5 LIMITATIONS OF LIMINALITY

Gary was an exploration geologist who hoped he would never make a big find. I met him while he was transitioning into retirement in his sixties and building support for what he called a "new way for geology to serve society." We traced his story back to his childhood, when he became enchanted with rocks, fossils, and the outdoors while growing up in the American Midwest, where he fondly remembered hiking with his family through trails that were strewn with fossils and geodes. Upon graduating from an engineering college in the late 1970s, he found that the only people hiring were mining and oil companies. He worked as an independent contractor for a string of multinationals, "niche-hopping," he said, from "one commodity to the next." After spending a few years looking for mineral deposits that could become the basis for new mines, he then moved to oil-related mapping, remote sensing, and air photo interpretation for major oil companies. Yet he approached this work with a persistent sense of trepidation that, if he actually made a discovery, it would lead to a major industrial development that would wreak havoc on the environment he loved so much: "I was always afraid of finding something. That was because I love the outdoors. I've always been a camper and a hiker. I didn't want to see anything messed up. I would bet that a lot of the geologists, the people that go into this business and find themselves in exploration, have that same regret. They're afraid of actually being successful in the corporate world."

Gary experienced a profound sense of alienation in his work as a corporate consultant. He loved that exploration gave him the chance to piece

together a geologic picture from field observations, but he eventually realized that his goal was never the same as his employers'. Reflecting back on his early career, he said that while he was occupied raising a family and taking care of others, he could not see that disconnect fully or imagine an alternate career path that would offer an "idyllic job that actually paid." Describing how he dealt with the anguish of thinking that his work would facilitate large-scale environmental destruction and culture change, he said, "You just put it out of your head. You just don't think about it, you compartmentalize. You join the Nature Conservancy and then you go out and look for gold." In remembering his corporate days, Gary described a process of detachment from the broader context and effects of his work—"you just put it out of your head"—that produced a compartmentalization of where and when he could invest himself in his work. He remembered feeling estranged from the corporate firms that contracted him: "You end up having this black cloud that follows you around. You're never really accepted. You're always one of those contract people that they can have do anything anytime. They don't worry about you. There's no loyalty there, but then again, there isn't in most of corporate America anyway. It's all gone." The lack of loyalty Gary perceived in corporations was one part of his larger critique of them. As I explain later in this chapter, Gary went on to found his own nonprofit to find ways to make mineral development benefit the poorest people living in close proximity to these resources.

While Gary's critiques of corporations were fervent, they were not unique in my research. The engineers and applied scientists I met who had left corporate jobs described a persistent and untenable clash between the expectations they felt as company employees who reported up a chain of command, on the one hand, and their own accountabilities to their professional ideals, to the publics their work affected, and to their moral frameworks, on the other.[1] The lure of consulting was that it seemed to promise greater opportunity to choose clients and projects that already resonated with their other accountabilities. They narrated their careers as though they held their professional, public, and personal accountabilities constant, treating the corporate projects and clients as variables that could be selected and adjusted to fit the prior three.[2]

This chapter shows that one of the biggest challenges facing these consulting engineers and scientists was managing a liminal position in relation to those corporate forms. This liminal position sharpened their experience of distributed agency and positioned all but the most successful in a position of dependency in relation to the corporate clients they "chose." In a different but related context, Javiera Barandiarán evocatively quotes a young environmental consultant in Chile who described the relationship among scientists, consultants, and companies as "toxic" because of the power of the corporate actors over the others: "Consulting firms are in a vicious circle because the company pays you to do a study to evaluate the company's project's environmental impacts. The company is judge and jury in its own cause."[3] I heard similar echoes in my own interviews. In particular, consultants felt hamstrung by their position "recommending" courses of action to clients that then had the power to act—or not—on their work. While consultants enjoyed relative autonomy in designing and conducting studies or creating plans within the client's specifications, they were not in control of how those were eventually implemented by the people hiring them. I conclude by suggesting that the bind in which many consultants found themselves ultimately served as a source of value and legitimacy for their corporate clients: consultants were often perceived by publics as more "objective" and "independent" than company employees, even though in practice they remained financially dependent on those companies for their livelihood and did not retain control over the implementation of their work.

CORPORATE DETACHMENTS

This chapter theorizes practices of detachment from corporate forms as a central dimension of engineers' agency. Detachment is a key dynamic in everyday life, though anthropologists' own cultural predilections for connection and attachment lead many in the field to foreground these latter processes over the former.[4] Detachment figures in the anthropological literature on corporate social responsibility as a corporate strategy for separating these entities "legally, morally, and socially from binding obligations and responsibility to producers."[5] This process is vividly illustrated through

Dinah Rajak's ethnography of mines strategically delimiting the beneficiaries of their programs to a "working community" that does not encompass subcontractors or miners' own families.[6] It is at work in the research by Katy Gardner and colleagues on the "community engagement" practices of a transnational oil company that actually further separate it from the community through its grounding in neoliberal values of "self-reliance, entrepreneurship, and "helping people to help themselves."[7] It is present in Elana Shever's analysis of a transnational oil company that abdicated its responsibilities for a health center in a poor community through a corporate social responsibility program (unironically) titled "Creating Bonds."[8] And it animates Hannah Appel's ethnography of offshore oil enclaves in western Africa that prompt companies to work furiously to "perform a distinction between itself and that which is 'outside' its walls, despite their utter intercalation."[9] Jamie Cross argues that "the bracketing, limiting, and ending of economic relationships, like those between actors in a market transaction, are always still relationships; and, to the extent that detachment is a guide to conduct, it is an ethic."[10]

Taking up the question of engineers in particular, Penny Harvey and Hannah Knox argue that their practice is predicated on "virtuous detachments" in which engineers extract themselves and their work from ongoing sociomaterial relationships, such as the mutual imbrication of construction sites and the people and environments transformed by them. Importantly, they identify these detachments as political in nature, since they define the "practices for which engineers might legitimately be held responsible."[11] In my research, engineers detached from—but also partially reattached to—corporate forms precisely to set the contours for the accountabilities to which they would be held. This chapter builds on Harvey and Knox's work by drawing out the politics of the liminal status occupied by engineering consultants. They could not just detach but remained dependent on corporations for continued contracts and were frequently called to speak on behalf of those corporate clients in public to help diffuse social unrest.

