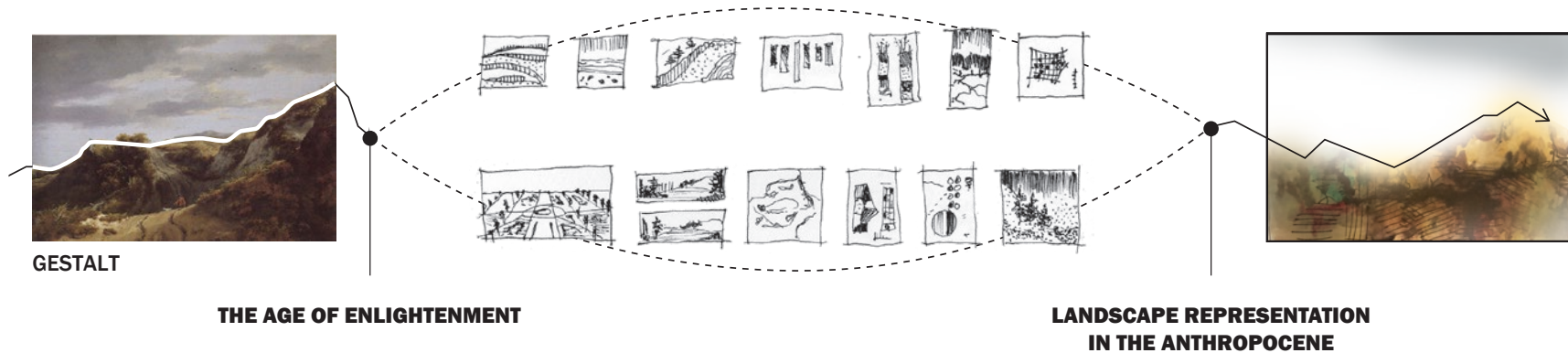
Young Herdsman with Cows, ca. 1655-60
Aelbert Cuyp
Image in the Public Domain.



Wheat Fields, ca. 1670
Jacob van Ruisdael
Image in the Public Domain.

important to underscore the tradition's fundamental association with capitalism. Landscape paintings proliferated during the seventeenth century as a direct product of a "wave of commercialization" that introduced art to the free market.³⁰ For the first time, popular demand drove painting subjects rather than solely from the court and the church.³¹ A wealthy citizenry commanded this emergent art market, establishing this new landscape view as a commodity. Four centuries later, we must reckon with the destruction wreaked by this consumerist relationship to the landscape. Revisiting the foundations of this seventeenth-century tradition within the present-day context offers an opportunity to reflect the impact of the commoditized view on the physical landscape.

As we search for a visual language with which to meaningfully communicate contemporary environmental conditions, the landscape painting tradition offers a rich legacy for informing future representation. By reclaiming tenets of seventeenth-century expression in the context of our own tenuous moment in history, toxicity becomes legible through most common language of all: the landscape itself.



³⁰ Michael North, "The rise of a genre: landscapes on the Dutch art market" in *Networks of knowledge in seventeenth century landscape painting*, ed. Ulrike Gehring and Peter Weibe (Münich: Hirmer, 2014), 433.

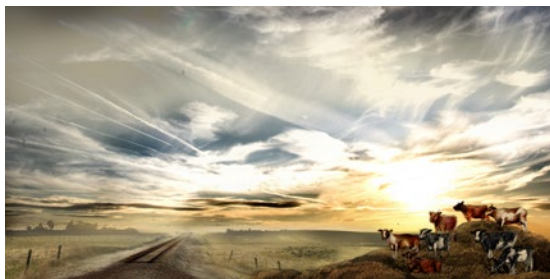
³¹ Franz Ossing, "Clouds in Seventeenth century Dutch landscape painting: the urge toward the real" in *Networks of knowledge in seventeenth century landscape painting*, ed. Ulrike Gehring and Peter Weibe (Münich: Hirmer, 2014), 429.

EXPRESSING TOXIC TOPOGRAPHIES

How, then, does an Anthropocenic landscape painting come to life?

Oil paint makes sense to me. It moves on the canvas with the same languid, sticky drawl of an Atlanta afternoon. Some approach it as a dimensional medium, spreading it thickly like rich buttercream. I, however, find the true beauty of oil paint in the slow accretion of alternating hues — burnt umber, Prussian blue, yellow ochre — thinned layers of pigment that achieve symphonic depth. I paint to a patient rhythm, like a rocking chair synced to the cadence of sprawling summertime story.

These landscapes, however, are of a different ilk. The depth of these images does not arise from the lustrous qualities of oil paint, but rather from the depth of thought embedded in the compositions themselves. The layers of these paintings accrued in quick succession — three-dimensional modeling, hand drawing, digital manipulation — but they settle into the same haunting profundity as oil paint. They resonate with a lingering harmony wrought between empirical research and aesthetic allure.



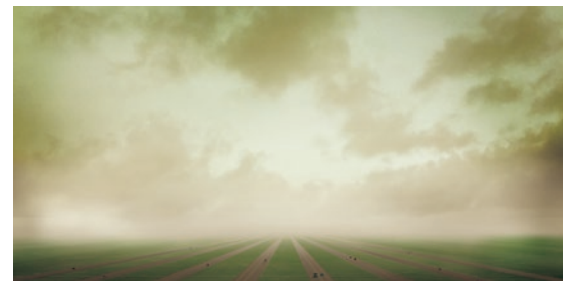
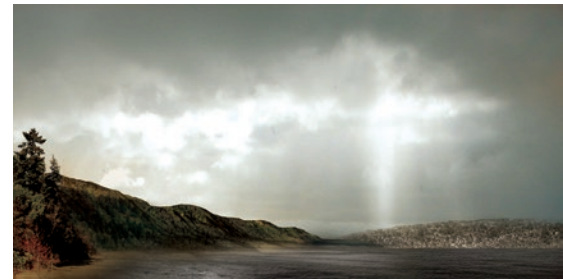


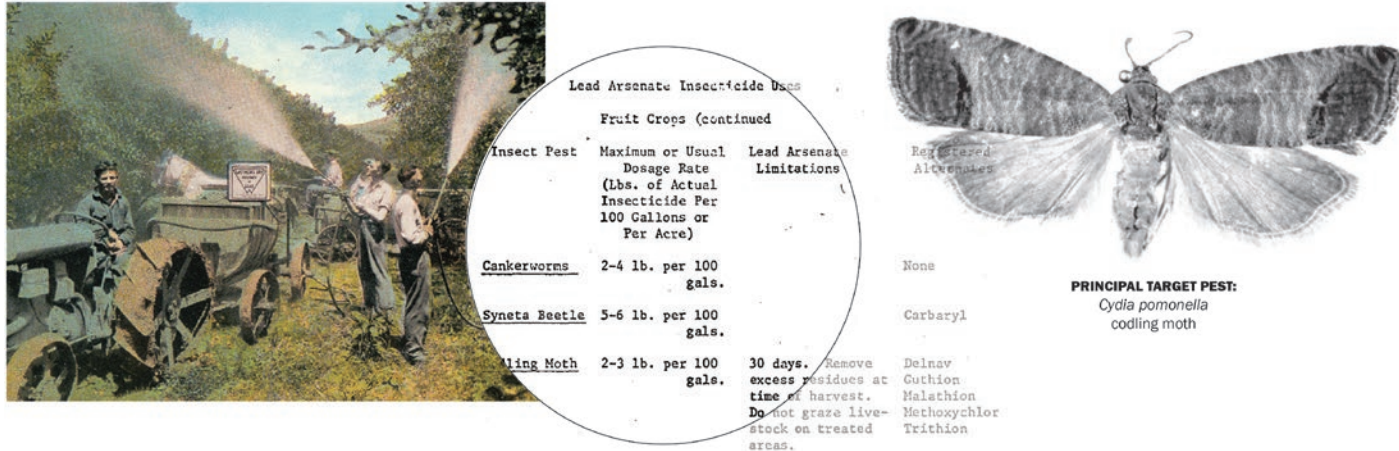
Drawing from seventeenth century traditions, these paintings position knowledge and beauty as irreducibly symbiotic; they offer access to inquiry through the familiar lens of landscape. Like their Dutch forebears, these views are constructed using contemporary technical tools — seventeenth-century surveyor telescopes replaced with digital modeling software and LIDAR point clouds. Furthermore, the images shift from the plan view to the human perspective, providing entry to the audience while also establishing infinite horizons that allow the narrative to expand outward without restraint.

Each painting uses the landscape itself to embody the narratives that weave through the Tacoma smelter plume. Not strictly chronological, the topographies give form to the erased histories, insidious toxicity, and ongoing processes at play in the landscape. From the production of copper during the smelter's peak operations to the spread of arsenenic pesticides across the nation's orchards — from the accrued wealth of corporate greed to the accumulation of displaced soil — these compositions work in tandem to challenge our fundamental assumptions about the nature of our common landscape.

The imagined landforms, as embodiments of toxicity and unchecked consumption, implicitly renew a sense of terror and fascination in topography. These paintings offer a geographic imagination that allows contamination to be read into our most persisting cultural view of the landscape: the painting.

