



The Cost of Gold:

Environmental, Health, and Human Rights Consequences
of Gold Mining in South Africa's West and Central Rand

Harvard Law School International Human Rights Clinic

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Cover Illustration

The poor community of Soul City Extension 2 sits near a gold mine waste dump in the West Rand. Mining has produced contaminated water and tailings dams that have threatened the local environment, residents' health, and human rights.

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October 2016

Contents

Table of Acronyms	i
Methodology	iii
Summary	1
Historical and Legal Context	2
Environmental Contamination	2
Inadequate Information and Participation	5
A Coordinated and Comprehensive Program	5
Recommendations	7
Environmental Contamination	7
Inadequate Information and Participation	8
A Coordinated and Comprehensive Program	8
PART I: Historical and Legal Context	11
1. Gold Mining and Human Rights in South Africa	13
The Origins and Early Effects of Gold Mining in the Witwatersrand	13
The Mining Industry in the Apartheid Era	15
Post-Apartheid South Africa and Its Human Rights Commitments	16
Gold Mining in Modern South Africa	18
2. Human Rights Framework	19
Economic, Social, and Cultural Rights	19
Civil and Political Rights	23
Right to a Remedy	25
A “Reasonable” Program to Realize Human Rights	26
Conclusion	27
PART II: Findings	29
3. Acid Mine Drainage	31
Creation and Spread of AMD	32
Exposure to AMD	37
Health Impacts	43
Rights and Duties	47
4. Tailings	59
Creation and Spread of Tailings	59
Exposure to Tailings	63
Health Impacts	70
Rights and Duties	73

5. Information and Participation	87
Limited Access to Information	87
Inability to Participate in Decision Making	91
Rights and Duties	95
6. A Coordinated and Comprehensive Program	105
A Coordinated Program	105
A Comprehensive Program	109
Elements of a Reasonable Program	111
Acknowledgments	113
Maps	
Gauteng Province	v
West and Central Rand	vi
Key Landmarks in West Rand	30
Bekkersdal and Donaldson Dam	36
Contamination and Communities in West Rand	62
Tailings Dams and Communities in Central Rand	64
Sinqobile, Tudor Shaft, and Kagiso Extension 8	92

Table of Acronyms

AMD	Acid mine drainage
ATSDR	Agency for Toxic Substances and Disease Registry
CAT	Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CERD	International Convention on the Elimination of All Forms of Racial Discrimination
CESCR	Committee on Economic, Social and Cultural Rights
CRC	Convention on the Rights of the Child
DEA	Department of Environmental Affairs
DHS	Department of Human Settlements
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
FSE	Federation for a Sustainable Environment
GDP	Gross domestic product
HDS	High density sludge
IARC	International Agency for Research on Cancer
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
IHRC	International Human Rights Clinic
LRC	Legal Resources Centre