Consultants move inside and outside of the porous corporate form.[12] During my research, the knowledge they produced became materialized in the infrastructure, processes, and discourses attributed to the corporations

contracting them. In meetings with external "stakeholders" or public hearings, consultants were sometimes called to speak on behalf of those corporate forms. At other times, their status as nonpermanent employees was marked, such as when they were introduced as "independent" experts to shore up public support for proposals being made on behalf of corporations.

The position of consultants clearly illustrates the partible and permeable dimensions of the corporate person analyzed in chapter 4.[13] "Independent" consultants do an astounding amount of the work attributed to major corporations, for several reasons. While most of my interlocutors narrated their move to consulting as an agentic *choice* that they welcomed compared with full-time corporate employment, the job market also changed the opportunities available to them. Corporations themselves became leaner by cutting the ranks of employees for whom they owed benefits such as health care or retirement plans, and some specialized forms of expertise were required only at occasional points of a project, making it expensive to keep such professionals in house on a full time basis. "As firms become less self-sufficient, their boundaries become more permeable because lean firms must, by definition, acquire more resources externally."[14] The final environmental report put together in 1981 for the proposed Mt. Emmons mine analyzed in chapter 3, for example, lists only fourteen employees of AMAX Minerals Inc., along with fifty-six consultants working for sixteen different firms who participated in the studies included in the report. The number of consultants engaged would have been even larger if the mine had actually been fully designed for construction and then built. By 2018, a geological engineering consultant and project manager said that, by the time her firm finished with a proposal for a mine tailings dam, "the entire team that touched the project, I mean, it would be hundreds of people, eventually."

The consultants I met worked primarily as engineering and applied science consultants, though a few were engineers who moved into community relations and performance standard reporting. Their work departs substantially from the dominant image of consultants cast in the mold of management consultants. Felix Stein's ethnography of these professionals shows how they enable managerial rule and advance shareholder value through their work reconfiguring corporate relationships and processes.

He argues that these management consultants delivered not concrete products or knowledge but an image of legitimacy for the clients contracting them. Indeed, he writes that "almost all management consultants I met were somewhat proud of not being actual experts at anything."[15] In contrast, those I came to know had very deep and very concrete sources of expertise that were highly and specifically valued by their clients. Rather than producing endless PowerPoint slides unmoored from clear referents in the world, as did the managerial consultants, the engineers and applied scientists also produced studies, data sets, and plans that could be measured against the world. What they shared with the management consultants was their dependence on corporate clients for work and a liminal status as both company insider and outsider.

Consultants' participation in a corporate person understood relationally, as a composite of multiple agencies, made them complicit in the activities of many others whom they did not control and sometimes could not even influence. The difference between the consulting engineers profiled in this chapter and the full-time corporate employees profiled in chapter 4 is that consultants were institutionally positioned to have more opportunities to detach their activities, emotions, and sense of self from the corporate forms hiring them. While they did have to construct alignments strategically with the corporate forms that hired them, they were also able to stand more firmly outside of them.[16]

PROFESSIONAL AUTONOMY

This ability to stand at arm's length from corporate mandates has been productively theorized in terms of "professional autonomy." Sociologists and historians suggest that engineering work is in many ways necessarily bound up in organizational, if not corporate, settings: "Engineers, in order to function as engineers, must have a boss, or at least a client."[17] This feature of their work distinguishes engineering from other professions, such as medicine and law, and has generated much consternation for engineers and those who study them. In Edwin T. Layton Jr.'s foundational history of the US engineering profession, he writes, "The very essence of professionalism lies

in not taking orders from an employer."[18] I join other scholars who urge a complicating of this account by paying attention to the different dimensions of autonomy and how these may be supported or constrained inside of organizational workplaces, rather than beginning from a point that presumes professionalism and corporate employment to be antithetical.[19]

My interlocutors seemed to accept organizational work as an inevitable requirement of working as an engineer but appreciated that consulting allowed them to stand at a greater distance from corporate forms. Sociologists Stephen R. Barley and Gideon Kunda found similar sentiments in their in-depth study of technical consultants, who desired independence from the "politics, incompetence, and inequities of organizational life."[20] They write in a celebratory tone, "Nearly all of our informants told us that contracting had released them from the social constraints of organizational life. They no longer had to conform to the whims of managers who once controlled their fate."[21]

My interlocutors found their tethers to corporate life to be much shorter, since they remained dependent on particular people and units inside of corporations for continued work contracts.[22] Any "independence" they found stemmed from their strategic detaching from and connecting to corporate forms in search of finding corporate clients and projects that aligned with their professional, public, and personal accountabilities. This also contrasts with Barley and Kunda's findings that consultants "could speak their minds while focusing more exclusively on the technical aspects of their work."[23] My interlocutors did not use consulting to retreat into a depoliticized technical world, quite the opposite: consulting work provided them more space to practice engineering that articulated with broader social and environmental accountabilities.

IN SEARCH OF ACCOUNTABILITY

Most of the consultants I met had moved into that work after becoming disenchanted with corporate employers, like Colton, a midcareer petroleum engineer who agreed to be interviewed with the caveat that if it fell on a "powder day," with new snow, he would be out of the office backcountry skiing. He was born and raised in rural Colorado, where he grew up loving

the outdoors and helping his dad out on the oil patch. Unlike most of his peers, he paid his own way through college, which meant that he accumulated a lot of first-hand oilfield work experience. After learning that he preferred smaller companies to larger ones, and deciding that he wanted to stay in Colorado instead of getting "stuck in Houston," he started his own consulting firm that allowed him to "decouple," in his words, from the misdeeds of the larger industry.