These Anthropocenic landscape paintings are embedded with specificity, from the spatial data of their contexts to the specific volumes embodied by landform, yet they breathe with mystery. While each image differs slightly in process — and varies widely in content — the following discussion details my workflow for creating one of these compositions:





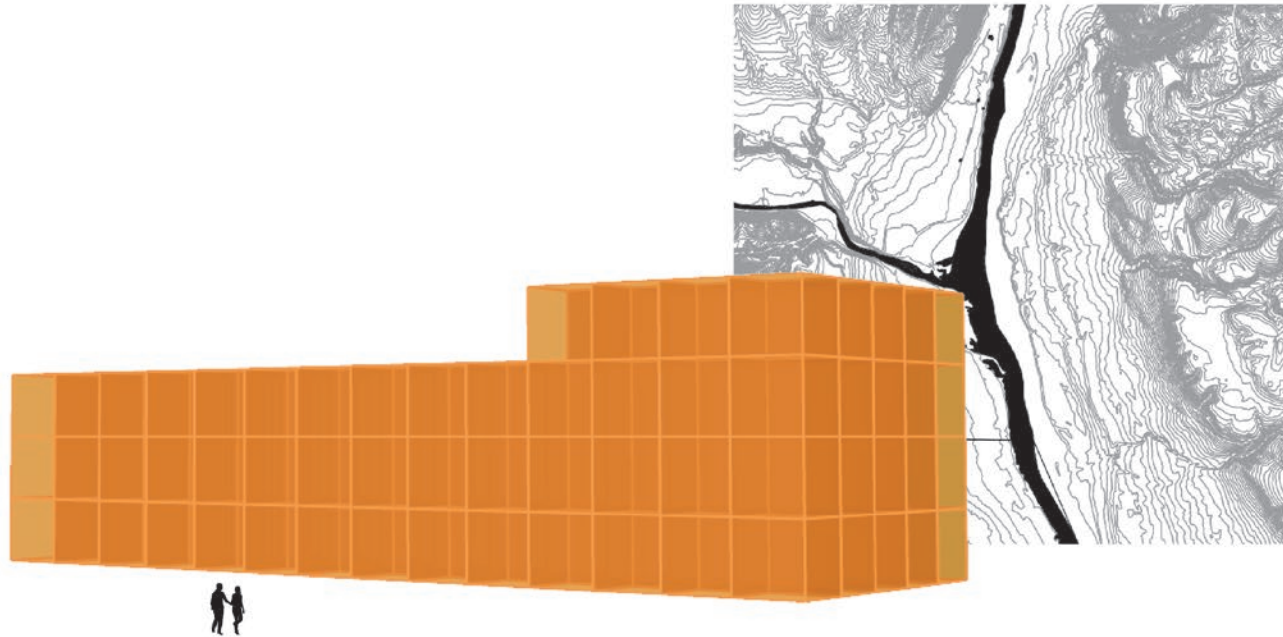
1. TEXTUAL RESEARCH

Each of the ten landscapes began as a textual research process, from exploring historic USDA yearbooks to gathering data about contemporary soil replacement. The research process was fluid, with no regard for disciplinary or chronological restraints. Recent journal articles measuring arsenic and lead levels in South Puget Sound freshwater lake sediment were fair game, as were news articles revealing labor conditions in Peruvian mines operating today.

This landscape, specifically, investigates the imprint of arsenic pesticides — which were produced from arsenic captured at the smelter — in apple orchards in Eastern Washington. I collected spatial maps of historic orchard footprints estimated from aerial photography to get a sense of the reach of this contamination, and then looked to historic documentation of pesticide application rates and procedures to estimate how much pesticide was typically applied in an orchard per year. These documents shifted in tone from early records touting the efficacy of lead arsenate in eradicating the ever-destructive codling moth, to early EPA memos that begin to acknowledge the harms of this agricultural practice. From descriptions of apple trees veritably dripping with lead arsenate to photographs of farmers’ arsenic-caused skin lesions, I built a robust foundation of textual knowledge from which I sculpted a landscape.

Historic postcard image of orchard pesticide spray from Yakima Valley Museum.

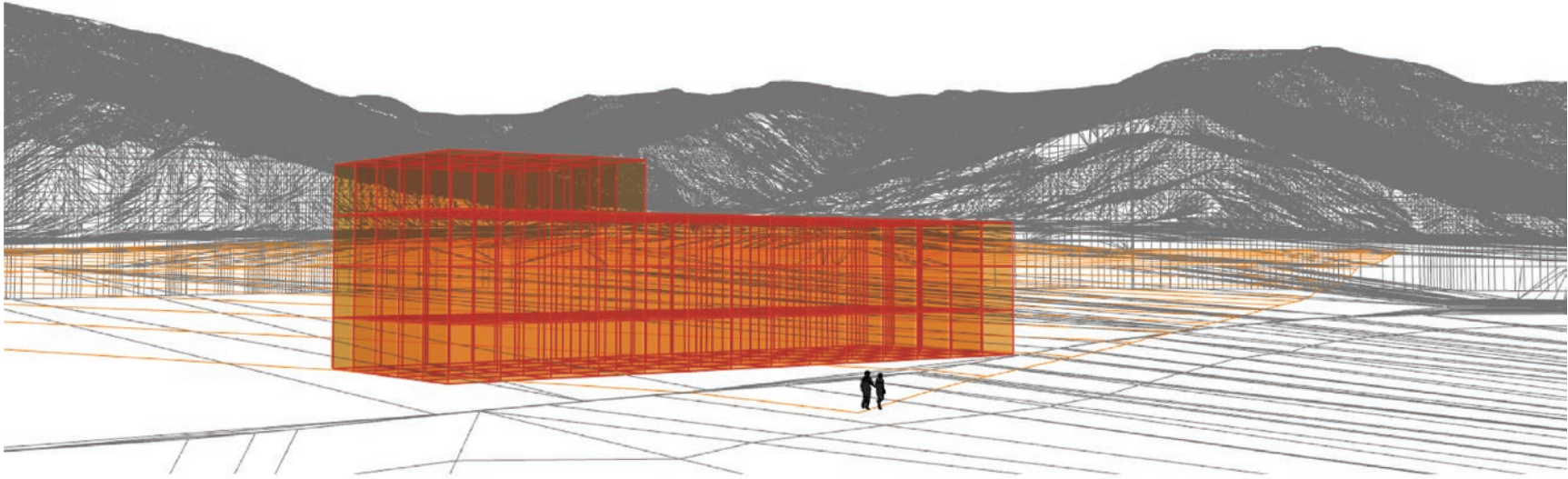
Codling moth image from Simon Winkley & Ken Walker, Museum Victoria, under CC BY 3.0 AU



2. SPATIALIZING DATA

Subsequently, I translated the quantities that I had gathered in my research — be it soil removed, arsenic emitted, or money distributed — into spatial volumes. The wealth of data we can access is staggering, but numbers remain an obtusely difficult thing to conceptualize. By generating the geometries of these amounts, the scale of these quantities become comprehensible. While it is a significant conceit to aggregate these quantities as singular masses, when in fact most of these volumes are dispersed over large regions, the geometries are as specific as the data allow.

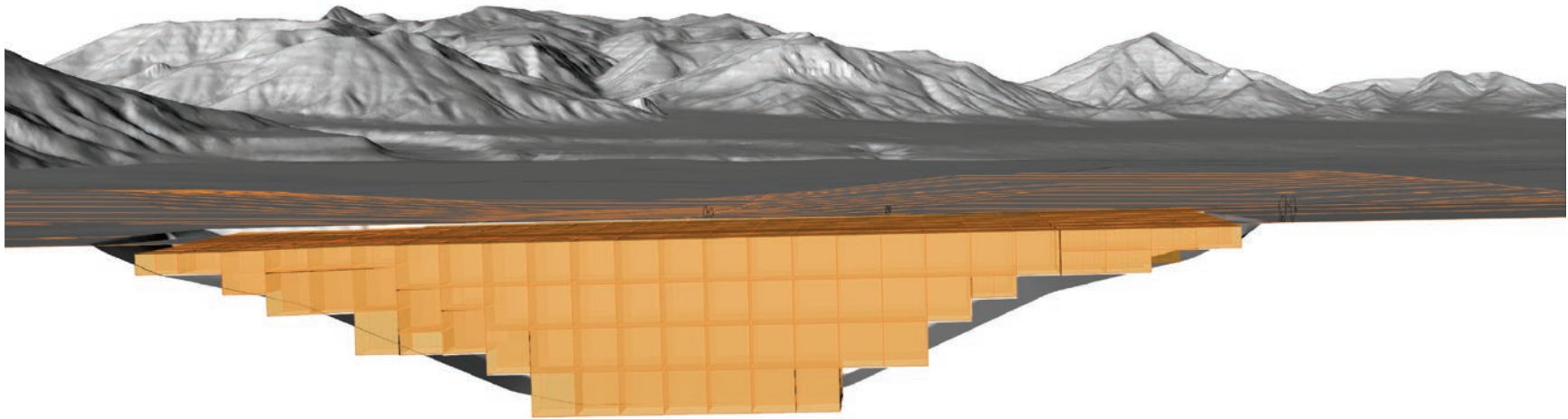
In the lead arsenate composition, I calculated the amount of pesticide typically applied on an average 50-acre orchard in Wenatchee. I derived this amount by cross-referencing various historic agricultural pamphlets and contemporary estimations based on soil arsenic content. I aggregated the amount of pesticide applied during the era in which lead arsenate was a legal substance so as to underscore the permanence and immobility of arsenic as it accumulates over time.



3. CONSTRUCTING LANDSCAPE

The spatial volumes were then placed into three-dimensional landscapes, situating these forms in particular locations. These contexts were generated from GIS contour lines and LIDAR point clouds, exploiting the capabilities of digital tools to generate specific spatial surfaces. By situating the geometries I created from textual research into hyper-specific terrains, these images begin to evoke the uncanny pull of subverted realism.

This example, specifically, locates the accrued lead arsenate within a modeled terrain generated from Wenatchee topographic data. Placing the cubic volume into this landscape immediately lends the scale of the geometry a gravity that it cannot achieve when alone on the page.



4. IMAGINING LANDFORM

Once placed into their respective contextual terrains, I manipulated the novel geometries into landforms, integrating these industrial narratives into the landscape itself. Suddenly, these abstracted cubic forms become meaningful and legible; the textual record is translated into the language of the land. By allowing these volumes to adopt the contours of the landscape, these compositions move from a straightforward exercise in scale comparison to an image more deeply invested with cultural significance and inherited connotations.