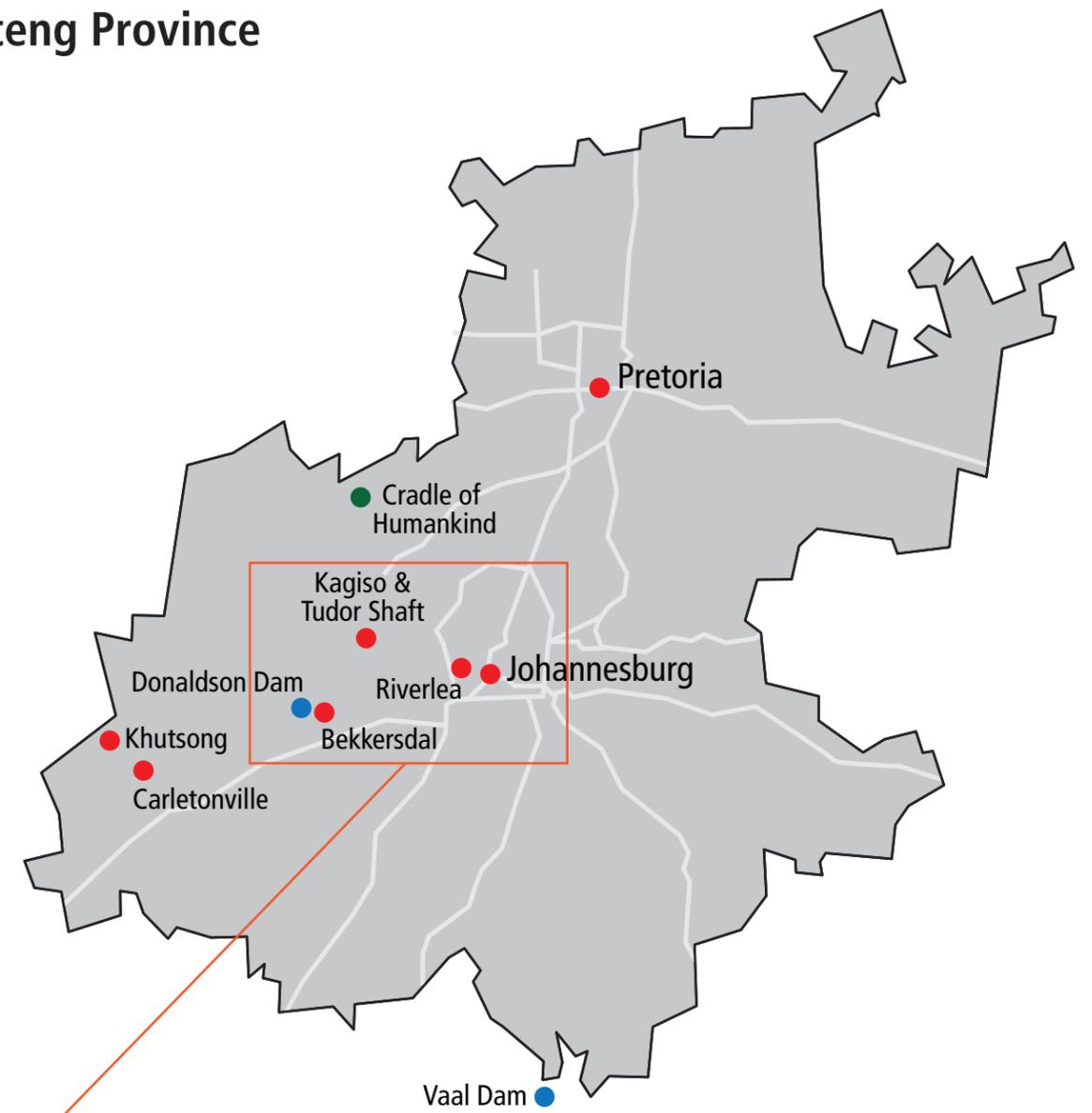
MPRDA	Mineral and Petroleum Resources Development Act
MWRG	Mine Water Research Group
NEMA	National Environmental Management Act
NGO	Nongovernmental organization
NIOH	National Institute for Occupational Health
NNR	National Nuclear Regulator
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the UN High Commissioner for Human Rights
RDP	Reconstruction and Development Programme
SAMRC	South African Medical Research Council
SERI	Socio-Economic Rights Institute
TCTA	Trans-Caledon Tunnel Authority
UN	United Nations
WHO	World Health Organization
WRTRP	West Rand Tailings Retreatment Project

Methodology

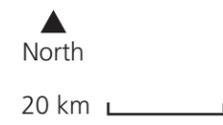
This report is based on a combination of fieldwork and desk research. The Harvard Law School International Human Rights Clinic (IHRC) conducted on-the-ground investigations in South Africa in 2014, 2012, and 2010, and updated its information through phone interviews in 2016 and 2015. During that period, IHRC researchers interviewed about 200 people from a variety of spheres. They visited more than 20 communities in the West and Central Rand in order to speak to residents of informal and formal settlements. The researchers also interviewed government officials, especially from the national government, representatives of several mining companies, civil society advocates, scientists, and other experts. (Citations identify interviewees with the title they held at the time of the interview.) While in the West and Central Rand, IHRC investigators went on site visits to observe first hand the environmental effects of mining and the activities that have exposed local residents to its contamination.

IHRC supplemented the testimony it collected with a wide range of other sources. IHRC researchers drew on government and industry documents, scientific studies, news reports, and histories of the region. In addition, they identified and applied the most relevant pieces of South African, international, and regional human rights law, which provide an analytical framework for this report.