Colton specialized in the design and implementation of difficult wells, such as high-pressure, high-temperature deep wells and shallow reservoir wells whose small economic margins made every design decision count. Colton took pride in his work, believing that oil and gas development could be done in a way that did not offend people who sought to use the same public lands for recreation, as he did (see figure 5.1 for an example of this style in general, but not Colton's projects in particular). He explained:

Figure 5.1
The equipment on this well pad in New Mexico is painted to blend in with the surrounding area to reduce the visual impact. Photo courtesy Bureau of Land Management.

> I work on a lot of public lands, out in the West. I operate mainly in the Rockies, and most of it's public BLM [Bureau of Land Management] land. So I'm very conscious about the appearance of my operations. The BLM, they really like our operation. The state inspectors do. We keep everything buttoned up and looking good. We want to keep it a certain way, but it's driven by perception. You don't want to get a bad perception, because then that makes them look at you closer, right? I take pride in my operation, and I don't want it looking, I don't want somebody out there in the back country, hiking around, and going by my well and saying, "Well that's ugly."

Colton hoped that his own work would eventually help change people's minds about the possibility for responsible oil and gas development. Living in a Colorado town known as an outdoor recreation mecca and hub of progressive politics, he felt demonized on a daily basis for working in oil. "I tell people I'm a petroleum engineer and they just give me the stink eye," he said. "They think I'm evil. [They think] 'Oh, earth raper,' right?" Rather than debate them, he hoped that his work would change their impressions: "I don't vocally get up there and get in debates with people about [the oil and gas industry]. I just do the best that I can and let my work speak for itself."

Colton believed that truly irresponsible oil and gas companies were few, but his career satisfaction was still grounded in being able to choose clients and projects that aligned with his own senses of accountability. "I'm not conflicted about my own role in the industry," he said, "because I have the option to participate or not participate in that kind of [irresponsible] operation and I won't." To illustrate the point, he relayed a story of a Chinese company he witnessed operating in Kurdistan that brought in extra workers, assuming that a large percentage of them would experience death or injury on the job. "So when people aren't valued as your most important resource, I stay away from that operation, right?" Colton's language emphasized separation between his work and less scrupulous industry actors, saying, "I'm able to distance myself from that in that respect. . . . I've been able to decouple myself from that." In Colton's case, consulting allowed him to decouple from a larger industry and invest his time and energy into making his own projects as responsible as possible.

Lila, an energetic engineer, sustainability specialist, and entrepreneur, also chose consulting as a way to choose projects that aligned with her own accountabilities. She described herself as having "always wanted engineering to help people," which inspired her to pursue the most nontraditional engineering degree of all the engineers in this research—a degree in "ceramic engineering and society" that in her case included substantial elective coursework in anthropology and women's studies. Her first job after graduation, however, was developing new colors for automotive parts, which she dryly described as "not full of passion." To be closer to her family, she took a job at one of the largest engineering consulting firms in the world, where she found herself bored developing and designing the brick linings for furnaces. On a whim, she attended a lunch hosted by the firm's sustainable development group and gradually began moonlighting on projects for them. Eventually she took a leave of absence so that she could pursue a master's degree in international development and complete six months of fieldwork in a marginalized community affected by a major mine.

After finishing her degree, Lila went back with a "mission" to the sustainable development group at her previous firm to engage in community relations work. Yet she eventually left the firm entirely because she detected a lack of desire on the part of the managing directors to take community relations seriously. She then worked on two international projects for a small consulting firm before moving back into full-time corporate employment, persuaded by a charismatic new director of community relations for one of the world's largest and most controversial mining companies who wanted to "turn the company around." In a particularly painful example of the distributed agency that characterizes corporate forms, her director's boss soon asked her to cover up human rights abuses and began harassing her when she refused, prompting her to leave the company. "I knew [the company] was doing things wrong, in violation of human rights even, and I couldn't do it anymore. So I left them. I parted ways. Then I started working for myself." With the sting of her last experience still fresh, she recalled telling potential collaborators, "I'm done with mining. There's no ethics here. You can't have a bone of integrity. I'm getting out of mining."

Only after Lila met a visionary with a different business plan—one that gave communities part ownership of the mines—did she accept another mining consulting job. The project convinced her to reconsider her previous strong stance on not accepting mining and to take on clients she trusted and respected. She distinguished her clients from others in the industry by saying, "The clients that I tend to meet and work with are kind, ethical as you can be. . . . We don't print lies. Well, the ones I've worked with don't [lie]. People really want to do well, want their company to do well." During her career, Lila stepped in and out of corporate forms. In her view, consulting gave her greater opportunity to choose which "ethical" companies and personnel she would work with and on what kinds of projects she would dedicate her own efforts.

RISKS OF "RECOMMENDING" ACTION

While the consultants I met treasured the professional autonomy afforded by their ability to step out of corporate forms, many were simultaneously frustrated by the limitations that this liminal status presented for their ability to shape the behaviors of the corporate teams with which they worked. In other words, it was not always easy to detach their own personal and professional hopes, ambitions, and desires from the *projects* they worked on, even if they welcomed detachment from the *companies* themselves.

