



# Tar Remedies

## Methods of Return and Re-vision on Colonized/Contaminated Land

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**Abstract** This two-part essay turns to the landscapes of bitumen mining in the Athabasca tar sands in western Canada. Despite the environmental costs of the tar sands mining process, the Canadian state remains invested in oil extraction in the tar sands. Starting from the premise that the extraction and burning of this bitumen was and is not inevitable, this dialogue locates hazardous hope in the landscapes of the Athabasca region. To do so, the first section is an analysis of Warren Cariou's photographic practice, situating his work within themes of toxicity and hope. Written by an art historian, it argues that we can read the petrographs through a mode of critical spectatorship that generates questions about how extraction makes our world and how these processes are historically contingent choices based in what society has chosen to value. The second part is a short reflection by Warren Cariou on his practice and how he theorizes hope in the context of pollution.

**Keywords** photography, settler colonialism, materiality, Athabasca Tar Sands, land relations

### Part 1. Re-visioning Bitumen

Written by Siobhan Angus

A photograph by Warren Cariou, *Tailings Pond and Bitumen Plant*, documents a bitumen mine in the Athabasca tar sands of western Canada.<sup>1</sup> Cariou is from Meadow Lake, Saskatchewan, which is located near the Athabasca River and the infrastructure of the tar sands. He began to make petrographs to document the incredible changes he witnessed to the landscape as corporations sought bitumen deposits buried beneath strata of rock, clay, muskeg, and boreal forest. Here material and representation come together:

1. I discuss Cariou's petrographs in length in Angus, *Camera Geologica*.



Figure 1. Warren Cariou, *Tailings Pond and Bitumen Plant* (2016). Bitumen photograph, 8 in. x 10 in.

bitumen extraction is the subject of the image, but bitumen is also the light-sensitive material used to make the photograph. The image is striking and seductive: a monochromatic wash of glowing golden light set on a reflective surface of polished aluminum. Bitumen was used as the light-sensitive material to produce the earliest known photograph. In 1826 or 1827, the French inventor Nicéphore Niépce (1765–1833) made the *View from the Window at Le Gras*. The image was set in bitumen of Judea on a pewter plate. Niépce called his process the heliograph: sun writing, centering the role of light. In renaming Niépce's heliograph as the petrograph—oil writing—Cariou shifts attention from the role of light to the role of the fossil fuel. By redirecting our awareness to bitumen deposits that lay below the surface of the earth, the image brings the pervasive reliance on petroleum in contemporary culture into view.

The aerial perspective reveals a bird's-eye view of the bitumen plant as the infrastructure forms an abstract geometry indexed onto the land. Billowing plumes pour out of the smokestack, signifying industrial production. In a nod to early photography, the photograph is set on a reflective surface. When viewing the image, the details of the picture come through more strongly as the light moves over the image. Like daguerreotype images, the petrograph shifts between a negative and positive image as the image

comes in and out of view.<sup>2</sup> The reflective surface is essentially a mirror, overlaying the viewer into the scene. The viewer's face is superimposed onto the landscape of bitumen mining in the Athabasca region.

Cariou's images are quite small, contrasting to the immense scale of the tar sands themselves, which are the largest industrial project in the world. Bitumen mining in the region spans 140,200 square kilometers, of which 220 square kilometers consist of tailings ponds, human-made lakes managed by dams and dikes that hold the toxic by-products of extraction including ammonia, benzene, cyanide, phenols, toluene, polycyclic aromatic hydrocarbons, arsenic, copper, sulfate, and chloride.<sup>3</sup> The tar sands mining process releases at least three times the carbon dioxide emissions as standard oil production since the tar-like bitumen mixed with sand and clay is difficult to extract and refine. Oil extraction reshaped the Athabasca region around the demands of extraction, turning a boreal landscape that is the traditional territory of Métis, Dene, and Cree nations into an environmental sacrifice zone.