Gauteng Province



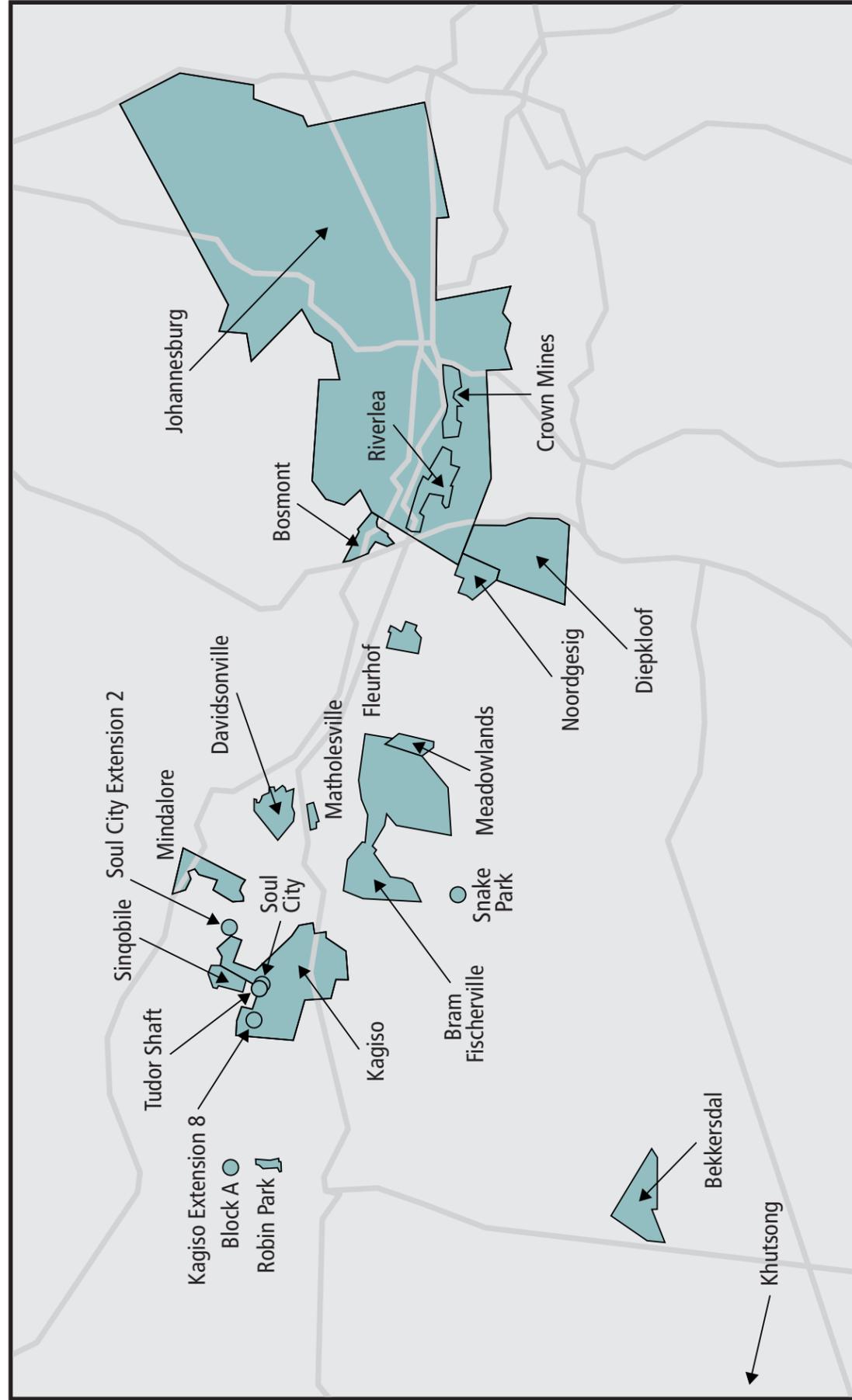
See map p. vi for a detailed view.



- Community
- Dam
- World Heritage Site
- Road



West and Central Rand



Map depicts communities referenced in the report.

