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Residue

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By Gabrielle Hecht

Waste and toxicity are foundational categories of knowledge for the Anthropocene. Consider how natural scientists approach the topic. Empirically, the “great acceleration” they’ve identified corresponds to a massive increase in human-generated wastes: carbon molecules, toxic chemicals, radioactive particles, plastics, and much more. Measuring molecular concentrations of these materials, and mapping these measurements onto models of earth systems (such as the atmosphere, the biosphere, or the pedosphere), hails certain materials as excessive, residual, and/or toxic. Model-mediated measurements (Edwards, 2010) thus enact ontologies of waste and toxicity, generating evidence for the planetary scale of human terraforming. In important ways, tracking (toxic) wastes is how we know the Anthropocene.

Of course human terraforming is geographically and politically uneven. Communities living in precarious economic and environmental conditions experience it very differently than those living comfortably: the Anthropocene may be planetary, but it is not uniform. And knowing *that* aspect of the Anthropocene requires a qualitative approach. So how can waste-centered epistemology help humanists and social scientists think about differential histories, presents, and futures in in the Anthropocene? Let’s take mine residues in South Africa as an entry point.

Rocky residues

Consider rock. At certain historical moments, production imperatives, industrial needs, and sometimes just plain greed turn rock into rocks. As some rocks acquire value through mining, refining, and chemical extraction, others (actively, dialectically) become waste. Such dynamics were central to the making of modern South Africa.

Industrial gold mining on the Witwatersrand plateau (in today’s Gauteng province) began in 1886. In the ensuing decades, hundreds of thousands of men migrated to the Rand from southern and central Africa to work in the mines, which rapidly became deepest in the world. As miners tunneled in, they extracted millions of tons of rock. Rocks with high gold content got

processed. Rock whose gold content couldn't be profitably extracted at the time of mining piled up around the shafts. By the 1930s, gigantic tailings piles had changed the topography of the Rand – including that of Johannesburg, the urban sprawl birthed by mining.



Workers descend into the Robinson Deep Gold Mine, 1900. Source: <http://www.miningartifacts.org/South-African-Mines.html>

In production-centered historiographies, histories of mining focus on shaft-sinking, tunneling, descending, collapsing; the absence of air, the falling of rocks, the terrors of the dark. A pivot to waste extends this vertical orientation upward: mining makes mountains, as well as holes. Not that this history is any less wrenching. South African author Peter Abrahams, best known for his novel *Mine Boy*, which took readers deep underground, also wrote poetry about the mine dumps. Here's an excerpt from "Fancies idle (iii)":

Mine dumps of the Rand.
These pyramids speak hands
Torn and bleeding,
Black, hard, rocky,
Like the black earth, wind-swept and touched by time
To leave

Torn nails and twisted thumbs
And missing spaces where the first and third fingers lived.

...

These pyramids
Scattered over the body of the Rand,
Mighty in their grandeur and aloofness,
Monuments of the Twentieth Century Pharaohs,
Speak the world,
Not thousands of black men,
But millions of toilers,
Welded into a rock of firm aloofness,
Like them, made of the soul of suffering;
These pyramids are the symbol of revolt!

And revolts there were, of course, but those have been thoroughly analyzed by others. Here, I offer Abrahams's vision as a counterpoint to that of a mining magnate in the 1950s, who in gazing out at the new topography of Johannesburg and its surroundings saw not pyramids of suffering, but gigantic piles of cheap uranium.



The dump at the Crown Gold Mine, 1939. Source: Central Mining-Rand Mines Group.

All rock is a complex conglomerate of elements and molecules. For decades, Rand magnates cared only about gold. But as the Cold War heated up, a previously valueless element suddenly came into view: uranium. And it was readily available in South Africa, embedded in Rand residues. Procurers for the American and British nuclear weapons complexes salivated. Contracts were signed, treatment plants built. The first 10,000 tons of South African uranium came from these mine dumps. After that, the cycle of tunneling and mountain making resumed, extracting both uranium and gold for the rest of the 20th century (Hecht, 2012).

In deep time, water shapes rock. Industrial mining accelerated this process, rescaling it for human time. Extracting gold in South Africa required a vast amount of water, particularly once the cyanide leaching process became the standard means of extracting gold from host rock. Gold mining was accompanied by massive water works: dams, barrages, and pipelines channeled water from the Vaal River to the mines for use in the treatment process. But water also had to be extracted from the mine shafts. By the early 20th century, many shafts had plunged below the water table. So they got flooded. Water had to be pumped out so that miners could work.

Dozens of different companies extracted Rand ore over the years. The mines they worked fell into three geological basins. Within each basin, the shafts were all connected underground. When a mine ceased to produce profit and shut down, the pumping stopped too. This increased the pumping burden on the other mines. By the late 20th century, only a handful of mines in this vast techno-geological assemblage still operated. The onus of pumping ever-increasing amounts of water squeezed profit margins. The now democratically-elected government, no less a promoter of capitalism than its apartheid predecessor, paid pumping subsidies to the remaining mining companies to preserve their profit margins (McCarthy, 2010; Turton et al., 2006; Adler et al., 2007).