Within the Wenatchee scene the lead arsenate became a lake, partly because of the liquid nature of the pesticide, but also as a way to evoke a sense of submersion and depth. Envisioned as a lake, the abstract volume of lead arsenate evokes sensations beyond the visual: the volume is now embedded with the memory of murky, thick wetness. The imagined landform allows us to interpret contamination with an emotive, experiential perspective.



5. PAINTERLY LENS

Finally, I applied my artistic sensibilities to these crafted landscapes through an iterative process of analog and digital mediums. Adopting the seventeenth-century aesthetic immediately engenders the images with a familiarity and coherence that makes this toxic story accessible to a larger audience. The landscapes are both intuitively simple and thick with complexity, operating within the realm of art to challenge assumptions about the very constitution of our landscapes.

Though these images were created in the fraction of the time of an oil painting, I used the same sensitivities in these compositions that I would on canvas. Beginning with a monochromatic value study in a warm, burnt sepia tone, I layered collage, scanned hand drawing, and digital paints to create the additive depth that gives paintings that unshakable haunted quality. By embracing the modern mediums that constitute the bedrock of these topographies – namely, digital software – these paintings become contextualized in the contemporary era. The edges between what is hand-drawn and what is computer-generated are blurred, offering a digital image that resists typical categorization. The digital element of these paintings, however, does not resist painterly layers of hue and texture; in fact, I luxuriated in rich darks and luminescent lights to evoke a sense of resplendent power in the landscape. Though our environment is irreversibly imprinted with the traces of societal consumption, the landscape must be allowed to speak with painterly majesty lest we forget the inclination to respect it at all.

All of the landscapes started with a base modeled in Rhino to depict researched volumes as landform in specific topographic contexts.



Hand drawing softens the digital base and creates an underpainting with warm tones and gestural texture.

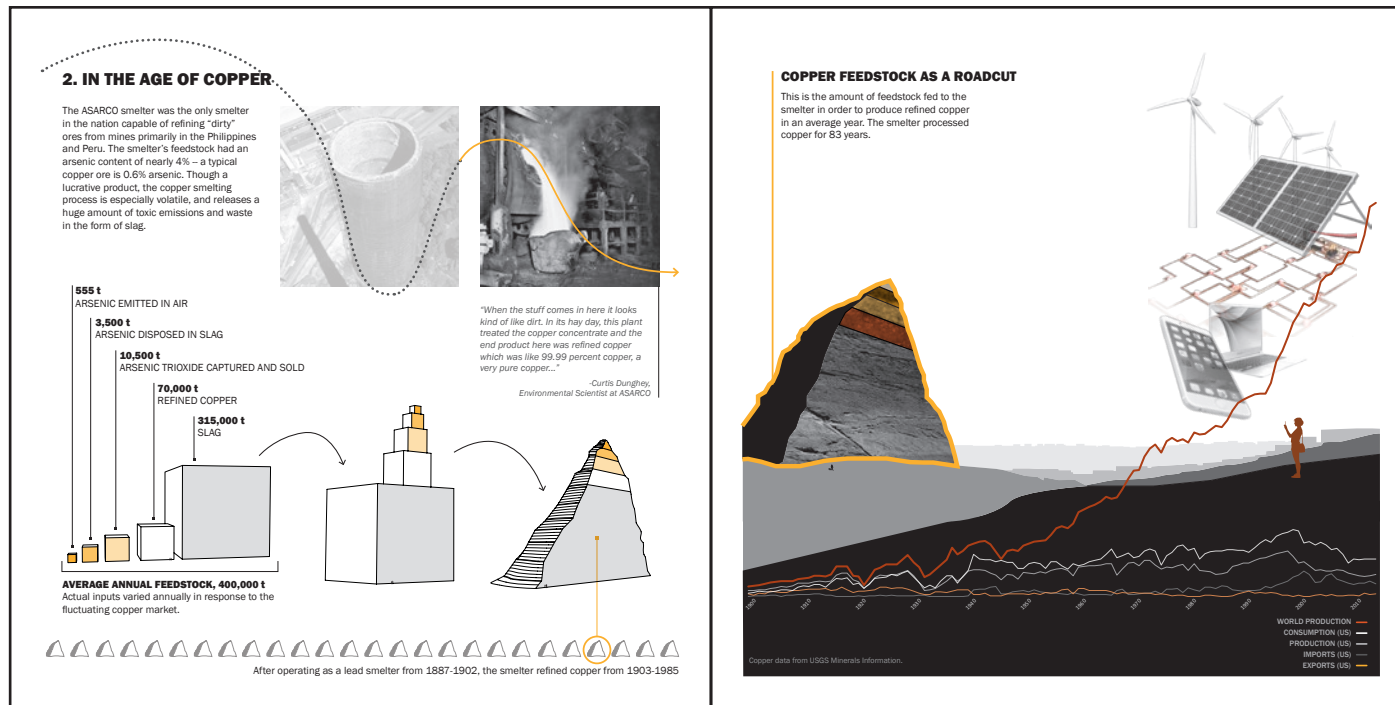




Photoshop collage layers on top of the hand-drawn base to add depth and materiality to the landscape.



Iterations of collage, drawing, and Photoshop manipulation accrue on the digital canvas to create a contemporary landscape painting.



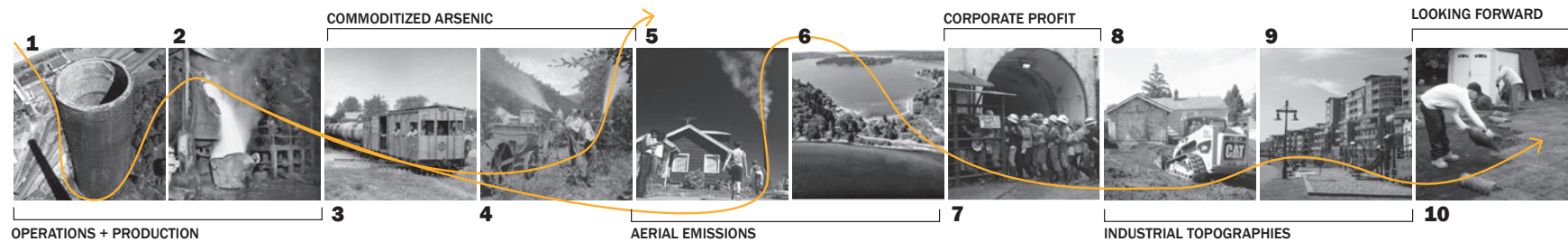
6. INTERPRETIVE KEY

Though seventeenth-century landscapes adopted a cultural fluency that merged a shifting worldview – from one shaped by religion to a prosaic perspective – with artistic expression, I knew that my landscapes would need the aid of annotation to interpret the embedded inquiry in these frames. Yet I refused to let the text subsume these images; the image alone invites renewed return in a way that didactic dissemination does not.

Ultimately, I created a key that identifies the smelter story in these landscapes, and offers threads of inquiry that weave through the larger discourse. The key describes the quantities embodied by the landforms, as well as offers diagrams and maps to contextualize the painted landscapes in the greater body of research. The key allows the landscapes to be imprinted with the memory of the smelter plume story, but – most importantly – it can also be tucked away.

UNFOLDING NARRATIVE

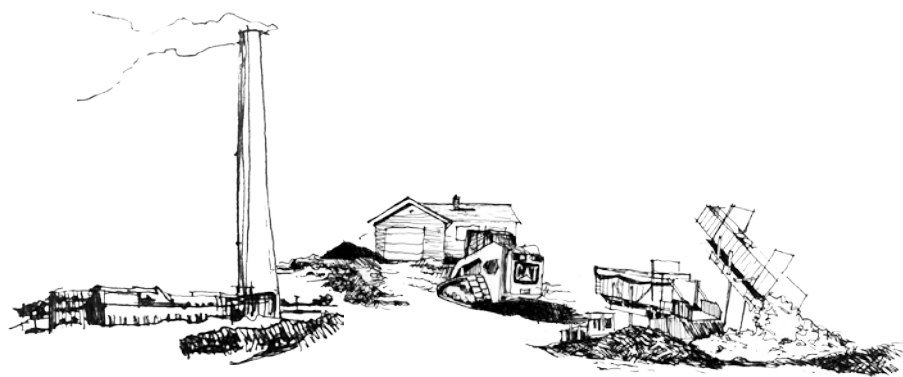
The landscape paintings that embody my visual research process unfold as a story rich with embedded narratives and temporal fluidity. The images are nested within a hand-bound book, material artifacts that offer moments of stillness and imagination. The landscapes work in conjunction with each other to evoke a story of diffuseness and permanence, of consequence and possibility. By celebrating tangible craft through the bookbinding process, the book form offers a familiar tactility that situates the landscapes within a storytelling space.





"It is presumed that [arsenic discharged from the stack] floats to **such infinite distances** and is deposited in such minute traces that it cannot be identified or found."