The development of extractive industries in the Athabasca tar sands in the mid-twentieth century marked a shift to large-scale bitumen extraction. Historically this material was not mined on a large scale. The Canadian state at both provincial and federal levels funded decades of research to find a use for the bituminous ore in the tar sands, including asphalt, roof tiling products, and eventually the extractive techniques that turn the bitumen into a transportable form of crude oil. Once a viable means of processing the oil was developed, the state played a significant role in ensuring financial support for extraction, which continues today.<sup>4</sup> The Canadian government subsidizes the energy sector an average of US\$14.3 billion per year either through direct investment or uncollected taxes on externalized costs.<sup>5</sup> In 2018, the Canadian government under Prime Minister Justin Trudeau spent US\$3.4 billion to buy the Trans Mountain oil pipeline, which connects Alberta's oil fields to shipping ports in British Columbia. Indigenous land and water protectors as well as environmentalists have resisted pipelines across the region. Despite the environmental costs of the tar sands mining process, the Canadian state remains invested in oil extraction in the tar sands. The amount of effort that went into making bitumen extraction in the tar sands possible and the

2. In 1829, Niépce entered a formal partnership with Louis-Jacques-Mandé Daguerre (1787–1851), who continued to experiment on the process after Niépce's death in 1833. Daguerre adapted Niépce's process and replaced bitumen with silver due to the "slowness and uncertainty" of bitumen. The heliograph process was renamed the daguerreotype, and it became one of the two dominant forms of early photography alongside Henry Fox Talbot's (1800–1877) calotype process.

3. Sierra Club, *Toxic Tar Sands*, 3.

4. For example, in 1948 the provincial government purchased a failing processing plant, Bitumount, which became the Alberta Government Oil Sands Project. In the 1970s, the provincial governments in Alberta and Ontario and the federal government purchased 10 percent, 5 percent, and 15 percent of Syncrude after a private American company pulled out. Shortly after, the Crown Corporation, PetroCanada, was formed, though it went public in the 1990s.

5. *Energy Mix*, "Canada Boosts Fossil Subsidies."

ongoing subsidization of its extraction undermine claims about its inevitability. Instead, it reveals that bitumen extraction for the purpose of being burned as a fossil fuel is, in essence, a state-funded megaproject that is the opposite of inevitable.

Bitumen is a material that, when routed into industrial processes of extraction, forms an extreme hazard to life. Before bitumen was used as a fuel, however, it was used as a salve in medicine and as a material in art. It healed and created meaning. Cariou returns to these earlier histories of bitumen to contest the inevitability that bitumen will be burned as fuel, while gesturing to deeper levels of temporality, both through the use of fossil fuels and through a return to the chemical exploration that led to photography. In doing so, Cariou locates hazardous hope through a method of return to earlier histories of the tar sands to re-vision bitumen's relationships to humans and other beings.

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I began writing about Cariou's work as part of a larger project on extractive mining and photography that thinks through photography's material reliance on raw natural resources like silver, iron, and, for a brief historical moment, bitumen.<sup>6</sup> As a medium, photography has a significant environmental impact, but it can also be an activist tool as artists use photography as a way of raising awareness about environmental justice issues. My thinking about the potential role of photography in environmental justice activism was shaped in a dialogue with Cariou that became the starting point for this piece. The collaborative method and tripartite structure of this article is an attempt to grapple with this contradiction and the disparate relations we have to pollution, hope, and bitumen mining in the tar sands landscape. This section of the essay introduces Cariou's practice and argues that approaching the petrographs as ethical spectators introduces a set of questions about how extraction makes our world and the ways in which we are entangled and implicated in these hazardous histories, which forms a starting point to consider them anew.

My reading of the petrographs is informed by own experience of polluted mining and refining landscapes. I was born in Toronto's South Riverdale neighborhood, in the shadow of the lead smelter Canada Metal Co. We eventually moved to a place where the soil was contaminated with high levels of arsenic. The toxic soil was eventually smothered in situ, buried under fresh soil and sod. These hazardous histories—particularly childhood lead exposure—are indexed in my body. In the final section, Cariou introduces a different perspective that narrates his journey working with bitumen as a material. Cariou's deeply personal mode of making photographs has broader implications, however. While proximity to extraction impacts exposure, no one is insulated from the slow violence that accompanies the extraction and refining of materials as the increasing ubiquity of toxicity transforms ecosystems globally. Cariou's photographic practice bears

6. See, for instance, Levin and Ruelfs, *Mining Photography*.

witness to the damage caused by extraction, as *Tailings Pond and Bitumen Plant* shows, but his work also narrates hazardous hope. Cariou's photographic practice explores how both hope and toxicity emerge through a material engagement with bitumen.