Jennifer worked for a major consulting firm that specialized in tailings dams, one of the most controversial and potentially catastrophic elements of mine infrastructure. When reflecting on the social responsibility dimensions of her career, she began by pointing to the structural position of her work: "From our position as a consultant, it's difficult to, but we can, influence change. But, you know, ultimately we're not the ones footing the bill for this project. So we can recommend lots of different things. But ultimately, we're not the ones that are building it, operating it, owning it. So we're in a difficult position when we see [that] it would be so much easier if they would just do what we recommend." Fabiana Li found similar concerns during her research on mining conflicts in Peru. Because consultants

were limited to particular projects, they rarely got to see the "complete picture," in the words of one of the engineers she interviewed.[24] Echoing chapter 3, Li found that these professionals were asked to bring their expertise to bear on questions of how things should be done, not whether they should be done. One engineer explained: "As consultants, we limit ourselves to the question that is put to us."[25] Another of her interviewees was direct: "We are engineers, and we are an engineering firm. Our commitment is to the client, and we have to help clients carry out their project. We [cannot] get fundamentalist with environmental themes."[26]

Peter, an environmental engineering consultant, also experienced frustration when companies did not take his advice that they ostensibly hired him to provide. He began his career in the 1970s, highly skeptical of corporations. Describing himself as a "closet tree hugger," he vividly remembered coming of age as the "Cayuga River set Ohio on fire, and you'd see pictures of these four pipes discharging colored dye into the rivers, and it was just appalling." That environmental consciousness made him highly critical of mining.[27] Yet a chance encounter at the university where he was pursuing a PhD in engineering led him to a summer job on the Minnamax project analyzed in chapter 3. As an employee of a state agency, he helped set up the water quality monitoring studies with AMAX and enjoyed the work so much that he went on to accept a full-time job with the state and spent the next three decades working on mining projects. In our conversations, Peter positioned himself as an outsider to industry. He described common sentiments among environmental engineers while he was beginning his career by saying, "You just felt like you were basically doing battle with the evil industry. You know, you got to battle the evil industry and you don't want this huge mine on the border of the Boundary Waters Canoe Area polluting the water because all mines pollute." He remembered other mining areas that "literally looked like a moonscape . . . because it was so rocky, because all the vegetation had been killed."

From his position at the state agency, Peter set up some of the world's first studies on waste rock leaching. Even though the scientific literature at the time advised that tailings with less than 1 percent sulfur were safe, many problematic cases had emerged that were under the 1 percent

threshold. Because of his research experiments with AMAX, Peter was able to demonstrate that the waste rock was contributing to release of acid and thus convince companies and industry regulators to change best practices for handling waste rock. He went on to establish more cooperative research projects between the state and other mining companies and their consultants, taking on the position of a sympathetic yet supportive industry outsider. What he found meaningful in his work was that he could "actually make a difference," while he thought his graduate work the lab "wasn't going to have much impact on my life or anyone else's life." He explained:

> We [at the state agency] were working on projects with the industry, and we were trying to solve problems. The mission of our group was to support the environmentally sound development of Minnesota's resources, and that includes mining. And so it was a very different mindset. I mean, as I said, I mounted up on my white horse and charged to do battle with the evil industry, and then all of a sudden, here I am saying, "Well this is a big change, you know? I'm just trying to solve their problems so they don't make a mess."

Peter eventually left the state agency, when he felt that it had come to lack "flexibility and commonsense" after being taken over by people he viewed as anti-mining advocates who were more concerned with avoiding potential lawsuits than actually promoting the responsible development of resources. He moved into consulting work, first at a large, multinational yet employee-owned consulting firm and then at smaller firms as he began transitioning into retirement. What he appreciated about his work as a consultant was the relative independence he enjoyed, saying that he could turn down projects that did not align with his own values: "I don't have to take anything." While he found it painful to observe mining projects "going down the toilet" from the position as an outsider, he said his reputation allowed him to choose his clients and avoid those that did not share his commitment to the environment.[28]

Indeed, the consultants I met who said they rarely experienced alienation from the implementation of their work were those who had a steady client base and could therefore be choosier about accepting contracts. Jen, for example, built up her own social and environmental consulting company and found success working in some of the world's most challenging

social, political, and economic environments. What she loved about her work as a consultant was that it allowed to her ask the kind of big questions about mineral development that inspired her, such as, "How do you translate mines in poor countries or mines anywhere into poverty reduction?" She said, "I had this feeling that we knew how to make money, we know how to create wealth, but we didn't know how to reduce poverty." Even as an undergraduate mining engineering student, she saw how worksite engineering decisions that were presented to students as "technical" decisions informed by economic considerations were also inherently tied up in the wider social context of the communities close to the mine. She recalled being taught the benefits of block caving, an underground mining technique that involves undercutting the ore body so that it slowly collapses under its own weight. Within industry, the technique is referred to as the "underground version of open pit mining" and is praised for requiring fewer workers than other techniques. But seeing mining as an inherently sociotechnical endeavor, Jen immediately worried about what the decrease in employment would do for the mine's social contract with the people who lived and worked nearby: "If you took away one piece, if you took away the employment, how could [the mine] justify itself? And what was it actually delivering for a community when it was costing a community something, and costing a society something, and taking a finite resource away? What was it actually delivering back to the nation, back to the community?"

Jen's big questions about poverty led her to obtain a master's degree in development after finishing her undergraduate degree in mining engineering. She then took a job for a major mining multinational, but she left because she came to realize that the company's

> first mandate was always to be a mining company with their development contribution to communities and countries only a second order consideration. . . . So I thought I'd work for myself so that I could pick and choose, and pick the projects that were companies that I felt were ethical, or that were trying to do the right thing, or were trying to be brave and do something that was outside the box . . . I wanted to have the freedom to choose the projects that I would work with. I wanted to work with the ones that I truly believed had development potential and that were going to contribute positively.

Jen's emphasis of her own agency in leaving the corporate world in order to be able to choose projects and clients threaded through the narratives of the consultants I met. Her experiences highlight that this relative autonomy depended on having a steady enough client base that she could turn down projects in which she was uncertain about the clients' commitments. "If there's a company that doesn't appear to be at all interested in my recommendations and is just asking me to do something to get a report written to show that someone did something, I don't take the work in the first place," she said. Her favorite clients were those with whom she had developed mutual trust so they could work out problems together, "to be in that place where people are asking for your help rather than, sort of, 'We've got this piece of work that we think we ought to do. Can you please do it and here's this really defined scope?' I never get that." Jen wanted to participate in the scoping—or what engineering educators might call problem definition—rather than being handed a narrow task. She knew that it was in those initial stages where development concerns could either be made central to the question at hand or marginalized.