-L. V. Olson, ASARCO
Director of the Dept. of Agricultural Research, 1951



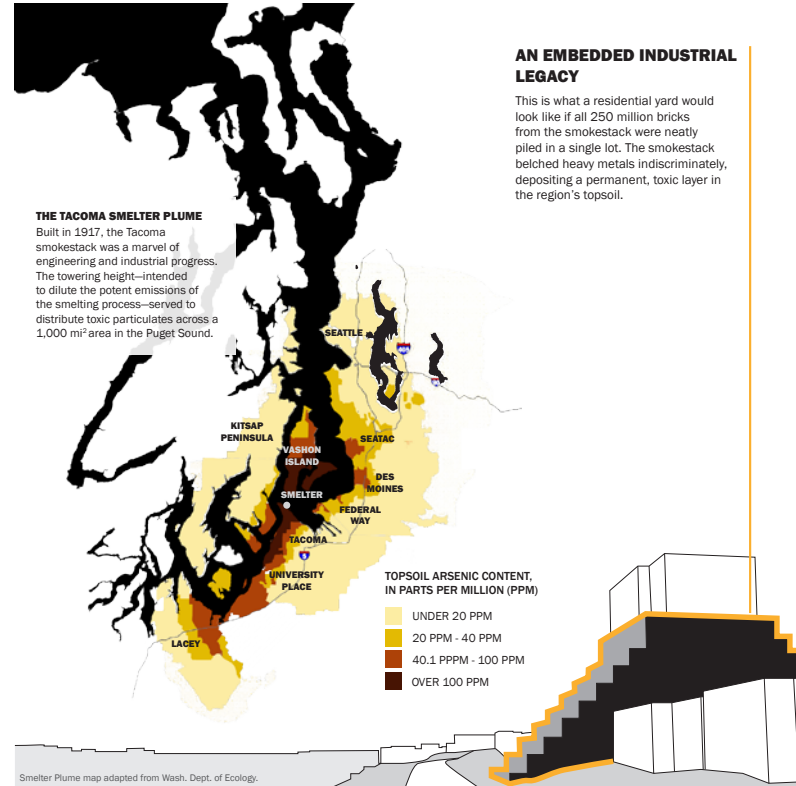
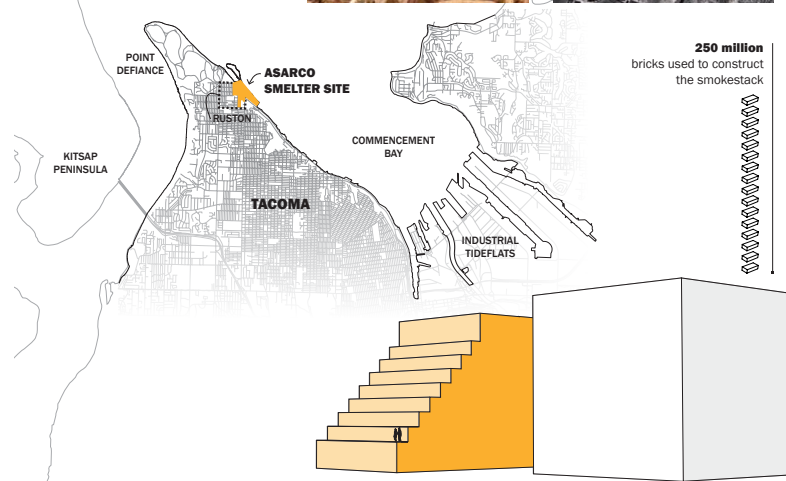
This is a story of a copper smelter's industrial legacy,
told through landscape.



1. View of demolished smokestack, bricks as foundation

1. THE CITY OF DESTINY

In 1887, William Rust set his industrial sights on Tacoma's deep-water harbor and built a lead smelter on the shore of Commencement Bay. In 1902, the site was converted to a copper smelter and was, in short order, purchased by the American Smelting and Refining Company (ASARCO), a venture of the Guggenheim brothers. At 562 feet, the smelter's smokestack was the tallest of its kind. By 1927, the smelter produced 12% of nation's copper. In the face of environmental regulation and a tanking copper market, the smelter stopped production in 1985. The iconic smokestack was demolished in 1993.

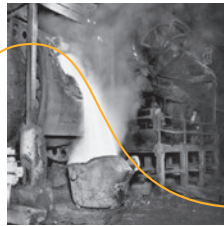
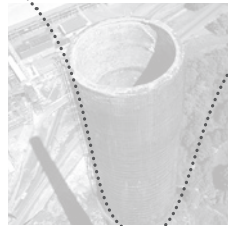




2. Roadcut through the annual output of the Tacoma Smelter

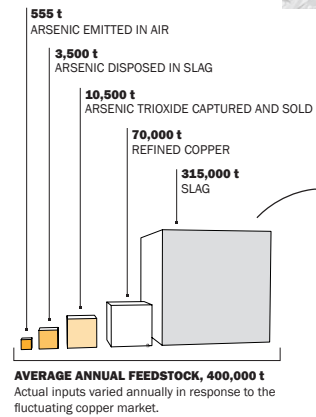
2. IN THE AGE OF COPPER

The ASARCO smelter was the only smelter in the nation capable of refining "dirty" ores from mines primarily in the Philippines and Peru. The smelter's feedstock had an arsenic content of nearly 4% – a typical copper ore is 0.6% arsenic. Though a lucrative product, the copper smelting process is especially volatile, and releases a huge amount of toxic emissions and waste in the form of slag.



"When the stuff comes in here it looks kind of like dirt. In its hey day, this plant treated the copper concentrate and the end product here was refined copper which was like 99.99 percent copper, a very pure copper..."

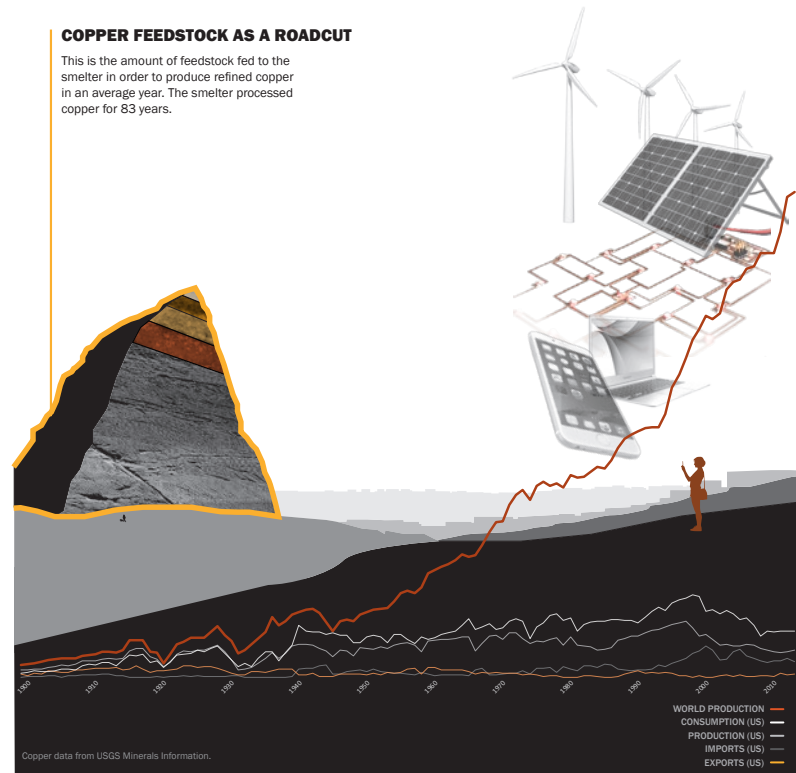
—Curtis Dungey,
Environmental Scientist at ASARCO



After operating as a lead smelter from 1887-1902, the smelter refined copper from 1903-1985

COPPER FEEDSTOCK AS A ROADCUT

This is the amount of feedstock fed to the smelter in order to produce refined copper in an average year. The smelter processed copper for 83 years.

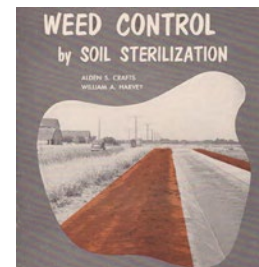
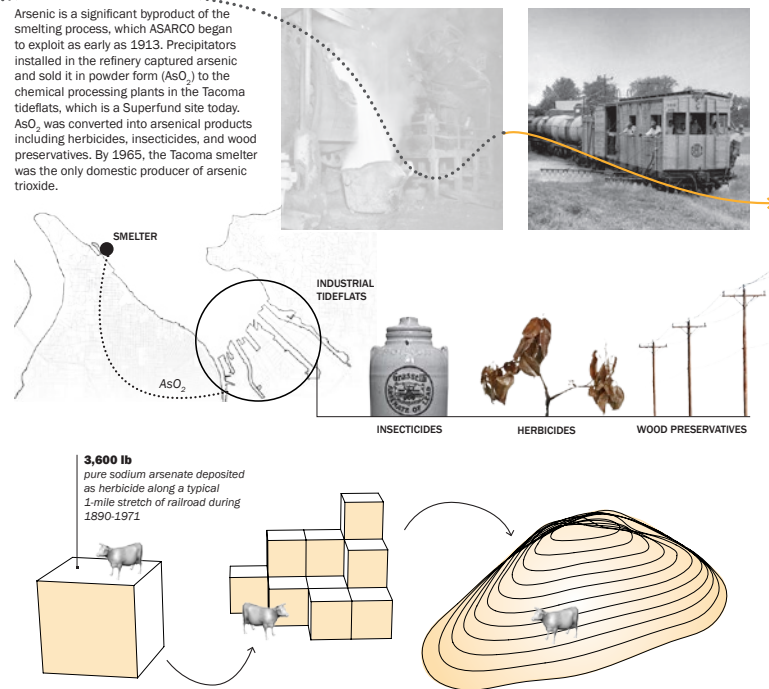




3. View of railroad along a sodium arsenate hillside

3. COPPER'S COMPANION: THE ARSENIC INDUSTRY

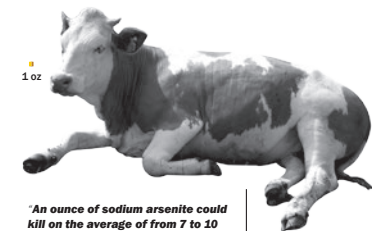
Arsenic is a significant byproduct of the smelting process, which ASARCO began to exploit as early as 1913. Precipitators installed in the refinery captured arsenic and sold it in powder form (As_2O_3) to the chemical processing plants in the Tacoma tidelflats, which is a Superfund site today. As_2O_3 was converted into arsenical products including herbicides, insecticides, and wood preservatives. By 1965, the Tacoma smelter was the only domestic producer of arsenic trioxide.