Hope can be hard to locate in the context of large-scale industrial extraction, which often seems totalizing and inevitable. As Ernest Bloch writes, hope is distinct from optimism as it is rooted in fear and crisis. Here there are resonances with Cariou's practice, which directly engages the destructive realities of extractive mining. Understanding the impacts of extraction becomes the starting point for societal changes, including decarbonization. Images are a method of environmental communication that can generate more affective responses. At the same time, photography is also not a particularly effective medium for thinking about toxicity. As literary scholar Rob Nixon observes, the slow violence of environmental damage largely evades vision as it develops unevenly and moves between temporal scales and geographic regions.<sup>7</sup> This is a violence that generally eludes photographic capture, revealing the limitations of photography as representation in making sense of pollution.<sup>8</sup> However, the materiality of Cariou's petrographs reflect an embodied experience in environmental sacrifice zones. Photography is likewise not necessarily an effective medium for thinking about hope. The photograph stops the flow of time. It arrests movement. Hope, in contrast, projects—in an uncertain way—into the future. Here the materiality of Cariou's petrographs nuances this reading of photography's relationship to time: the images change when the viewer encounters them. They are activated in the present, extending the temporality of the image. Cariou's petrographs take something we consider hazardous—bitumen—and show us that it is also something beautiful, prompting a reengagement with bitumen as a material.

Cariou thus situates hope as a relational practice. To focus on hope in the context of pollution is to shift the relation with the toxin and the land, contesting the two dominant narratives told about bitumen: one that underplays its toxicity and one that reifies its toxicity. The extraction and burning of fossil fuels have turned the tar sands landscape into an environmental sacrifice zone, exposing life in this region to toxicity and contaminants. Métis anthropologist Zoe Todd describes how, in industrial processes, oil becomes transformed into a pollutant. Todd asks how our relationship to the tar sands would change if we thought of fossil as kin, as bitumen is formed by decomposed organic materials. Oil is traces of ancient life. Through the evocation of fossils as kin, Todd proposes that we are in relation with bitumen, in addition to the other human and extrahuman species that make up the Athabasca region. Todd invites us to imagine how we could understand bitumen beyond its role as an energy source. This is a complicated and unresolved question in settler societies that have largely severed these

7. Nixon, *Slow Violence*, 2.

8. For writing on the "toxic sublime," see, for instance, Nisbet, "Environmental Abstraction and the Polluted Image"; Ray, "Environmental Justice"; Peeples, "Toxic Sublime."

kinship ties between the human and nonhuman worlds. Todd highlights that it is the large-scale extraction of petroleum for profit that reifies toxicity, that “weaponises” bitumen.<sup>9</sup> This is a critical distinction: it is not the material; it is the system. Or, following Michif-settler scientist Max Liboiron, it is the *relations*.

In settler-colonial states like Canada, Liboiron argues that pollution and toxicity are fundamentally problems of colonial land relations: environmental damage is a symptom of colonial violence that prioritizes economic growth over bioflourishing worlds.<sup>10</sup> Without industrial infrastructure, naturally occurring pollutants do not exist in the tonnage and toxicity that cause widespread environmental harm.<sup>11</sup> Materials like arsenic, bitumen, and lead are toxins, and with proper care the harmful effects can be mitigated or eliminated.<sup>12</sup> In contrast, toxicants are industrially produced materials, either synthetic materials produced in a lab or toxics that, through large-scale industrial processes, have a longevity and tonnage that has both immediate and latent effects that are much harder to mitigate. This is where pollution comes in, for “toxicants are engendered by specific systems, including industrialization, economic growth and capitalism.”<sup>13</sup> Bitumen is transformed into a pollutant through large-scale mining in the tar sands. If pollution is a problem of land relations, there is an urgent need to shift how society relates to this particular landscape.

Through the material engagement with bitumen and the embodied process of making images, Cariou’s petrographs move toward a land-based photography. These images constellate the structural forces of settler colonialism, petro-capitalism, and consumption that make the image possible while proposing other ways of understanding this territory. Cariou pushes against an extractive way of seeing land that, as Todd and Liboiron show, produces toxicity by prioritizing economic growth over a more relational understanding of place.<sup>14</sup> Through the move toward land-based photography, Cariou utilizes photography as a site of anti-extractive world-making. By shifting the relations between the photographer, the subject, and the materials used in the process, Cariou moves toward “different land relations” within photographic practice. These relations are “specific, place-based, and attend to obligations” to oppose the colonial logics that cause pollution.<sup>15</sup> Recent scholarship has analyzed photography as a relational practice, and Cariou frames his approach to photography as “gathering” photos instead of “taking” them. In this, Cariou seeks to break from the often extractive nature of photographic practice. In the violent language of photography—aim, shoot, trigger, capture,

9. Todd, “Fish, Kin, and Hope,” 104.

10. Liboiron, *Pollution Is Colonialism*, 6–7.

11. Liboiron, *Pollution Is Colonialism*, 4.

12. Liboiron, Tironi, and Calvillo, “Toxic Politics,” 334.

13. Liboiron, Tironi, and Calvillo, “Toxic Politics,” 334.

14. Here, Cariou’s intervention can be situated within a broader critical-artistic practice surrounding the tar sands. See, for instance, Spiegel et al., “Visual Storytelling”; Wilson, Carlson, and Szeman, *Petrocultures*; see also McArthur and Cariou, *Land of Oil and Water*.