In narrating her motivations choosing projects and shaping them, Jen used the language of improving the industry and its contribution to development.[29] She described her ideal position as one in which she thought she could "actually help." She said, "I didn't want to just make someone look good because . . . they spend some money on a project. I didn't want to be a part of that. I wanted to be with people who were really trying to fight to make things better." This narrative of reform was prominent in how consultants wrestled with their participation in industries that they viewed as holding promise to improve people's lives, despite the prominent cases of companies failing to deliver on those promises.

"STEERING THE SHIP": NARRATIVES OF REFORM

If consultants desired professional autonomy and many had deep reservations about the industries in which they worked, why did they not leave industry completely? What were their attachments to these industries in general or to the companies they with contracted in particular? In this vein,

the most common theme that emerged throughout my research was a narrative of reform that acknowledged but also critiqued the ethic of material provisioning analyzed in chapter 2.

Scott, a midcareer geological engineer, was skeptical of how profit motives shaped the practice of engineering, but he maintained his work with corporations through his position at an independent geotechnical consulting firm. Among my interlocutors, he was the most explicitly reflective in our conversations about when he was speaking on behalf of himself, his consulting firm, or the project as a whole: at multiple points in our interviews, he said *we* but then paused to clarify to which "we" he was referring—his consulting firm or the project team, which would include the company personnel. Scott said he appreciated the opportunity to develop relationships with and make changes inside of powerful companies, but he acknowledged that "as a consultant, your ability to change some of the big-picture issues is really limited." His main concern was that for-profit companies were "kind of doing the minimum, from what I can tell, the minimum they need to do to have the social license and the actual permits that they need to develop the project. So I get the sense that everyone is sort of representing themselves and just doing the minimum required to make the project move forward." In contrast, he described his colleagues from the firm as sharing a similar progressive political ethos.[30]

Yet Scott believed firms such as his played an essential role in ensuring that natural resource production was done responsibly. His specialty was roads, specifically, making recommendations to mining and oil and gas companies about where to place them to minimize financial costs of construction along with exposure to geotechnical, hydrotechnical, and geohazard risks. He saw roads as "intrinsically political," recognizing that his infrastructural work as always embedded in social structures and relationships of power.[31] For mining and petroleum projects, the recommendations that he and his team made about where to place access roads and where to cite major infrastructural elements such as tailings dams facilitated large-scale industrial development where there previously had been none—a conundrum that sparked lengthy soul-searching conversations among his coworkers at the office as well as at their field sites. He described

his coworkers at the consulting firm as "people who are excited about the outdoors, like me," only to find themselves directly contributing to the transformation, if not destruction, of the environments they value.

> So then, we all arrived at [a field site] and we sit around and we say, "Well . . . but now, here I am, going to this pristine wilderness. I get to fly over in a helicopter, it's amazing. But we're here to . . . I mean, destroy it." We think that. Like, "You know, it looks so amazing now, but ten years down the road, this is all gonna be a tailings pond and you won't recognize it." And we're all sad about that. And so, yeah, we sit at these camps in the evenings and lament about the fact that this beautiful valley's gonna be destroyed. And then, we talk about, "Well, how do we justify doing this?"

Scott was not alone. Dan, a fellow geological engineer, had worked both as a consultant and as a full-time corporate employee. He said, "We all got into geology and geotech because we love the outdoors, but we discovered that the resource industry is the only place to work. We rationalize it by saying that we're all users of resources and therefore our responsibility is to do that development responsibly." Scott justified his career decision through the metaphor of "steering the ship," the ship being a minerals industry that increasing levels of consumption around the world made necessary:

> It comes back to the argument . . . I flew here in an airplane, I drove my car across town. I have a standard of living that I've grown used to that I'm not gonna walk away from. And so, if I'm gonna have those things, then I need to be part of the . . . we say, "steering the ship." We got this big ship. And either you can be the Greenpeace who jumps in front of the ship and tries to stop it—and I'm fully supportive of those people—but I could choose to be that person who is jumping up and down in front of the giant ship and gets pushed out of the way, or I could help steer the ship. So we say, "Well, all of us at [our firm], we're helping to steer the ship. And maybe we're steering the ship off the edge of a cliff, but we're steering the ship." And that's how we justify it, rightly or wrongly.

In this statement, Scott acknowledged the dominant ethic of material provisioning, pointing to his own consumptive practices that made mineral

development necessary, but he simultaneously recognized it as a particular framing of accountability rather than as simply the "truth" about how the world was. He also subtly critiqued this ethic by opening up the ultimate "good" it proposes to question, jokingly saying that they might actually be steering the shift "off the edge of a cliff."

To help steer the ship, to make the industry as responsible as he could from his position, Scott paid attention to "really consequential stuff" that appeared deceptively "mundane." One of his projects at the time of our interview, for example, was assisting a South American mining company in decommissioning the access roads and drill platforms it had been using to explore a mine expansion that never materialized. The original inhabitants, many of them campesinos, had returned to the exploration sites to find new flat pads, in the midst of an otherwise mountainous Andean landscape. They took advantage of the pads and constructed homes and small businesses, but those pads were flanked by steep and potentially unstable cut slopes designed for short-term use by the mine's subcontractors wearing personal protective equipment, not for long-term habitation by people untrained in landslide management. When Scott and his team from the firm arrived on site, they saw that the risks to the returning residents were not included in the original proposed scope of work. He and his coworkers convinced the people in charge of the project to broaden that scope to include a risk assessment to investigate the possibility for people to live long term in those areas. When we spoke, his team was studying the dozens of drill paths and roads to prioritize those that posed the greatest risks, so that they could recommend plans and best practices for how to close those areas or lower the risk to a tolerable level for long-term human habitation.