"Permanent soil sterilization is to provide complete and long-lasting destruction of all plant growth."
-Weed Control by Soil Sterilization, 1955

ROLLING HILLS OF SODIUM ARSENATE

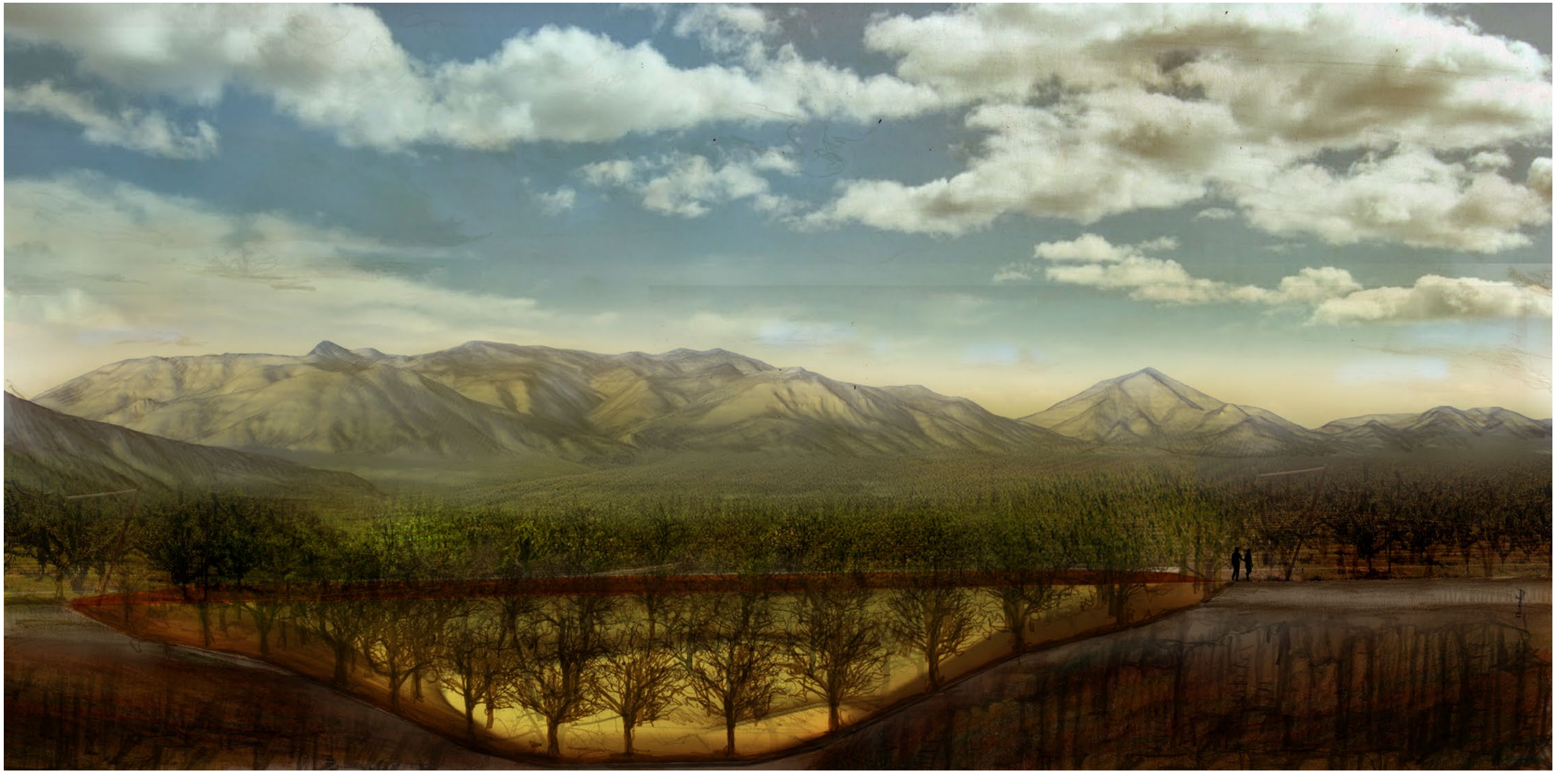
This is the volume of pure sodium arsenate deposited as herbicide solution along a typical railroad bed. Sodium arsenate herbicide was, on average, applied in a solution at a rate of 600 gallons per acre and was the preferred herbicide for railroads, rights-of-way, and industrial yards until the 1970s.



"An ounce of sodium arsenite could kill on the average of from 7 to 10 cows. The expert testimony was also to the effect that vegetation sprayed with sodium arsenite has an attractiveness to cows."

-Florida East Coast Railyard Co. v. Cain, 1968

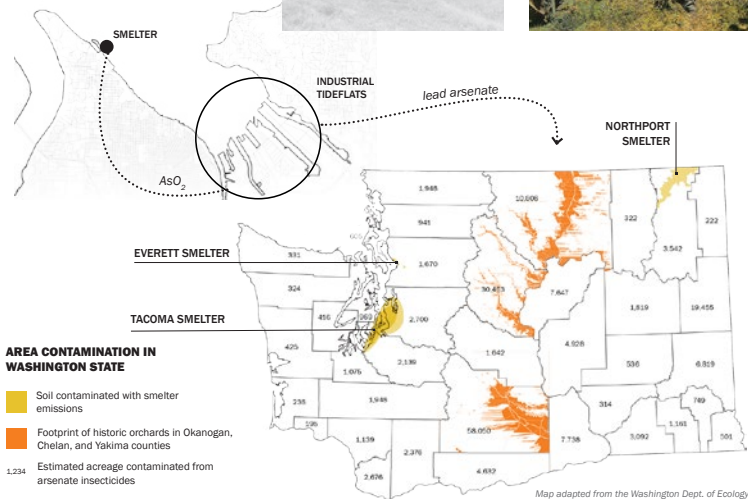
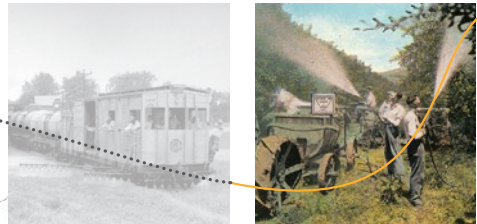




4. Wenatchee orchard with a lead arsenate lake

4. ARSENIC ACROSS THE REGION

Lead arsenate insecticide, produced from arsenic captured during the copper smelting process, was liberally applied to orchards across the nation for over 50 years. Eastern Washington, especially, doused the landscape with this insecticide ***in defense of the apple-destroying codling moth. As historic orchards are developed into residential communities, area contamination from the lead and arsenic in insecticide has prompted its own soil remediation effort.

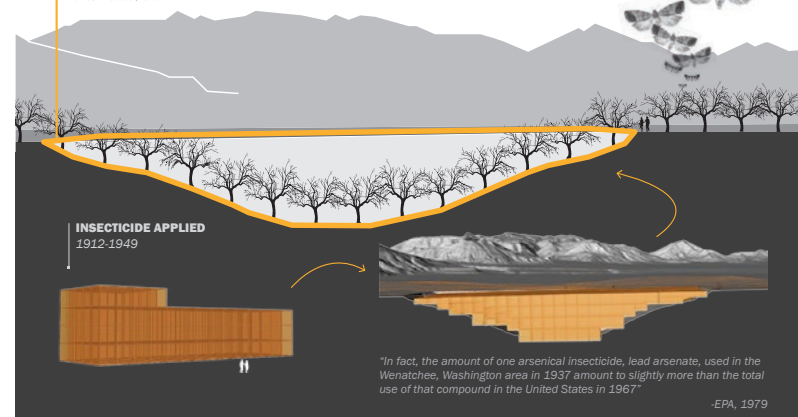


LEAD ARSENATE LAKE IN AN APPLE ORCHARD

This is the aggregated amount of lead arsenate pesticide applied to an average 50-acre apple orchard in Wenatchee, Wa. before it was replaced by DDT in the 1950s.



PRINCIPAL TARGET PEST:
Cydia pomonella
codling moth

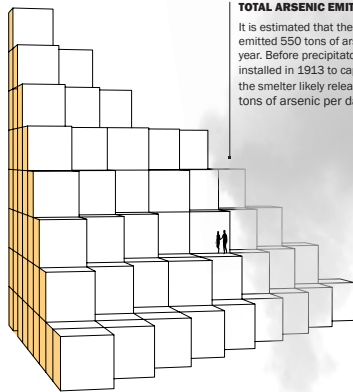




5. Arsenic emissions from 1905-1985, as basalt

5. DISPERSED TOXICITY

Smelter arsenic that wasn't sold as a commodity was released into the air along with other toxic byproducts, and deposited across the Puget Sound. Ironically, the smelter's urban setting delayed local resistance to the pollution since it did not visibly impact crops and livestock as it did in other Western locations. In the 1970s, citizens began to demand environmental regulations on local air quality. Thus emerged the "Tacoma Process," in which the EPA consulted with residents to determine an acceptable arsenic emissions level, which was not under EPA regulation. The smelter closed before such a regulation could be set.



TOTAL ARSENIC EMITTED

It is estimated that the smelter emitted 550 tons of arsenic each year. Before precipitators were installed in 1913 to capture arsenic, the smelter likely released 35 to 67 tons of arsenic per day.

ADDITIONAL TOXINS EMITTED

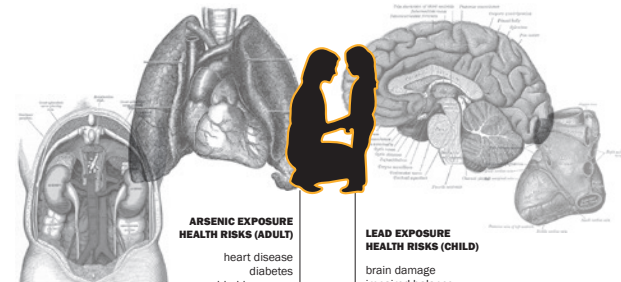
LEAD
CADMIUM
ZINC
SULFUR DIOXIDE



A "jobs vs. health" divide emerged in the community as citizens attempted to agree on an arsenic emissions cap for the smelter. Ambiguous health impacts were pitted against 575 smelter jobs in a debate that rocked the community for over a decade while ASARCO continued to quietly emit arsenic, unregulated.