15. Liboiron, *Pollution Is Colonialism*, 7.





Figure 2. Warren Cariou, *Tarred and Feathered: Short-Eared Owl* (2017). Bitumen photograph, 8 in. x 10 in.

take—we see a convergence between photography as a medium and the drive to accumulate that underpins extractive capitalism. As Cariou explains in the second part of this essay, he initiates a relationship with the material and landscape that consciously tries to move away from extractive relations.<sup>16</sup>

The doubled indexicality of Cariou's image—gathering the oil from this territory to document this territory—roots these images in place. They become a specific, located form of hope. The site-specificity of Cariou's practice introduces a commitment to the nonabstraction of land, employed to fight against the tendency to view land as the backdrop of human activity. As an abstraction society's reliance on fossil fuels becomes overwhelming, seemingly inevitable. By redirecting our attention to how extracting and burning fossil fuels impacts a particular place, the critique becomes grounded. From this located place, it becomes more possible to think through alternatives rooted in a process of understanding and respecting the material itself. The use of bitumen in the images invites the viewer into an ecology of pictures, an invitation to see beyond the image to the complex histories that made it possible.

16. Cariou and Gordon, "Petrography," 13.

Cariou shows us what this alternative might look like. While some images document the infrastructure of industry and the destruction caused by extraction in the tar sands, other images show glimpses of nonextractive ways of relating to this landscape. In the petrograph *Tarred and Feathered: Short-Eared Owl*, the piercing gaze of an owl in a boreal landscape of birch trees stares at the viewer. The owl's forest habitat is at risk as the tar sands are being rapidly deforested because trees are valuable raw material, compounded by oil companies seeking oil deposits below the boreal forest. Scale and reflectivity are deployed by the artist to immerse the viewer in this landscape scene, a reminder that the tar sands are a boreal landscape of waters, more-than-human species, and the traditional territories of Métis, Dene, and Cree people. There is an embodied experience of looking at and moving around the object, which changes through the act of looking due to the reflective surface. This connects bitumen as a material in tangible, nonabstracted ways to land, people, and nonhumans. As the viewer modifies the image with their own reflection, there is an agency introduced and, perhaps, responsibility in viewing the image.<sup>17</sup>

To focus on hope in the context of toxicity is to rewrite the relation with the material and the land. In Cariou's petrographs, the relations that bind land, material, and bodies are layered onto the image. As one views the image, the land is inseparable from the material, and by extension, the body superimposed in the image through the reflective surface. The materiality of the object—the tangible, visible use of bitumen and the reflective surface—invites a reflection of the responsibility the viewer might have to lands that are threatened by the extraction of this oil, and to the many vulnerable ecosystems worldwide that are endangered by the burning of this oil. The mirrored surface invites the viewer to imagine themselves in this landscape, to enact a different relationship to place. What the unfixed surface of the petrographs reveals is that there is nothing inevitable about fossil fuel extraction. This is a form of hope.

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I want to conclude with the petrograph *Boreal Web*, which shows an intricate network of the spider's web, shimmering in the aureate hues of bitumen. The spider's web points to interconnectedness.

We see the impossibility of separating relations: we are bound up with bitumen and the structural forces that weaponize it. As a metaphor, the web implies dangers, traps. The web suggests that we are implicated in this history—unevenly and often unwillingly. Yet the filamentary threads that come together to form the web evoke the slow and patient coalition building work of environmental justice organizing, the resilience required to build sustainable and meaningful change. Cariou reflects on the relational nature of making petrographs: "As I spent more time with the bitumen, I came to understand it not only as a source of potential danger but also as a creative collaborator,

17. Donna Haraway reminds us being "response-able" means having "the capacity to respond" (Haraway, *Staying with the Trouble*, 78).



helping to reveal new ways of seeing the world.”<sup>18</sup> This new way of seeing is a postextractive imaginary rooted in a relational encounter. There is a brief glimpse into a future where our relations to land have shifted. Through the reflective surface, it invites the viewer to imagine themselves in this landscape; there is an invitation to ethical spectatorship. The instability of the image, which changes every time someone enters into relation with it, gestures to the reality that this history is not yet fixed, that there is still space for transformative change. Cariou’s petrographs invite the viewer to engage with the complex realities of extraction and in the process imagine a different relationship to this landscape.