Scott, however, was unsatisfied with just trying to make corporations more responsible and established professional spaces that were not dictated by profit demands and allowed them to serve people who had been underserved by engineering. The part of his job he loved the most was helping found a division of his firm that would engage in pro bono work for the communities that needed geotechnical expertise but could not afford to hire their own experts. "We have to have enough corporate clients so we

can pay our bills," Scott explained, "but we have more than enough business to reinvest our earnings back into communities." Because the firm was owned by its employees, they had the power to create the division and direct a substantial percentage of their profits to support its work. For Scott, the "person" of the consulting firm he enacted was still constituted by multiple parts, like the corporations he critiqued, but in the consulting firm he felt that those parts nonetheless shared many political and social commitments.

Like Scott, Gary craved professional spaces that would directly serve marginalized communities. After becoming disenchanted with the corporate world and leaving his consulting job, he formed his own nonprofit that would put geotechnical knowledge at the service of communities that could not normally afford it. Motivated by big questions about economic development, social justice, and environmental sustainability, Gary dreamed of finding a way for poor communities to process tailings—heaps of accumulated mine waste that still include trace "uneconomic" minerals left behind after the main mineral has been extracted—for smaller amounts of profit that could nonetheless make a big difference for the poor.[32] "There are resources in those materials, but they're not enough to trigger the greed in a mining company to do something with it," he explained wryly.

While Scott and Gary both created professional spaces that were more distant from the corporations they contracted with, other engineers took an opposite career trajectory and left consulting to enter full-time corporate work specifically to influence change from inside of powerful companies. Benjamin spent his first years as a consulting environmental engineer helping mining companies demonstrate regulatory compliance. The experience helped him develop expertise in geology, minerology, sulfides, acid mine drainage, water quality assessment, impact prediction, and closure plans. A participatory environmental monitoring assignment in the Global South impressed on him the importance of doing technical work that mattered to the people who bore the greatest burdens of industrial development: "Suddenly you're working to collect information, make opinions that people really care about. It's not just making opinions for a regulator to sign off on to put the book on the shelf to show that the process has been done so that

then you can do whatever activity you want to do. But rather, people really care about the results because they feel like it impacts them directly, right?"

The experience compelled to work with "clients that wanted to do technical work or environmental work but with community interests and community involvement." He said he eventually took a job with one of the world's largest oil companies in order to make a bigger impact:

> Then I did think that one of the gaps in my experience was working for a company, right? Because you're always working in consulting. . . . You're collecting information. You're synthesizing, you're writing, but you're not actually working at the very up-front end of the companies that create the problems in the first place, or however you want to couch it, right? So it seemed like a good opportunity to do similar work but internal to a company and hopefully make a difference.

Similarly, Paul was a senior environmental engineer who moved from a successful consulting career to one of the world's largest mining multinationals because he could not pass up the chance to spearhead a major cleanup effort. In narrating his career, he signaled his own critical assessment of the company and industry as a whole. He described himself being very resistant to a friend's suggestion that he interview with the mining company, recalling that he said to him, "There is no way in the world I will go to work for a mining company. I will damage my own personal reputation, and it's just not going to happen." He said he "reluctantly" agreed to job interview but became convinced of the magnitude of the project they wanted him to lead—a cleanup that would go on to become the largest privately funded cleanup in US history—and company's serious commitment to doing it right. "So I ultimately sort of swallowed my pride and said, 'Yes, I'll come to work for you,'" he said. "And sure enough, the company put its money where its mouth was." Even as a junior engineer, Paul felt that his colleagues listened to him and respected him, so much so that they flew him to the corporate headquarters to talk to the board about the cleanup program. "To me, that was something I had never experienced before," he said. "And what impressed me the most was that the board was knowledgeable and interested and asked good questions and pushed me

in certain areas, but it was obvious that they took this all very seriously." Many engineers and applied scientists were like Paul in portraying themselves as initially skeptical, as described in chapter 4, perhaps because doing so both emphasized their own agencies of critically assessing companies' performance and leant further credibility to the responsible image of the companies they sought to portray.

By the time the cleanup was finished, Paul said, their team had moved "more hazardous waste material than the entire EPA Superfund program across the country." He went on to management and executive roles in the company, helping establish a climate change policy that was the first of its kind for a mining company and to integrate environmental sustainability and social responsibility into operations, including the decision-making process for new projects. His corporate career allowed him to become a powerful agent of change inside of industry, though he experienced unease when visiting some of the company's less respectable operations that were just giving social responsibility "lip service," he said. "They weren't really doing the work." His frustration points to the tensions that emerge in corporate forms that are constituted by multiple agencies—the "laggers" reflected poorly on Paul's performance because the company was collectively constituted, even though it was geographically dispersed across the globe. To try to align the company's agencies with what he viewed as his and coworkers' more responsible practices, he tried to mentor the laggers to embody the company's overall social responsibility framework. Paul said that, while it was demanding work, he appreciated the opportunity to transform the industry practices he viewed as the most troubling.

"WE'RE BASICALLY HERE TO SERVE": NEW SOURCES OF LEGITIMACY

Stein argues that corporate clients enroll consultants to shore up their own authority to fight in-house battles, positioning them as "outside" experts who endorse or even propose the client's own desires for change.[33] In this section, I show that corporate actors also enroll consultants as key sources of legitimacy for *external* audiences as they manage their accountability

to members of the public. Yet while company personnel and public relations offices tout the detachment of consultants from corporate forms as an "independent" stamp of approval for their projects, the structural conditions under which consultants work engender dependence on those corporations for continued contracts, constraining that very independence. In other words, corporate personnel can claim the objectivity and independence of consultants as a way to shore up public trust in their own projects at the same time as those consultants' activities are constrained by their dependence on those same corporate forms.