ARSENIC EMISSIONS AGGREGATED AS BASALT

Arsenic and other heavy metals dispersed through the air as particulate dust and settled across the landscape. In 1972, a health study found that arsenic levels in local children's urine were **15 times higher** than what is considered safe.

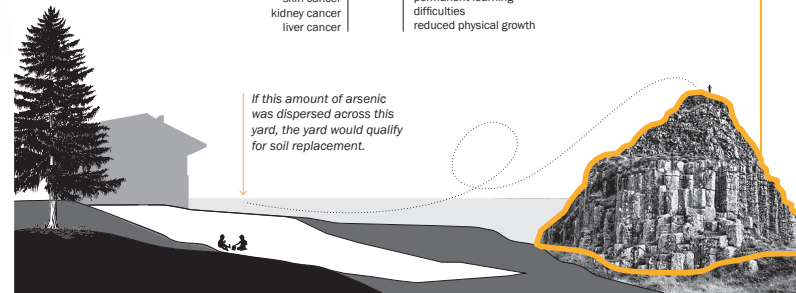


ARSENIC EXPOSURE HEALTH RISKS (ADULT)

heart disease
diabetes
bladder cancer
lung cancer
skin cancer
kidney cancer
liver cancer

LEAD EXPOSURE HEALTH RISKS (CHILD)

brain damage
impaired balance
hyperactivity
permanent learning
difficulties
reduced physical growth



If this amount of arsenic was dispersed across this yard, the yard would qualify for soil replacement.



6. Landscapes under a shared sky

6. VARIED LANDSCAPES UNDER A SHARED SKY

The toxic smelter plume distributed contamination indiscriminately across varied landscapes. In addition to the urban areas along the east shore of the Puget Sound, emissions settled in high concentrations on the forested landscape Vashon Island and into waterbodies across the region. Increased levels of arsenic and lead is evident in lake bed sediments as far away as 50 miles and exacerbate the already degraded marine ecosystems of the South Puget Sound.



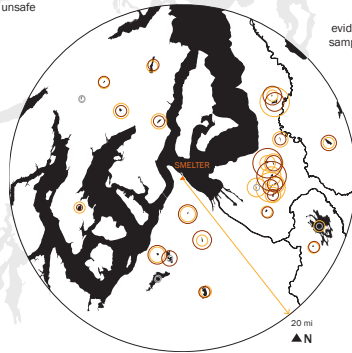
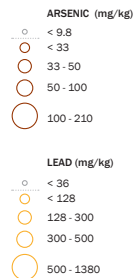
LAKE BALLINGER

LAKE WASHINGTON

Elevated arsenic content is evident in Seattle lake bed core samples, correlated to the years of smelter operations.

ARSENIC AND LEAD IN LAKES

A 2013 study measured arsenic and lead in sediment in lakes within 20 miles of the smelter. 20 years after the smelter's closure, nearly each lake registered unsafe levels of toxic traces.



Map adapted from J Gawel et al., "Arsenic and lead distribution...", 2013.

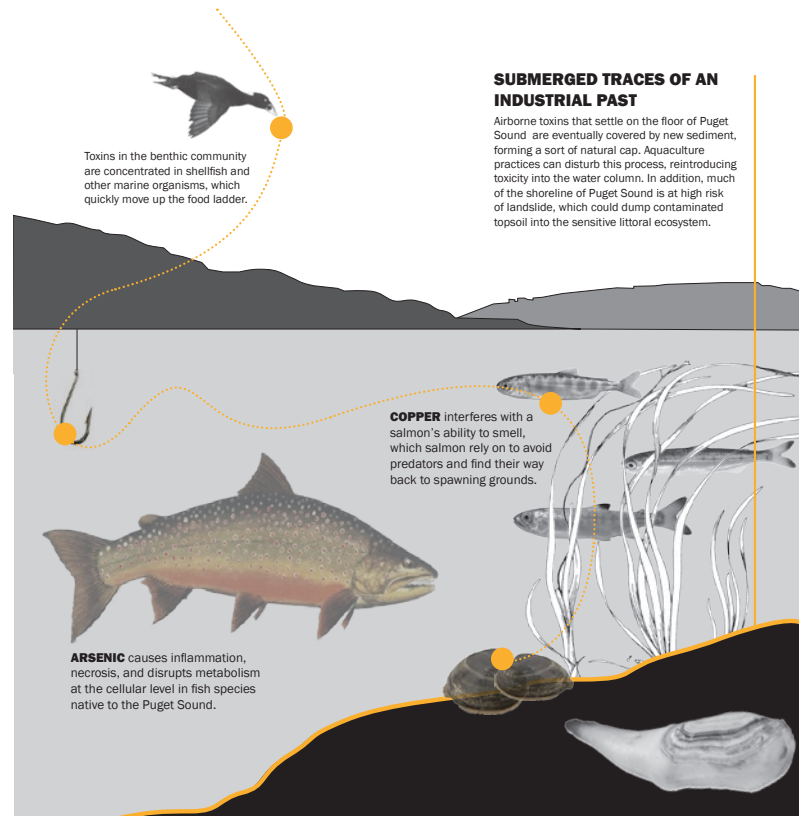
SUBMERGED TRACES OF AN INDUSTRIAL PAST

Airborne toxins that settle on the floor of Puget Sound are eventually covered by new sediment, forming a sort of natural cap. Aquaculture practices can disturb this process, reintroducing toxicity into the water column. In addition, much of the shoreline of Puget Sound is at high risk of landslide, which could dump contaminated topsoil into the sensitive littoral ecosystem.

Toxins in the benthic community are concentrated in shellfish and other marine organisms, which quickly move up the food ladder.

COPPER interferes with a salmon's ability to smell, which salmon rely on to avoid predators and find their way back to spawning grounds.

ARSENIC causes inflammation, necrosis, and disrupts metabolism at the cellular level in fish species native to the Puget Sound.

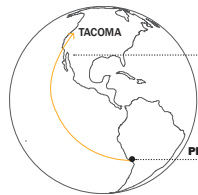
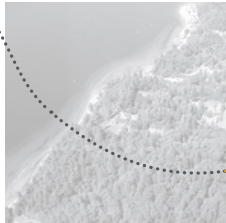




7. Seascape of corporate wealth distribution

7. CORPORATE GREED AND ENVIRONMENTAL INJUSTICE

In 1999 ASARCO was purchased by the mining giant Grupo Mexico. As environmental demands mounted against the corporation, ASARCO filed for bankruptcy in 2005. The company settled environmental claims at 54 sites across the country for a small fraction of the estimated cost, thereby conveniently avoiding any long-term responsibility for remediation. In 2009, ASARCO emerged from bankruptcy and reintegrated into Grupo Mexico, without the burden of previous environmental grievances. Grupo Mexico is notorious for worker rights violations and violent suppression of labor protests.



GRUPO MEXICO PRESENCE IN PERU (2017)

- PRODUCTION PLANTS
- MINES
- FUTURE MINES

In keeping with Grupo Mexico's history of violent worker suppression, in 2016 martial law was declared in Arequipa, Peru as residents protested against the opening of a new mine that threatened the region's water supply.

SONORA, MEXICO

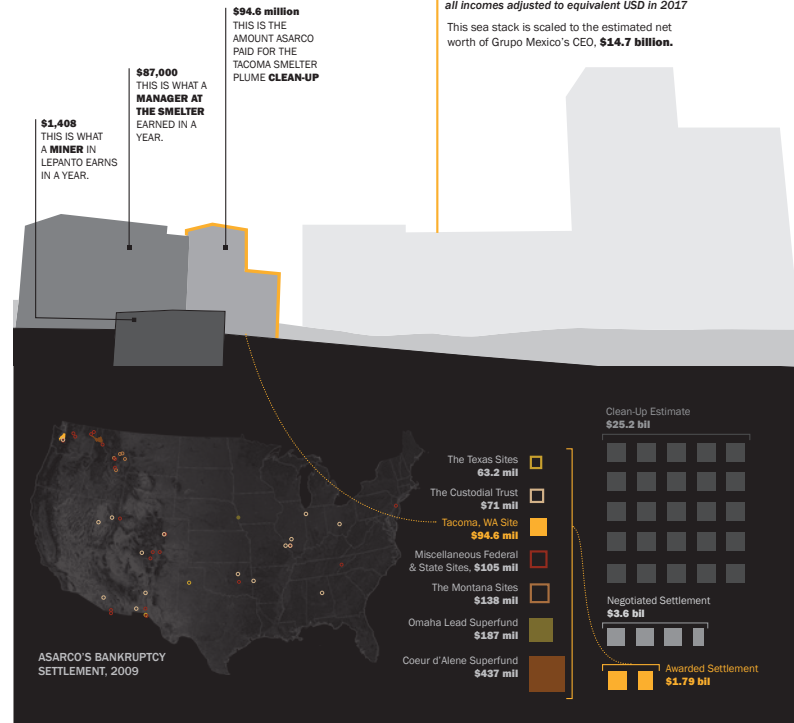


In 2014, a Grupo Mexico production plant spilled 11 millions gallons of toxic waste into the Sonora River, marking Mexico's worst environmental disaster on record.

MOUNTAINS OF MONEY

all incomes adjusted to equivalent USD in 2017

This sea stack is scaled to the estimated net worth of Grupo Mexico's CEO, **\$14.7 billion**.