By making petrographs, Cariou repurposes bitumen to establish a new relationship with the material to center questions of land, ethics, and relations. In the photograph, small amounts of bitumen are routed out of the oil and gas industry to be used as a tool for environmental justice activism and Indigenous sovereignty. This is a profound gesture in our current moment as the extraction of bitumen in the tar sands is reshaping climate globally. Through the complex process of making the images and the material properties of the object, Cariou directly engages with toxic materials to show a different way of understanding the tar sands landscape. Cariou’s practice shows us that bitumen is a material that exists outside of oil extraction and that the tar sands landscape and other extractive zones have value outside of the wealth that is physically taken out of them. In doing so, it makes a claim rooted in hope: this landscape can be otherwise.

## Part 2. Notes on the Tar Harvest

Written by Warren Cariou

I am deeply grateful to Siobhan Angus for her illuminating and generous responses to my petrography project and for the many conversations we have had about the roles of relationality, land ethics, extraction, and embodiment in photography. Meeting an art historian who so deeply understands what I have been trying to do in this work has been a source of hope and inspiration for me. I came to the practice of photography almost by accident, as a result of my ongoing attempts to understand the horrifying transformation that oil extraction has wrought upon my homeland and the neighboring territories. When I began my first experiments with bitumen photography, I considered myself a writer, not a visual artist. I had no idea where this work would lead me, and I had serious doubts that I could produce viewable images at all. The fact that my petrographs have come into being is due to a series of fortunate encounters I’ve had with artists, scholars, and Indigenous knowledge keepers who saw the potential in what I envisioned and who helped to show me how it might be possible. It has been, in many ways, a collective effort, one that has developed through ongoing mentorship, alliance, and kinship that I value greatly. This relational process has been a very appropriate one

18. Cariou, “Portfolio,” 253.

for petrography to arise within, because the work is ultimately about human relationships to the natural world and our collective responsibility for maintaining and fostering those relationships.

When pondering my relationship to bitumen—both in my art and in my petroleum-suffused life—I often return to a kind of fluctuational thinking: between creation and destruction, medicine and toxin, pleasure and repugnance, euphoria and grief. My mind can't settle—and maybe that's the way it should be. With this substance that has been deployed to such devastating and long-lasting effect over the last half-century, the alternative would be a monological embrace of despair. To seek hope in bitumen is to accept that it will always be stuck to its opposite. The tar is conceptually sticky that way, bonding together things we humans might prefer to keep separate, getting all over our hands, making a mess of our intentions. Maybe it's trying to teach us something.

This narrative is about teaching and learning, about messes and gifts. It traces part of the path I've traveled since I began working with bitumen in 2014 to create my petrographs, which depict the Athabasca region where the tar itself is found. Athabasca is also not far from my home territory, so I have an intimate stake in what has been done to the land there in the name of economic development. For more than twenty years I have tried to come to terms with what is happening there and how it is affecting local Indigenous communities and also the entire world. I have made films about this subject and have written stories and poems and articles, but after each project was finished I always felt that there was more to say, that I couldn't adequately address the extraordinary magnitude of the tar sands. I also became frustrated at times that critique seemed like the only viable position, that there was nothing positive one could do or say to make a difference in this dire situation.

Finally one day I began to think more intensively about the bitumen itself, and I wondered whether something affirmative, something with a spirit of generosity, could be made from this material that is associated with so much destruction. That led me to the history of photography and to Nicéphore Niépce's use of bitumen as the medium for the first photograph. Eventually I was able to replicate Niépce's technique using Athabasca bitumen gathered from near the tar sands mines. I decided to make bitumen photographs of the Athabasca region itself—both the areas that have been destroyed by tar sands mining and the areas that are still relatively untouched.