Summary

The discovery of major gold deposits in the Witwatersrand Basin in 1886 marked a turning point in the history of South Africa. The gold rush that followed sparked an economic boom, which attracted wealthy mining magnates and then national and multinational corporations. It also gave rise to South Africa’s largest city. Since its earliest days, however, the industry has endangered the environment and health of the people who have made the region their home. Ongoing mining activities combined with the legacy of 130 years of operations have caused water, air, and soil contamination in the West and Central Rand, an area encompassing Johannesburg and its surroundings. Residents have been exposed to elevated concentrations of heavy metals and radiation that can contribute to immediate and long-term medical problems ranging from asthma and skin rashes to cancer and organ damage. Furthermore, the local people have been largely excluded from decisions about how to deal with the dangers. The situation has particularly affected impoverished, and frequently black, communities.

Over the past five years, the South African government has taken some noteworthy steps to address the adverse impacts of gold mining, but it has failed to live up to many relevant human rights obligations. Its response to the crisis in the West and Central Rand has generally been slow and insufficient. As a result, mining has not only created environmental and health risks, but it has also prevented community members from realizing numerous human rights. Widespread contamination has raised concerns under the rights to health, a healthy environment, water, and housing, while inadequate community engagement has interfered with the rights to receive information and participate in decision making. To remedy the situation, South Africa should adopt a coordinated and comprehensive program that both mitigates the effects of mining and helps the country meet its responsibilities under domestic, international, and regional human rights law.



Residents of this corrugated metal shack in Kagiso Extension 8 said dust from the tailings dam gave them severe breathing problems. Acid mine drainage flowing down the dam through a broken white pipe contaminated their garden. © 2010 Bonnie Docherty/IHRC.

This report provides a fresh look at the problems posed by gold mining in the West and Central Rand because it examines them through a human rights lens. It is based on three field trips to South Africa and about 200 interviews conducted by the International Human Rights Clinic (IHRC) at Harvard Law School. The report documents the effects of mining on local residents and assesses efforts to deal with them. While recognizing that industry and community involvement is essential to addressing the situation, the report focuses on the actions of the government, which has a legal obligation to guarantee human rights. The report directs most of its recommendations to the government as a whole because South Africa is better situated to assign tasks to specific agencies.

Part I of the report provides context by laying out the historical background and legal framework. Chapter 1 discusses the history of gold mining in the Witwatersrand and the evolution of human rights in South Africa, while Chapter 2 explains the most relevant provisions of domestic and international law. Part II presents the study's factual findings and legal analysis. Chapters 3 and 4, which address acid mine drainage (AMD) and tailings, respectively, document exposure pathways, describe potential health impacts, and evaluate government responses. Chapter 5 illustrates and critiques how communities have been given limited information and few opportunities to participate in decisions about mining that affect their lives. Chapter 6 concludes by highlighting the need for a coordinated and comprehensive program to resolve the situation.

Historical and Legal Context

Gold mining has been both a boon and a burden for the West and Central Rand, which makes up a large portion of the Witwatersrand. Mining has played an integral part in the region's economic growth for more than a century, but from its earliest days, it has caused environmental damage. Because the industry contributed to the establishment and survival of the decades-long apartheid regime, the government had little incentive to regulate mining's harmful effects during that period.

Since the end of apartheid, South Africa has continued to receive economic benefits from mining, but the industry has operated in a different context. The new government has demonstrated its commitment to human rights through its national constitution and ratification of international treaties. As a result, the effects of mining and the government's response should now be assessed within a human rights framework.

Environmental Contamination

Gold mining has released highly toxic contaminants into the environment of the West and Central Rand for more than a century. In the process, it has raised concerns under several economic, social, and cultural rights. For the South African government to meet its corresponding obligations, it should take steps to remedy ongoing harm and prevent additional effects in the near term as well as to develop a more complete solution for the future.

The pollution of the region's ground and surface water with acid mine drainage has implicated the rights to health, a healthy environment, and water. AMD is produced when water and oxygen mix with sulfides exposed by mining activities, and it contains elevated concentrations of heavy metals, which are in some cases radioactive. Community members have indirectly ingested AMD, especially by eating vegetables irrigated with the polluted water, meat from cattle that have drunk from local waterways, and fish from contaminated bodies of water.



AMD neutralized at the West Rand Treatment Plant has flowed for several years through this pipe and manmade trench to a nearby pit, where heavy metals have precipitated. The water, which has continued on to the Tweelopiespruit in the background, however, has retained dangerously high sulfate levels. © 2014 Bonnie Docherty/IHRC.