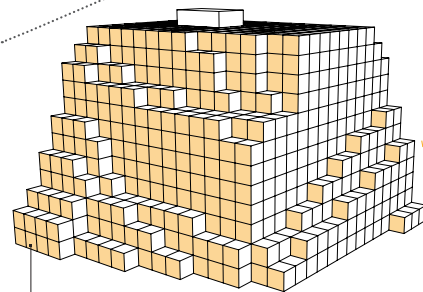
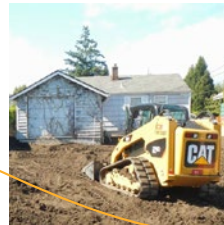




8. View of excavated residential soil, exported to Eastern Washington

8. SHIFTED SUBSTRATES

The \$94.6 million settlement funded a state-led effort to remediate impacted soils in the Tacoma smelter plume, continuing the EPA-funded remediation of the most contaminated soils in the neighborhood adjacent to the old smelter site. The toxic cleanup program focuses on replacing contaminated soil in schools and daycares, playgrounds, and residential yards throughout the region. Residents can get their soils tested for free, and if the samples exceed state-imposed safety levels, then they qualify for soil replacement and a year of lawn care.



416,250 yd³
ESTIMATED AMOUNT OF SOIL
EXPORTED TO OFF-SITE LANDFILLS
On average, 150 yd³ is excavated
from each yard that qualifies for
replacement. As of 2016, there are
still over 1,000 yards anticipated for
replacement.

HEIGHTENED CANCER RISK
in parts per million (ppm)
Wa. Dept. of Ecology and EPA
Arsenic = 20ppm
Lead = 250 ppm

ACTION LEVELS
Child Play Areas
Arsenic = 20 ppm
Lead = 250 ppm
Residential Yards
Arsenic = 100 ppm
Lead = 500 ppm

**PRACTICE
SAFETY
PRECAUTIONS**

**SOIL
REPLACED**



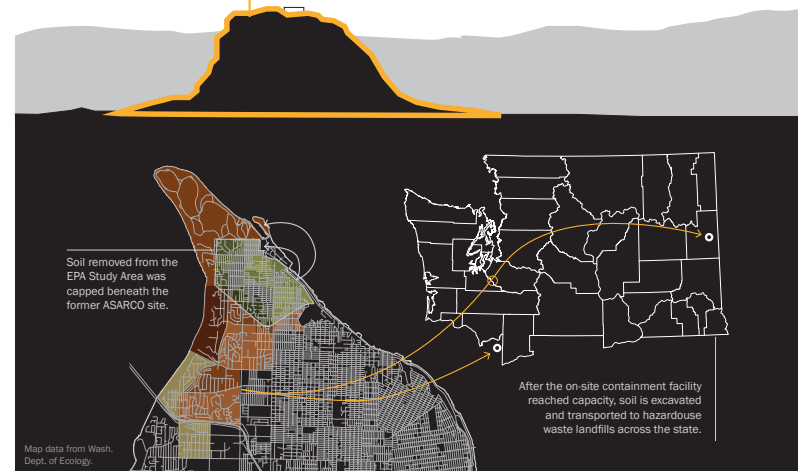
Inorganic arsenic is relatively immobile in the soil and, for the most part, is concentrated within the top 6"-18" of soil.

NEW SOIL HORIZONS

This is the estimated amount of soil removed from Tacoma and Vashon-area yards and exported to off-site hazardous landfills. For yards that test above the clean-up level of 20 ppm but below the action level of 100 ppm, residents must use soil safety precautions, such as taking shoes off in the house and wearing gloves to garden.



A patchwork geography:
Yards replaced in 2016.





9. Landscape of industrial topography

9. INDUSTRIAL TOPOGRAPHY

The remains of the original smelter site and buildings, along with remnants of the smelter in Everett, are entombed below an engineered cap on the old site. Development is underway to build luxury condos in the area where the smelter once stood. A park is being built atop the 54-acre peninsula, made entirely of arsenic-laden slag from the refining process.



Point Ruston, a development featuring luxury condos and retail storefronts, stands above the former smelter.



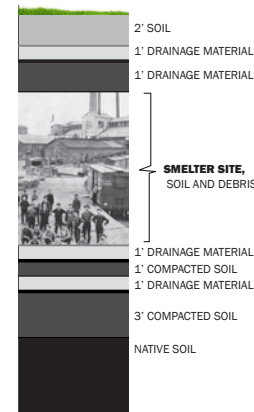
54 acres

ASARCO dumped toxic slag directly into Puget Sound for decades, creating a massive peninsula that provided a breakwater for the Tacoma Yacht Club marina. Slag from the smelter was also used to fill in the tideflats in Commencement Bay and as fill throughout the town of Ruston.

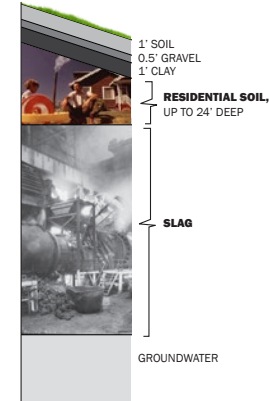
650,000 yd³

Residential soils, debris from the ASARCO site, and remains from the Everett smelter are packed into an on-site containment facility.

ON-SITE CONTAINMENT FACILITY

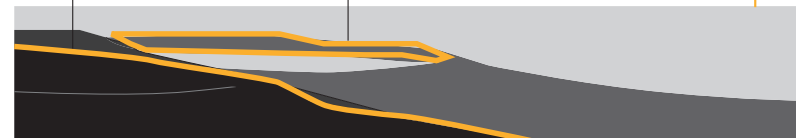


SLAG PENINSULA CAP



LASTING GEOLOGIC IMPRINT

This is the actual bare-earth surface of the shoreline, where the embedded imprint of industrial heritage becomes visible on the landscape.





10. Turf horizon

10. TURF HORIZONS

As government agencies attempt to make the massive toxic contamination of the region into safe and livable landscape, most remediated sites are replaced with fresh turf. As the nuanced legacy of the copper smelter is painted over with a thin veneer of imported topsoil and sod, the homogeneous turf landscape belies the legacy told in the geographic ledger.



2,436
residential lawns
replaced or intended
for replacement



1,000 m²
area of Tacoma Smelter Plume



Phytoremediation experiments have been conducted—to lackluster results—on Vashon Island, using native plants and the Chinese brake fern.



As a conservative estimate, there are at least three times as many acres of lawn in the US as irrigated corn.



WHAT WILL WE MAKE OF OUR POST-INDUSTRIAL LANDSCAPE?

"You didn't have to mow your front yard, because [ASARCO] would mow them for you. When they came up and they mowed the strips, they would mow the front yards also. They would do that twice a week for you. So, every lawn in Ruston was manicured. They did the edging and everything else. All those fringe benefits stopped the day the smelter stopped, and the tax base went down."

—Chuck Donahue, smelter union leader, 1965-1971

Map from C. Miles et al., 2005.

INTERPRETIVE KEY | BIBLIOGRAPHY

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Aerial image courtesy Washington State Department of Ecology.

Smokestack view courtesy of Washington State Department of Ecology.

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Smokestack view courtesy of Washington State Department of Ecology.

Smelter interior photograph courtesy of the Tacoma Public Library.

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"Over Vashon Island" by brewbooks, under CC BY-SA 2.0.

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"Over Vashon Island" by brewbooks, under CC BY-SA 2.0.

Image of miners by Christophe Meneboeuf, under CC BY-SA 2.5.

Sonora river contamination image from video from the Project on Organizing, Development, Education, and Research, Ltd. © 2016, www.projectpoder.org.

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Image of miners by Christophe Meneboeuf, under CC BY-SA 2.5.

Excavation photograph from Washington State Department of Ecology.

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Point Ruston image by author.

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EXPANDING EXPRESSIVE HORIZONS

There is a slowness inherent in painting; it offers a space in which the imagination can settle.

We find ourselves in a societal moment where access to information is seemingly unlimited. We digest media at a rapid pace, bracing ourselves against an endless tide of digital input. Stuck in a perpetual feast of data, we consume this tantalizing spread in a breathless frenzy.

My landscape paintings stand still within this coursing flow of information, offering a rare moment for reflection and wonder. The static image allows for dynamic imagination; these Anthropocenic landscapes demand that their audience ask questions rather than absorb answers. By upending our inherited assumptions about the forces at play within the landscape, these images chip away at the pervasive Western landscape perspective in order to create space for a more resilient ethic. As Stephen Meyer writes,

First and foremost we must come to terms with this basic fact: the end of the wild is fundamentally about us, not about this thing we call the environment. It is about our cultural norms, our values, and our priorities. The end of the wild is about how we have chosen to live and how those choices relate to the world around us.¹

Meyer portrays cultural values as choices, but I think there is something more formidable at play in the grave implications of his writing. At a global scale, we have irrevocably shifted the systems at work in the environment; the notion of an untrammelled nature is a vestige of a distant past. It is only when we acknowledge this fundamental shift — and its consequences — that we can move forward with shared purpose.