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When I began to exhibit the petrographs, people were curious about where I had sourced my bitumen, and many assumed that I had purchased or even stolen it from an oil company. I guess they imagined me jumping a fence and sneaking into one of the mine sites with a shovel and a pail. I found this interesting, their assumption that petroleum must be in the exclusive control of corporations. Perhaps with some forms of oil, the technologies and investments required to gain access to it might mean that an average person would have great difficulty sourcing it on their own. With Athabasca bitumen, however, that is not true at all. It is in fact freely available on the land for anyone who

knows how to find it. Procuring the bitumen for my petroglyphs didn't require the theft or purchase of a valuable commodity; it simply required me to travel along the Athabasca River in Treaty 8 territory, paying careful attention to my surroundings. As I did this I thought about the Cree, Dene, and Métis people of past generations who used to seek out this same material to use as a sealant for their boats and canoes. I had asked around in the nearby Indigenous communities to see if people remembered the bitumen-gathering methods from that time, but I was not able to find anyone who knew. So it was something I had to learn on my own, a knack that I eventually developed for scanning the forest floor and the banks of the river. As in all hunting and gathering practices, there was a lot of luck involved in this search, too, and I count myself as very fortunate indeed that on my very first excursion I found what turned out to be the perfect consistency of bitumen for my petroglyphs—thick, aromatic, slightly tacky at room temperature. A gift from the land, absolutely free. All I had to do was present myself there, and the bitumen made itself available to me.

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I want to tell you about another time, though, when I returned to the Athabasca to replenish my supply of bitumen. The story starts with a different kind of gift. In the fall of 2016, my graduate student Chuck presented me with sweetgrass and cloth when he asked me to be on his thesis committee. It was the perfect way for this young Métis scholar to begin his research project on Métis history, evoking the protocols of learning and teaching within the traditions of our people. The cloth was brightly patterned with the flower designs that are so treasured by Métis and that have marked our history for generations. The sweetgrass was a particularly beautiful braid, curled into a perfect circle when the grass was still green and tied there so it would hold that shape on its own. Its scent was gorgeous and complex: honey and soil and summer and life. Yes, it smelled of being alive, of vitality and possibility and creativity. I have long loved sweetgrass, and I loved this braid too. I kept it on my desk all that winter, and its scent was a reminder of why I do the teaching work I've chosen to do.

The next spring, when I went back to the tar sands, I brought along that sweetgrass braid from Chuck. It was important for me to leave something behind in the place where I sourced my new bitumen—something to express my gratitude toward this substance that makes possible my art practice. Sweetgrass was a perfect embodiment of that gratitude, and I specifically chose a braid that I had received as a gift because I wanted my relationship with this bitumen to begin in a place of reciprocity: one gift for another. Robin Wall Kimmerer writes eloquently about the teaching that sweetgrass gains its medicinal power through the workings of gift and that it should never be purchased because that would go against the fundamentally generous nature of the plant.<sup>19</sup> I thought about the practice of traditional harvesters, who often leave offerings of sweetgrass or tobacco in places where they gather berries and medicines.

19. Kimmerer, *Braiding Sweetgrass*, 27.

I haven't always considered bitumen as a gift or a source of creative possibility. Like most people who know about the tar sands mining and processing operations, I had for a long time thought of the bitumen as viscerally toxic, as a threat to the ecosystem and even to all life on earth. In some ways I still believe it is all of those things, but as I have worked with bitumen in my petrography process, I have come to a more complicated understanding of it. Most people have only seen bitumen in the context of the unfathomable devastation of the tar sands mines, but I've seen it in its natural surroundings, where it seeps to the surface along the banks of the Athabasca River. It's easy to forget that bitumen is a natural substance, and it has its own kind of beauty and vitality when it can be seen in that context. When I first encountered a natural bitumen seep I was shocked at how it contrasted with the horrors of the bitumen mines, and I realized that the devastating effects of petroleum upon our world are not the fault of the material itself. It's what humans do to petroleum that has created the catastrophe. Seeing the natural bitumen in its boreal habitat inspires a flicker of feeling that I might characterize as hope, though that feeling is still tempered by caution, because I am always aware of the dangers of this material when I'm working with it. In my petrography process, I have to heat the bitumen to bond it to a metal plate, and that heating releases a cloud of vapors that can give me headaches if I don't take proper precautions. I now wear an industrial respirator when I'm heating the tar, just to be safe. Still, my sense of the bitumen's potential for generosity is where it all starts for me, and I believe the petrographs themselves gesture toward it in their own way too. Made out of a material that is generally considered ugly but necessary, petrographs reveal something of the tar's beauty, its creative capacity.