In my research, tracing out the contribution of consultants to the everyday activities of corporations and their representational practices was difficult given how deeply they were embedded in most industry activities. Sometimes the knowledge that engineering consultants produced was enveloped into corporate self-representational practices, such as when corporate personnel shared the results of environmental studies in public meetings while attributing them to the *we* of the corporation without signaling that they were completed by consultants hired by them. At other times, corporate personnel made visible the consulting firm origin of those studies, perhaps because it added a veneer of objectivity—assertions that a mine would not compromise a groundwater table seem more believable when coming from an "independent" consultant from the same area as the groundwater table than from a distant corporate entity proposing the mine.

During my research, the most discussed US mining controversy was the proposal by PolyMet Mining Corporation to build a large open-pit metal mine in northern Minnesota, in close proximity to the Boundary Waters Canoe Area. A 2012 PolyMet news release titled "PolyMet Strengthens Permitting Expertise—Groundwater Monitoring Requirements Satisfied" highlighted the role played by consultants in the project:

> Foth is a recognized leader in environmental review and permitting with a nationwide reputation for successful permitting of nonferrous mining projects in the upper Midwest. In particular, Foth was the lead consultant that secured the environmental permits for the Kennecott Eagle nickel and copper mine in Michigan and the Flambeau Copper Mine in Wisconsin. "I am very

> excited to have Foth join our permitting team," said Jon Cherry, president and CEO of PolyMet. "Foth's key role is to provide strategic advice related to securing the permits necessary to construct and operate the NorthMet Project in an environmentally sound manner, as well as to ensure appropriate quality of permit submittals."[34]

Consulting engineers both from Foth and from Barr Engineering took on public-facing roles as the debate unfolded. The tailings dam became one of the most controversial components of the proposed mine, in the wake of devastating dam failures in Canada and Brazil. Barr Engineering was the lead firm in charge of the PolyMet dam project. Scott Grosser, a geotechnical engineer for Barr, appeared in multiple news articles to vouch for the safety of the proposed dam, including a 2017 article in the *Duluth Tribune* in which a PolyMet official specifically highlights the inclusion of consultants as improving the safety of the project:

> *Both internal and outside engineers*, including consultants for the DNR [Minnesota Department of Natural Resources], all have suggested modifications to the design that will make it stronger and better, said Brad Moore, PolyMet's executive vice president of environmental and governmental affairs. That includes dropping a plan to use concrete pumped underground to shore-up the base of the dam and instead use rock on the outside of the dam to make it easier to monitor how the buttressing is working and allow more to be added if needed. "The tailings basin design was one of the most-studied aspects of our project," Moore said.[35]

The "Tailings Basin Stability and Environmental Protections" information sheet that PolyMet produced and made available on its website also specifically calls out the role of Barr and other consultants:

> Geotechnical experts independently performed numerous geotechnical evaluations and concluded it is feasible to add our tailings to the existing facility. These experts will assist in the specification of future engineering requirements prior to and after production begins. . . . Minnesota-based Barr Engineering, our engineering firm for the tailings basin, has been designing tailings basins for mines in northern Minnesota since the 1960s and now works on tailings basin projects around the world.[36]

Yet other information sheets took on a third-person perspective that did not make visible the studies contributing to its assertions, such as about water quality or financial assurance. The same third-person perspective runs throughout the environmental impact statement, which itself was prepared by the consulting firm Environmental Resources Management at the request of the lead government agencies on the project. The executive summary—the section that was most accessible to readers out of an environmental review totaling a staggering twenty-two hundred pages[37]—asserts conclusions without citing the original sources at all. For example, it argues, "With the proposed engineering controls, the water quality model predicts that the NorthMet Project Proposed Action would not cause any significant water quality impacts."

A senior civil engineering consultant who worked for one of the firms hired by PolyMet was critical but pragmatic about the role his firm played in industry. Stuart's specialization in groundwater and soil contamination opened up ample opportunities for him to critique companies, which he summed up by stating, "A client will push you right to the ethical edge of your credibility." His long-term perspective on working with a variety of clients and holding executive positions at the firm provided him insight on the asymmetries between clients and consultants. Stuart believed that major companies hired consultants because "they want the local relationship, they want the local credibility." He traced this strategy all the way back to AMAX's Minnamax mining exploration project in Minnesota in the 1970s, where he saw the New York–based company shore up its credibility by emphasizing the work done by his consultant group based in Minneapolis. He speculated that skeptics of the project would be more likely to trust the Minnesota firm than the New York City conglomerate, as would the state regulators who would eventually be tasked with approving permits. Forty years later PolyMet engaged in similar representational techniques: the same 2012 news release that praised the consultants hired by PolyMet played up Barr's "local" identity, referring to the firm as "Minnesota-based Barr Engineering" and its "experience in Iron Range mining projects."[38]

Stuart criticized the structural position of consultants in relation to powerful mining companies like PolyMet, stating, "We're basically here to serve. They tell us what they need, and we develop a work plan for doing that. They may ask us what we think once in a while . . . [but] they're the client and we're the consultant and they're running the project." Stuart's critique resonates with scholars who examine the limitations and opportunities of engineers being "designed to serve."[39] Such an orientation has positioned engineers as solving problems defined by others rather than defining problems themselves.[40] This is problematic because the problem-definition space is where wider concerns about responsibility, accountability, or justice could be defined into or out of the equation, as consultants like Jen recognized. Being excluded from problem definition undercuts the ability of ostensibly "independent" consultants to practice engineering in a way that resonates with their senses of social and environmental responsibility. The permeability of the corporation—and its enactment by consultants who were structurally positioned to serve industry—served a strategic purpose in accessing new relationships and new sources of credibility for the corporation's activities, even as corporate personnel maintained the prerogative to do as they wished with the consultants' recommendations.