Local people have also been exposed through skin contact that has occurred when they have washed clothes or swum in tainted lakes and streams. Residents told IHRC that they suffered from skin rashes after exposure, and studies done in other parts of the world have documented long-term health impacts, such as cancer and organ damage, from the same contaminants.

In recent years, the government has pumped and partially treated the AMD, but this positive step was overdue and a more complete solution has been wanting. A treatment facility that came online in 2014 prevented AMD from decanting, i.e., reaching the surface, in the Central Rand. AMD in the West Rand, however, began decanting in 2002, and the government only assumed primary responsibility for treatment in 2012. The treatment plants have fallen short of a complete solution because they have only neutralized the water, leaving high concentrations of sulfates and other salts that can cause acute health effects and make water unsuitable for such activities as drinking, bathing, washing clothes, and watering livestock.

Desalination, a more thorough treatment process, has been needed to improve water quality and to reduce the strain on South Africa's limited drinking water supply, which has been used to dilute the neutralized water. Recognizing this need, in May 2016 the government announced a plan to construct desalination facilities, which it said would be fully operational by 2020. The project holds promise, but its success depends on the government implementing it effectively and in a timely manner. The government must also address other major sources of AMD, such as rainwater runoff and underground seepage from mine waste sites.



Sand Dump No. 20, one of the largest mine tailings dams in the world, loomed above the West Rand for years. It has recently been remined. © 2014 Bonnie Docherty/IHRC.

Contaminated dust and soil from omnipresent hills of mine waste have interfered with the enjoyment of the rights to health, a healthy environment, and housing. There are more than 200 such waste dumps, known as “tailings dams,” in the Johannesburg area, and like AMD, they contain elevated concentrations of heavy metals, including radioactive uranium. Contaminated dust has filled the air and blanketed communities, leading to widespread complaints of asthma and other breathing difficulties. In addition, the location of many settlements near or even on top of the tailings dams has endangered residents, who have indirectly ingested food grown in the soil, had skin contact with the toxins, or used mud in traditional medicines. In better studied parts of the world, the contaminants in tailings have been found to cause serious health problems, similar to those from AMD.

Government efforts to minimize the effects of tailings have been largely incomplete, short-term fixes. The government’s most notable accomplishment has been to relocate some residents of the informal settlement of Tudor Shaft, who were at particular risk because their homes stood directly on a radioactive tailings dam. The government has permitted new construction near other dams, however. In addition, it has neither pursued adequate dust control measures, such as irrigation and vegetation of tailings dams, nor ensured that industry has done so. While the massive amount of waste has been daunting, the government has taken inadequate steps to develop a more complete solution to the root causes of polluted dust and soil—i.e., the tailings dams themselves. Mining companies have extracted and removed some heavy metals through remining, but government oversight seems to have been insufficient to minimize the side effects of the process, which both stirs up dust and increases AMD. The government has also left companies to take the lead in designing and evaluating proposals to move tailings from urban dams to isolated mega dumps.

Inadequate Information and Participation

The government’s poor track record of communicating and engaging with residents about mining matters has been almost as problematic as the adverse effects of mining operations. It has prevented local people from fully exercising two key civil and political rights—the right to receive information and the right to participate in decision making. Community members have complained, for example, that the government (along with industry) has not provided ample warnings about potential risks or advance notice of mining activities or remedial measures. In addition, while contamination levels have been well documented, there has been a shortage of epidemiological studies regarding the effects of mining contamination on human health in the region. The lack of such information has undermined residents’ abilities to protect themselves or advocate on their own behalf. Over the past few years, the government has funded some new scientific research into the health impacts of AMD and tailings, and the World Health Organization (WHO) and North-West University have sponsored a study on uranium exposure in the West and Central Rand. South Africa should be more proactive, however, in collecting and disseminating information to the local population.

In many cases, government agencies have also failed to engage meaningfully with communities about mining issues that could affect them. Residents have reported being left out of discussions related to nearby operations or their own relocation. Frustration at the lack of engagement has led to violence, litigation, and feelings of mistrust. To meet its human rights obligations, the government should increase the participation of community members in decision making. Their participation could produce more effective policies to address the impacts of mining in the West and Central Rand and increase community buy-in for long-term plans.