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The trip I'm talking about happened in 2017, a little more than a year after the Fort McMurray wildfire that claimed the world's attention for a few days in the spring of 2016. I hadn't been to the region since the fire, and I was uncertain what to expect. Having seen the extraordinary images of the conflagration and its aftermath, I was expecting the area to still be a desolate burned-out wasteland, but I was surprised at the level of regrowth that had already occurred in the forest. Even driving from the airport to town we could see this. Charred pine trees stretched as far as we could see, but tall grass and wild roses grew in profusion, and new birch trees were nearly shoulder high in places. Later we would wander in the burned forest and marvel at the brilliant green of the new vegetation. In the city it was a different story: whole subdivisions had been razed by the fire, but only a few houses had been rebuilt so far. Everyone we met told us their own stories of the fire, as if they might find a way to contain it in retrospect by returning to their memories once again. An artist was selling sculptures she'd made out of burned items retrieved from the ruins of her house: a half-melted copper pot lid, a crazed piece of mirror, a smoke-tarnished axe-head. She lamented that no one wanted to buy.

Later, flying over the area north of the city toward the tar sands mines, we saw vast expanses of burned forest underlaid with what seemed like flows of green undergrowth, many different shades of green in patterns too complicated to fully comprehend at that distance. The dead trees were mere scratch-marks etched against that tide of new vegetation. Still we could also see the long cutlines that seismic crews had made as they tested for bitumen deposits, and we saw also the telltale squares of clearcut where SAGD (steam-assisted gravity drainage) wells were blasting steam deep into the ground to capture hidden bitumen. Further on, the strip mines stretched as far as we could see: forest and muskeg and topsoil peeled away to reveal nearly endless black pits, each unique in its own shape and texture, crisscrossed by makeshift roads and mazes of pipelines. Giant trucks and loaders moved like ants. Sunlight gleamed from myriad puddles and ponds, but there was no green whatsoever in those mines.

At one point I glanced back toward where we'd come from, and I thought: the fire was the least of the damage.

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Back on the ground, we looked for bitumen in the undisturbed areas of the forest. North of Fort McMurray there are still a few places where the mines have not yet encroached. The best sources I'd found in the past were right on the banks of the Athabasca River, where fisheries regulations prohibit bitumen mining. Unfortunately, this time my plans to procure a boat had fallen through, so we had to look for alternatives. We drove backroads (where they were not blocked off by oil companies), and we got out occasionally to wander in the forest, watching for the dark gleam of tar. Finally we found a trail I hadn't seen before—a narrow track through the woods, leading down in the direction of the river. From the tread marks in the mud and the bent-over grasses it looked like vehicles had driven there recently, but I didn't want to risk the undercarriage of the rental car, so we got out and walked down the little road. It was a beautiful afternoon, sun filtering through the poplar leaves far above us. It reminded me of the forest paths I used to walk when I was growing up, not far from here—except that in the land around my hometown, there is no bitumen mining yet. The forest in my home is more intact, except for the activities of logging companies and the effects of acid rain from the bitumen plants farther west.

Our first sign that this would not be a normal walk in the woods came when we approached a cutline that crossed the road. The deciduous trees had given way to a dense thicket of pine trees—the kind that are too spindly and grow too close together to be valuable for timber—and out of this wall of trees we saw an opening on both sides of the road. As we got closer, we saw that it was one of those seismic or exploration lines we'd seen from the air. It was almost a tunnel through the dense forest, and it moved in a resolutely straight line, not altering course for anything, leaving behind a neatly manicured trail of mulched trees. Every forty or fifty feet there was a patch of gray dirt on the ground, a powdery material that we thought must have been some kind of drilling mud

that had been used to lubricate a drill bit and to fill in the hole after a sample had been taken or a seismic charge had been detonated. The straightness of this line through the trees was an affront. Such regularity made no sense in a forest. We imagined a machine, piloted by GPS and possibly with no human driver at all, slowly devouring trees and spitting their remains out behind like a combine in a grain field as it moved from one drilling location to the next. Instead of harvesting, it was mapping and devouring. Searching for bitumen deposits, setting the stage for extraction.

We continued down the road and encountered two more cutlines exactly like the first one. It was tempting to follow one of these and see where it led, but we wondered about the possible dangers of this, and besides, it was boring to walk on such a forest path, from which all particularity, all forestness, had been obliterated. It was like being in a hallway or like playing an old video game where the dungeon walls are entirely smooth and free of detail. We decided to stay on the old trail, which may have started out as a cutline at one time but which was now alive with grasses and berry bushes and moss.