CONCLUSION

The engineers I met who were most critical of corporations were those who worked as consultants, from Gary's condemnation of corporate America to a seasoned petroleum engineer who believed that all natural resource conflicts could be reduced to "lawyers, guns, and money" and that young engineers should be taught that they are nothing more than a "tool of US foreign policy" that exists solely to further the interests of the shareholders of major transnational corporations. Consulting seemed to offer more attributes that scholars would associate with professional autonomy. Most significant, these engineers and applied scientists had more opportunities to choose to work for clients and on projects that aligned the most closely with their public, professional, and personal accountabilities, from Colton's

commitment to create operations that would not offend the environmental sensibilities of outdoor enthusiasts like himself to Gary's ambitious goal of restructuring natural resource production to benefit poor communities. This can be interpreted, I suggest, as a strategy to navigate the challenges of organizational work, specifically their being held accountable for the multiple enactments of an extended corporate "person."

The emphasis these consultants placed on projects that dovetailed with their public accountabilities suggests that "meaningful" work was that in which public accountability was integrated into the engineering itself. This finding builds on Peter F. Meiksins and James M. Watson's conclusion that "engineers, while not entirely comfortable with organizational constraints, view them as inevitable and are willing to accept them in exchange for interesting work."[41] This chapter shows that, at least for one group of engineers, "interesting" work was that which spoke to their sense of accountability outside of a narrow technical realm. Engineering professor James Trevelyan reached a similar conclusion in a large study that comprised over three hundred interviews with practicing engineers, survey data from nearly four hundred engineers, and multiple years of participant observations of Australasian engineers. He found that "more experienced engineers, those who had stuck with it for a decade or more, had mostly realized that the real intellectual challenges in engineering involve people and technical issues simultaneously. Most had found working with these challenges far more satisfying than remaining entirely in the technical domain of objects."[42]

The chapter also suggests that the boom of consulting opportunities may have changed the trade-off originally proposed by Meiksins and Watson, as full-time corporate employment no longer seems as inevitable as it once was, given the swelling ranks of consultants. But while consulting opened up many opportunities for engineers to work for corporate clients they respected and on projects they admired, they also expressed frustration in not controlling how their work was eventually implemented by those clients. Consulting thus seems to introduce a particular kind of alienation for engineers beyond what engineering studies scholars have influentially theorized as estrangement from craftwork or the "professional-bureaucratic dilemma."[43] Many consultants experienced alienation from

the implementation of their work, from how their studies were represented in an environmental impact statement to how a tailings dam was eventually constructed. Only a few were willing to seek full-time corporate employment to try to ameliorate such alienation. It was far more common for consultants to try to select corporate clients as carefully as possible.

The political economy of consulting raises serious questions about the accountability of corporate forms. Writing about environmental consultants who work on mining projects in Guatemala, sociologist Michael L. Dougherty describes the double bind they face: "They want to exercise their technical expertise and advocate for stringent and effective environmental management, but they recognize that their solvency depends on shilling for miners."[44] While the consultants I met all positioned themselves as scrupulously evaluating potential clients to ensure an ethical fit, only the most successful were able to build up enough relationships and projects that they could afford to say no to those that offended their sense of professional, personal, and public accountability. The fate of those ethically suspect clients and projects points to another dispersal of accountability: even if one consultant refuses the work, another one can pick it up.

The ambiguous fate of the consultants' work provides a vivid example of how these more "autonomous" professionals are nonetheless enfolded into corporate practices of accountability that extend the authority of corporations themselves: the consultants' studies, plans, and reputations were put to work in the service of their corporate clients. Corporate personnel highlighted the independence of consultants as a way to bolster support for their projects, even as consultants remained dependent on them for continued work. This focus on the liminality of consultants underscores that the partible and permeable nature of corporations contributes to making this form so slick and powerful.

For their part, most of the engineers found some peace considering—or perhaps consigning—themselves to be reformers, not revolutionaries. Accepting the inevitability of working for corporate forms in some way, they sought work that allowed them to practice engineering in ways that resonated with their multiple accountabilities. Their strategies seemed

to echo what Harvey and Knox identify as the relentless pragmatism of engineers.[45] Chapter 6 explores the politics of this pragmatism in detail, focusing in particular on how engineers in Colorado used their professional practices to attempt to quell the growing firestorm surrounding fracking in the state. It shows how attempts to cultivate accountability between engineers and the broader publics affected by their decisions rested on notions of reconciliation that marginalized criticisms that could not be reconciled with continued oil and gas production itself.

Extracting Accountability

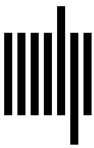
Engineers and Corporate Social Responsibility

By: Jessica M. Smith

Citation:

Extracting Accountability: Engineers and Corporate Social Responsibility
By: Jessica M. Smith
DOI: 10.7551/mitpress/12677.001.0001
ISBN (electronic): 9780262366151
Publisher: The MIT Press
Published: 2021

The open access edition of this book was made possible by generous funding and support from The National Science Foundation



The MIT Press

The MIT Press would like to thank the anonymous peer reviewers who provided comments on drafts of this book. The generous work of academic experts is essential for establishing the authority and quality of our publications. We acknowledge with gratitude the contributions of these otherwise uncredited readers.

This book was set in Adobe Garamond Pro and Berthold Akzidenz Grotesk by Westchester Publishing Services.

Library of Congress Cataloging-in-Publication Data is available.

Names: Smith, Jessica M., author.
Title: Extracting accountability : engineers and corporate social responsibility / Jessica M. Smith.
Description: Cambridge, Massachusetts : The MIT Press, [2021] | Series: Engineering studies | Includes bibliographical references and index.
Identifiers: LCCN 2020052840 | ISBN 9780262542166 (paperback)
Subjects: LCSH: Engineering ethics. | Social responsibility of business.
Classification: LCC TA157 .S588 2021 | DDC 174/.962--dc23
LC record available at https://lccn.loc.gov/2020052840