Residual governance

When yet more mines shut down, the remaining pumps could no longer beat hydrological cycles. Water seeped back in, filling cracks and shafts, reacting with the pyrite in the exposed rock. This chemical reaction acidified the water, rendering it more conducive to the dissolution of elements long trapped in the rock, such as lead, mercury, and arsenic. This toxic soup trickling through tunnels and tailings was known as acid mine drainage (AMD). A new residue had become visible – and with it, new demands for its governance.

Mind you, a small handful of experts, scattered across several government agencies, had long predicted that the acidified waters would rise, “decanting” out of abandoned shafts and into the water table (Förstner and Wittmann, 1976; Rösner and Van Schalkwyk, 2000). For years they had called, in vain, for measures to stop the overflow before it began. But out of sight, out of mind: as long as the water remained in the shafts, it attracted no attention as a potential object of governance. That changed in 2002, when a flood in the Rand’s Western Basin brought AMD, laced with heavy metals, to the surface. (Naicker et al., 2003; Bobbins, 2015).

In short order, acid mine drainage came to constitute one of Gauteng’s gravest environmental health threats. Residents without access to cleaner water sources bathed themselves and their clothes in acidic, metallic water. Contaminated water irrigated crops and quenched the thirst of humans and livestock. Along the way, people, animals, and plants absorbed heavy metals, chemical solvents, and radioactive particles. Of course they got sick; of course they noticed; of course they protested. Dozens, then hundreds of articles appeared in the press. As the decant and its effects increased in scale and visibility, architect Lindsey Bremner argues, it “transformed geology into politics”(Bremner, 2013).

The governance of mine residues remains central to the governance of Gauteng. National and regional government agencies, mining and water companies, civil society organizations, scientists, farmers, residents of informal settlements, and many others continue to battle over how to govern the toxic floods (Humby, 2013). In the Rand’s Western Basin, one constellation of such actors has taken a technopolitical approach to residual governance by building a neutralization plant to raise the pH of the water. But as others point out, this (dis)solution does nothing more than de-acidify the water. It doesn’t make the water safe for humans: heavy metals and other contaminants remain (Bobbins, 2015). This narrowly conceived approach, which isolates a small piece of the problem while ignoring its broader implications, represents residual governance in a second sense: governance as afterthought, governance on the margins.

And then there’s the ongoing problem posed by the pyramids. Although many of the mine dumps have been re-mined or moved (often spreading toxicity yet further), large piles of residues remain (Oosthuizen et al., 2012). When winter winds scream across the Rand, they blow radioactive mine dust over farms and settlements, both formal and informal. [Drifting](#) dust enters dwellings, lungs, and eyes, interpellating yet more agencies, experts, and publics (Schonfeld, Winde et al., 2014; Van Eeden, Liefferink, and Durand, 2009).



Tudor Shaft informal settlement with mine dump in the background, 2016.
Photo by the author.

Surprisingly visible among these publics: the residents of the Tudor Shaft informal settlement, located both on and downwind from dumps. Some Tudor Shaft residents, such as Mr. Jeffrey Ramoruti, lived there for over two decades. When Mr. Ramoruti first arrived, he and others were promised a short wait time for permanent housing (via the new government's [Reconstruction and Development Programme](#)). Their hopes frustrated again and again, residents pursued many strategies to remedy their plight. Radioactive dust, for example, helped them garner enough [media attention](#) to produce several studies that found radiation levels in excess of international norms. Some shacks were marked for demolition, yet they remained standing for years. The National Nuclear Regulator concluded that higher levels of public exposure were acceptable because Tudor Shaft presented an "existing exposure scenario." In other words, the radioactivity was already present – in contrast, say, to nuclear reactor maintenance, which would count as a "future exposure scenario," requiring an operations plan to minimize exposure. Studies continued to proliferate, some framing the issue in terms of lifetime cancer risk (Njinga & Tshivase, 2016), others in terms of human rights (Docherty 2016). Meanwhile, the Socio-Economic Rights Institute and the Federation for a Sustainable Environment helped Tudor Shaft residents articulate their right to benefit from democratic South Africa's basic compact: that the state stop treating *people* as residues, as waste. In February 2017, twenty-four years after the first residents arrived at Tudor Shaft, 300 families were relocated into RDP housing.



Mr. Jeffrey Ramoruti showing dust from mine dumps, 2016. Photo by the author.

Yet residual governance in this third sense – where people themselves are waste – continues. It continues on Tudor Shaft, where immigrants and others remain, the residues of relocation. And it continues throughout Gauteng, where immigrants from Zimbabwe sift through mine residues and descend into abandoned shafts, hoping to recover a few milligrams of gold to keep them going, hoping that today is not the day that the tunnel collapses, hoping not to get arrested when they sell their soil to merciless brokers.

In the afterlife of extraction, the three registers of residual governance – the governance of residues, governance as afterthought, and governance that treats people as residual – are deeply entwined in a slow, violent dance (Nixon, 2011). The violence seeps through technopolitical entanglements between the time of the human life and the geological time of rocks; between the time of colonized bodies and the time of metallic

integrity; between the time of the corporation and the time of radioactive decay; between the time of apartheid and the time of democratic promise.

Such is the violence of the Anthropocene. Is residual governance the only way forward?

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