A Coordinated and Comprehensive Program

South Africa should adopt an overarching program dedicated to realizing the human rights threatened by mining in the region. According to *Government of the Republic of South Africa v. Grootboom*, a seminal South African Constitutional Court case regarding the right to housing, a “reasonable” program to progressively realize rights should be coordinated and comprehensive. To date, South Africa’s efforts in the West and Central Rand have failed to meet the *Grootboom* standard. The complex web of responsible government agencies and repeated legislative changes to that organizational structure have impeded the development of a coordinated plan to deal with the negative effects of mining. The limited scope of action, inadequate attention to at-risk communities, and insufficient consideration of environmental concerns have undermined the completeness of any response. A coordinated and comprehensive program to deal with the situation in the West and Central Rand should follow the *Grootboom* model and address each of these shortcomings.

A holistic perspective could further minimize the harm caused by mining in the region. It would take into account the connection between AMD and tailings, recognize the importance of linking protection of the environment and human health with community engagement, and allow the government better to prioritize tasks and marshal finite resources. Implementation of such an approach would ultimately help minimize the adverse impacts of mining while promoting human rights.

Recommendations

Mitigating the environmental, health, and human rights impacts of gold mining in the West and Central Rand will require a significant commitment from the South African government. The government will need to employ practical and legal fixes, improve interactions with local communities, and adopt an overarching plan that is coordinated and comprehensive. Communities and mining companies should contribute to these efforts, including by bringing to the task an open mind and a willingness to cooperate. The government should play the lead role, however, given the risk of a collective action problem and the inadequate measures taken by industry to date. In addition, the state bears primary responsibility under human rights law for preventing infringement of its people's rights.

The South African government should take the following steps to address the mining problems in the region and advance realization of the relevant human rights:

Environmental Contamination

- Adopt measures to remedy ongoing harm from environmental contamination, such as:
 - Ensuring cleanup of polluted areas,
 - Providing free health screenings and access to medical care for at-risk populations, and
 - Considering a regime to compensate those harmed by the adverse effects of mining;

- Minimize the risks of further harm from acid mine drainage by:
 - Ensuring water treatment plants are adequate to prevent decanting, including during heavy rains and other severe weather events,
 - Implementing plans to upgrade water treatment in the region from neutralization to desalination as soon as possible, but no later than the scheduled 2020 deadline,
 - Monitoring water levels and degrees of contamination,
 - Requiring companies to reduce spillages from pipes transporting mining waste, and
 - Improving control of runoff and seepage from tailings dams, including through better enforcement of existing laws;

- Minimize the risks of further harm from mine tailings by:
 - Ensuring implementation by the government and industry of dust control measures, such as irrigating or planting vegetation on tailings dams,
 - Prohibiting the use of tailings dams for leisure biking and other recreational activities that stir up dust,
 - Relocating residents who live in areas at high risk from mining contamination and who wish to move to a safer environment, and providing them with adequate housing,
 - Requiring a larger buffer between new construction and existing tailings dams,
 - Adequately regulating and overseeing remaining operations to minimize the side effects of disturbing old tailings,
 - Working with communities and mining companies to develop and implement a long-term strategy that deals with the prevalence of tailings dams in populated areas, and
 - Ensuring its efforts encompass both privately owned mine sites and legacy mines that have reverted to the state.

Inadequate Information and Participation

- Ensure that the public and especially members of affected communities receive information related to the risks posed by mining, including by:
 - Educating, or requiring mining companies to educate, the local population about the dangers of mining contamination and ways to limit exposure through awareness-raising mechanisms, such as warning signs and community workshops,
 - Encouraging and supporting epidemiological studies of the health effects of mining in the West and Central Rand,
 - Providing advance notice of new mining and remining activities and remediation plans, and
 - Disseminating information in a form that is accessible and understandable to laypeople;
- Ensure that community members have the opportunity to participate in decision making about mining activities that affect their lives, including by:
 - Holding regular meetings with relevant stakeholders, including community members, civil society, and industry, to have constructive discussions about dealing with the problems of mining in the region,
 - Engaging meaningfully, and requiring mining companies to engage meaningfully, with affected residents about specific projects, such as those that involve remining or relocation,
 - Working with communities jointly to design constructive forums for regular contact as well as proper engagement mechanisms for specific projects,
 - Encouraging affected people to take part in these processes and voice individual and community concerns, and
 - Taking community perspectives into account when determining policies.