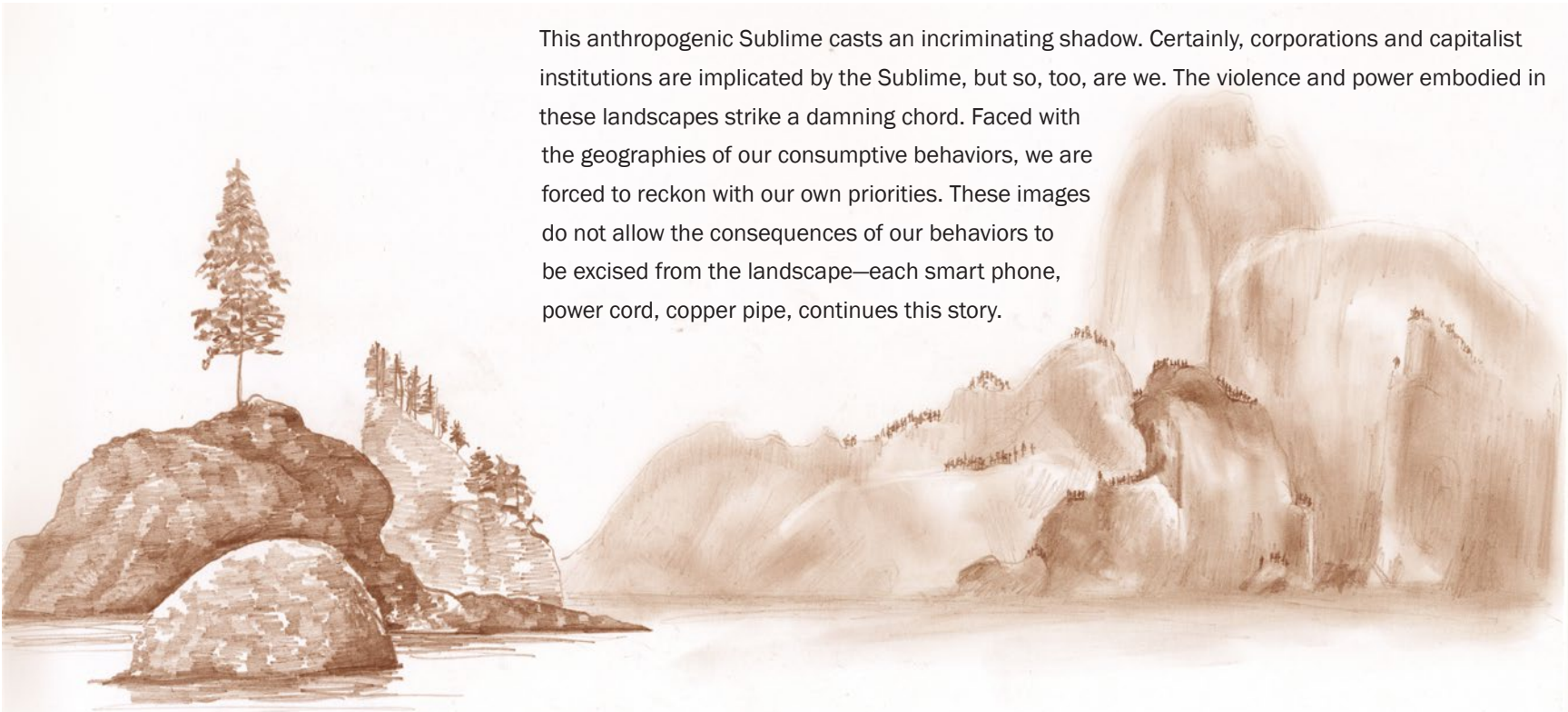
My response to the grotesque of our contemporary landscape is an offering of beauty. The images in

¹ Meyer, *The End of the Wild*, 74.

this book embrace beauty in all its complexity; the landscapes resonate with a somber elegance that stirs the spirit. Some may hesitate to represent a contamination story with such allure: we have long been conditioned to view toxicity as an abhorrent “other,” a transient aberration in an Edenic nature. Yet to continue to distinguish between ugly contamination and beautiful nature is to dangerously deny the permanence of our destructive legacy in the landscape. If we cannot find beauty in our landscape—human imprint and all—then how can we expect to cultivate a more respectful relationship with the earth?

Perhaps toxicity is our new Sublime: a looming presence that inspires awe and terror toward the irreversible impact we have bestowed on our landscape. Its monstrosity incites a perverse fascination and its sheer immensity provokes shuddering fear.

This anthropogenic Sublime casts an incriminating shadow. Certainly, corporations and capitalist institutions are implicated by the Sublime, but so, too, are we. The violence and power embodied in these landscapes strike a damning chord. Faced with the geographies of our consumptive behaviors, we are forced to reckon with our own priorities. These images do not allow the consequences of our behaviors to be excised from the landscape—each smart phone, power cord, copper pipe, continues this story.



While the alluring terror of the Sublime haunts the landforms of these paintings, beauty also wields a softer touch. Warm hues and carefully graded topographies extend an invitation to enter the worlds of these frames; they create an intimate, welcoming space in the context of an uncontrollable expanse. They position the individual within a story that is often told at an incomprehensible scale. Drawing from an aesthetic tradition deeply entrenched in our cultural memory, these landscapes speak with a familiar voice.

Undoubtedly the pictorial references in these images operate within a uniquely Western perspective. It is essential that we reclaim this fundamental Western view—and frame it within the context of our contaminated era—before we can presume to expand our worldview. These paintings assume the conventions of the Western pictorial tradition not simply as an aesthetic reference, but as a provocative reflection on what this commoditized perspective has wrought on our landscape.

Furthermore, the topographies in these paintings allow the landscape to speak for itself. They appropriate the agency of verbal text and instead speak with a more intuitive voice, a voice that – in the words of Faulkner – “clings to the earth.”² The landscape becomes more than a physical record of our exploits: it embodies our cultural memory. This idea has existed in non-Western worldviews far longer than the first landscape painting. As West African Elder Malidoma Somé describes his Burkina Faso culture’s perspective:

The elements of nature, especially the trees and plants, are the most intelligent beings because they do not need words to communicate. They live closer to the meaning behind language.³

In a world confronting a changing climate and urbanizing population, landscape architecture increasingly assumes a more results-oriented vocabulary. I fear that, in an attempt to assert legitimacy as leaders in the move toward resilient built environments, landscape architecture may eschew the emotive beauty of art in favor of a more empirical, evidence-based perspective. This does not have to be a binary choice. The wealth of data at our fingertips and the nascent potential of digital

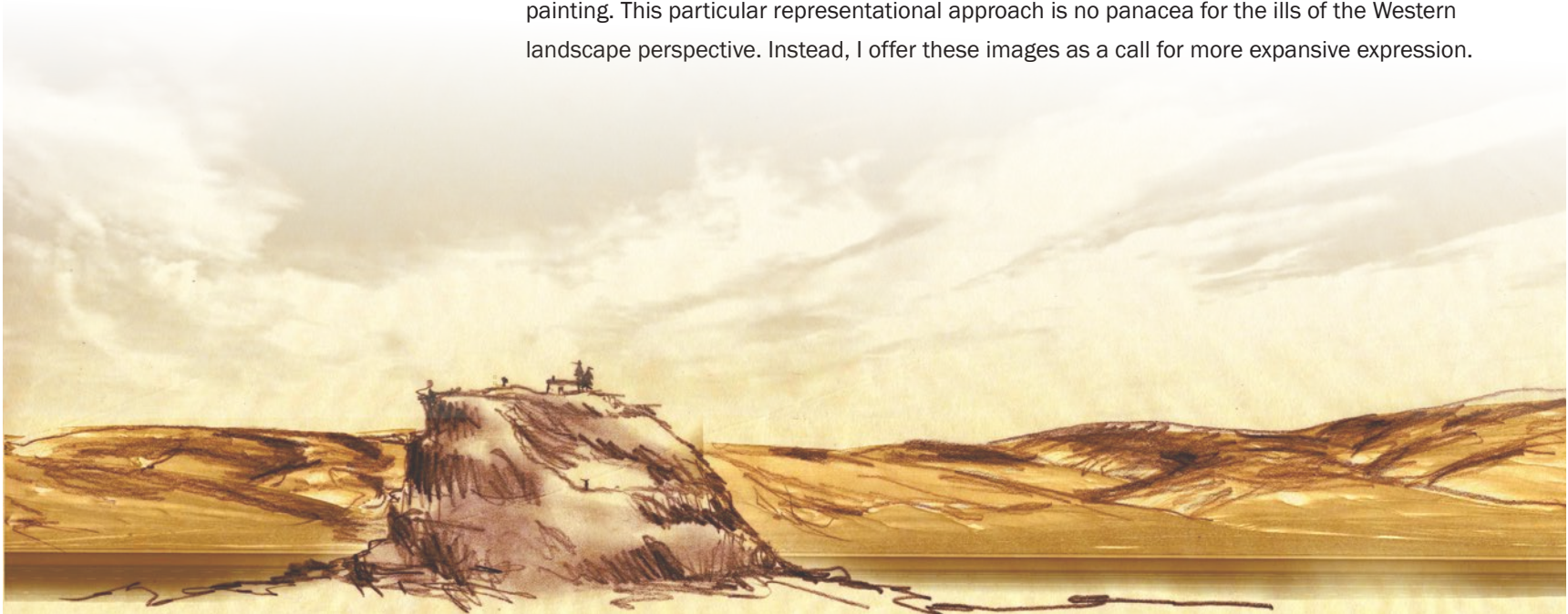
² Faulkner, *As I Lay Dying*, 173.

³ Malidoma Patrice Somé, *Of water and the spirit : ritual, magic, and initiation in the life of an African shaman* (New York: Putnam, 1994), 50.

tools offer powerful opportunities in research, design, and communication. But why should these sources of knowledge and methods of processing be sequestered from emotion, beauty, and art?

As we wrestle with the implications of the Anthropocene, landscape architects possess a unique toolset for evincing landscape narratives: topographic imagination, scientific curiosity, technical skill, representational acumen, and — above all else — an intrinsic passion for the landscape. In the face of increasingly complex environmental concerns, these qualities must be freed from the constraints of disciplinary expectations and professionalized language. Communicating contemporary landscape stories is crucial in a time of such environmental and political uncertainty; we must constantly seek to push the boundaries of representation and language to relay specific knowledge and technical innovation in ways that meaningfully resonate in the cultural imagination.

My exploration of the embedded narratives in the Tacoma smelter plume led to a series of digitally generated topographies that tell the story of contamination in the form of the archetypal landscape painting. This particular representational approach is no panacea for the ills of the Western landscape perspective. Instead, I offer these images as a call for more expansive expression.



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