And bitumen. Just to the left of the trail's main track it came into view as we crested a low hill: a rich black shape on the ground, extending a few feet down the shallow slope of the hillside. There is no other black like that in the forest. As we got closer we saw that it had seeped from a dark seam in the hillside, and it had almost coagulated there in a slight indentation of the roadway. Toward the edges it was a dull and almost dusty black, while other parts in the middle gleamed in the sun. I knew by the familiar scent that this was exactly the material I was looking for. I knelt down, touched it with my finger, felt the tack of it as I pulled away, realized too late that the soil I was kneeling on was saturated in bitumen too, so my pants would be permanently stained. This knowledge took nothing away from my exhilaration. I was happy to be marked by it.

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We found many more bitumen seeps that afternoon, and each of them seemed so perfectly *in place* right where they were. Moss and wild strawberries and Labrador tea grew all around them, and sometimes even sprouted up in the middle of the tar. Layers of leaves and pine needles and twigs were bonded to the sticky surface. One contained wispy feather plumes. Another was completely coated with bright yellow pollen from the pine trees nearby. Only a few dark trails across the yellow revealed that this was a small pool of bitumen, gathering tiny pieces of the forest into itself. My overwhelming impression was that this bitumen was a part of the forest, part of the reciprocity by which different beings provide for each other.

We also found more cutlines, and eventually we came to a large square clearcut that we knew would soon become a SAGD steam injection installation. In its exact center there was a large circle of that same ashy gray drilling mud we'd seen in the cutlines. Clearly a much bigger hole had already been drilled here. Soon, the bitumen beneath this





Figure 3. Warren Cariou, *Sweetgrass and Bitumen for Petrography* (2017). Digital photograph.

ground would be heated with steam and mixed with chemicals to break down its viscosity so that it could be pumped to the surface. I was struck again by the absurd regularity of the clearcut, the squared-off corners and perfectly straight lines. Transforming the land into empty cube. It was as if even the idea of the forest had to be obliterated in order to get at the bitumen, as if there could be no contact between the tar and nature. We had seen the exact opposite phenomenon in the natural bitumen seeps we had found, where the tar was clearly an important part of the ecosystem.

On the way back to the car, I finally decided which bitumen I would harvest for my petrography: it would be the very first seep we'd encountered, where the tar flowed partway out onto the tracks of the road itself. It had already been disturbed by truck tires and logging machinery that had driven on the road, and thus I decided to disturb it once again rather than to dig up one of the others that were so closely bonded to their surroundings. This particular seep of bitumen also looked most promising for petrography because it seemed relatively free of sand or other particles that would create spots on the images.

It took quite a while to scoop up the sticky bitumen and then get it from the spatula into my container, but finally the task was complete. Then I took out the sweetgrass Chuck had given me, and I held that braid up to my nose one more time, smelling the spicy mixture of the sweetgrass and the bitumen on my hand. I placed it down on the seep, just beside the place where my scoop had opened the surface of the tar, and I said my words of gratitude. I had considered placing the sweetgrass off to the side of the

road where it would not be run over by a vehicle, but then I decided it was important to place it where it could be seen. Maybe some day (I knew it was unlikely, but I wanted to imagine) an oil worker would see this shape in the bitumen and would stop to see what it was. Would it have any meaning for that person? I supposed not, but I still felt a need to believe in the possibility.

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In the years since I left that gift of sweetgrass there, I have often wondered what became of it, and of the bitumen and the forest we encountered on that gorgeous day. The place itself might well be utterly changed now, transformed into a strip mine. On the other hand, maybe it is mostly unaltered for now, though likely still slated for destruction at some later date. Whether an oil worker drove unthinkingly over the sweetgrass and pressed it down into the bitumen, or whether it was left there to slowly bond with the tar over the passing of the seasons, I like to think that my gesture remains there in the intimate connection of those materials. Two medicines mingling. I look forward to a time when Athabasca bitumen can be broadly understood in that way: as a medicine, a powerful substance that must be gathered from the land with respect and with a spirit of reciprocity. Whenever I work with the bitumen I harvested that day, its smell reminds me in a visceral way of the specific place where it presented itself, and it reminds me, too, of the gift I received from my student Chuck, and of what I have learned from him about generosity.

I can't yet quantify everything that I have learned from the tar, but I know it is teaching me too. In the Anthropocene, petroleum is perhaps the last substance where one would expect to find the possibility of hope, and yet I undoubtedly find it there, in the bitumen I work with. Even now, when the atmospheric effects of carbon are visible all around us, I am led to believe that the material at the center of the destruction may help to show us a different way.

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