A Coordinated and Comprehensive Program

- Design, resource, and implement a coordinated and comprehensive program to address the adverse effects of mining in the West and Central Rand;
- Build on the criteria for a “reasonable” program laid out in the South African Constitutional Court case *Grootboom*;
- Meaningfully engage communities and industry in the design of the program;
- Promote coordination by:
 - Establishing a focal point to lead the design and implementation of the program and to organize the relevant actors,
 - Creating a clear and stable division of responsibility among government entities with jurisdiction over mining matters, and
 - Providing legislative support, including in the form of necessary resources;
- Ensure comprehensiveness by:
 - Taking immediate preventive and remedial actions as well as developing and implementing long-term strategies to eliminate the root causes of the problem,
 - Devoting adequate attention to the needs of the most at-risk communities, and
 - Following a balanced approach that takes into account environmental and health concerns as well as economic benefits;

- Adopt a holistic perspective that:
 - Takes into account the connection between AMD and tailings,
 - Links efforts to protect the environment and human health with those to engage communities, and
 - Provides an overarching understanding of the problem to facilitate prioritization of tasks and marshaling of resources.

PART I:
HISTORICAL AND LEGAL CONTEXT

1. Gold Mining and Human Rights in South Africa

The history of gold mining in South Africa's Witwatersrand region is a story of great riches and high risks. From its earliest days, mining's profits were integral to the country's growth. They fueled the economy, sparked the growth of Johannesburg, and helped make South Africa one of the most developed nations on the African continent.¹ Mining operations also endangered the environment and human health. The industry's initially discriminatory practices, which became intimately connected with the apartheid regime, placed an undue burden on poor, largely black communities.

While many of the promises and problems of gold mining endure, the political situation has changed. After the end of apartheid, the government made an express commitment to human rights, particularly by accepting obligations under the 1996 South African Constitution and several international treaties. Today, mining in the Witwatersrand takes place in a new legal context, which will frame this report's analysis of the industry's impacts.

The Origins and Early Effects of Gold Mining in the Witwatersrand

An Australian digger found gold in the Witwatersrand in 1874, and the discovery of a major reef in 1886 attracted a flood of prospectors.² Miners' camps sprung up, followed by the founding of Johannesburg, which would become "South Africa's City of Gold."³ The Witwatersrand, which encompasses the West and Central Rand, would prove to be an exceptionally rich and long-lasting resource for South Africa. By 2013, the region had yielded about 40 percent of the gold ever mined in the world,⁴ and when measured by the number of tons of gold-bearing ore it contained, it was the earth's richest mineral deposit.⁵ The Witwatersrand has been difficult to mine, however, because it has very thin gold veins and poor quality ore deposits with a low proportion of gold to ore.⁶ Nevertheless, mining magnates and companies eventually made the enterprise profitable with substantial capital investments,⁷ and they paved the way for an industry that continues today.

The gold rush changed the natural and sociopolitical landscape of South Africa forever. Discovery of the mineral quickly and irrevocably altered the environment of the region. The Witwatersrand, which means "Ridge of White Waters" in Afrikaans, was named for its abundance of waterfalls, but when mining began, engineers built channels and drained the falls.⁸ Water was harnessed for and contaminated by mining, and mounds of waste replaced the natural landscape. Historian Jade Davenport wrote that "the Witwatersrand ... is the most

¹ "In the long run, gold production ... was to change the social and economic pattern of South Africa from a patchwork of agricultural and pastoral communities to a predominately industrial urban society." J.D. Omer-Cooper, *History of Southern Africa* (London: James Currey Publishers, 1987), p. 126.

² Jade Davenport, *Digging Deep: A History of Mining in South Africa* (Johannesburg: Jonathan Ball Publishers, 2013), pp. 137, 150. The gold found in 1874 was "payable," meaning that "it will pay working expenses." "Definition of Mining Terms," *The Barrier Miner* (New South Wales), February 23, 1910, <http://trove.nla.gov.au/ndp/del/article/45101382> (accessed November 15, 2015), p. 1.

³ Davenport, *Digging Deep*, pp. 150-53.

⁴ Matthew Hart, *Gold: The Race for the World's Most Seductive Metal* (New York: Simon & Schuster, 2013), p. 12. See also Davenport, *Digging Deep*, pp. 134, 136 (stating that the Witwatersrand has yielded one-third of the world's gold).

⁵ Davenport, *Digging Deep*, p. 295.

⁶ Nigel Worden, *The Making of Modern South Africa: Conquest, Apartheid, Democracy* (Chichester: Wiley-Blackwell, 2012), p. 45; Davenport, *Digging Deep*, p. 295.

⁷ Omer-Cooper, *History of Southern Africa*, p. 128.

⁸ Davenport, *Digging Deep*, pp. 136-37.

heavily industrialised and urbanised tract of land in South Africa, and it is now impossible to see why the area came to be named as it was.”⁹



The remains of the abandoned Tudor Shaft mine stand near an informal settlement in the West Rand. Tailings from its operations have long endangered residents in the area. © 2010 Bonnie Docherty/IHRC.

In addition to despoiling the environment, the growth of gold mining in the Witwatersrand contributed to South Africa's troubling history of racial discrimination. Exploiting the “extensive but low-grade” goldfield required not only significant upfront investments, but also imported technology and skilled foreign labor that commanded high wages.¹⁰ Early mining magnates found that the costs they could best control were the wages of their unskilled and semiskilled workforce.¹¹ In the late nineteenth century, these mine owners implemented a racially discriminatory system modeled on practices at South Africa's diamond mines.¹² To ensure a steady

⁹ Ibid., p. 136.

¹⁰ Ibid., pp. 290, 216.

¹¹ Ibid., p. 216. “[T]he utilisation of the cheapest unskilled workers was a fundamental requirement if the extensive but low-grade [Witwatersrand] goldfield was to be profitably exploited.” Ibid., p. 290.

¹² Ibid., p. 290.

supply of cheap labor, owners generally hired young, black migrant workers for 18-month periods at minimum wage.¹³ The owners compelled the workers to live in segregated, company-owned housing while white people settled in separate residential areas.¹⁴ Davenport explained that “the magnates and white population deemed that a particularly favourable system, as it prevented the incorporation of the black workforce into Johannesburg's industrial and residential system and, moreover, enabled mine managers to exercise a greater level of control over them.”¹⁵ Such practices would lay the groundwork for apartheid.

The Mining Industry in the Apartheid Era

The South African mining industry, in the Witwatersrand and elsewhere, continued to thrive with the coming of the apartheid era, which began in 1948. According to the country's Truth and Reconciliation Commission, established after the regime fell in 1994, the mining industry “help[ed] to design and implement apartheid policies.”¹⁶ It also benefited from a labor system that discriminated against black South Africans by paying low wages and allowing unsafe working conditions. The commission wrote, “The first-order involvement of the mining houses and the Chamber of Mines ... in shaping the migrant labour system is the clearest example of business working closely with the minority (white) government to create the conditions for capital accumulation based on cheap African labour.”¹⁷ The commission found the mining industry morally culpable for the “hardships” that resulted.¹⁸

Mining's relationship to the apartheid government also exacerbated environmental harm because it disincentivized regulation. According to Alan Durning's 1990 critique of the regime, the government relied on mining, which generated significant tax revenue and export earnings, to cover the costs of racial discrimination policies, segregated facilities, and international trade sanctions.¹⁹ As a result, the government was “loathe to touch the mining industry” and treated it like “a sacred cow.”²⁰ Durning wrote that the regime gave “great freedom to the minerals industry, allowing it to endanger black miners and the environment while protecting it from public scrutiny.”²¹ Environmental impacts, including contamination of water and soil with heavy metals, went largely unmonitored.²² Poor, black South Africans, oppressed by apartheid, felt the greatest burden of the environmental impacts, and they had little political power with which to “counter the industry's irresponsibility.”²³ Durning concluded, “Apartheid ... would have collapsed long ago were it not for the billion-dollar dividends gained by scouring the earth.”²⁴

While gold mining remained profitable for decades, in the mid-1980s, it started to decrease in the Witwatersrand and South Africa more broadly for economic, political, and practical

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Truth and Reconciliation Commission, *Truth and Reconciliation Commission of South Africa Report*, vol. 4, October 29, 1998, <http://www.justice.gov.za/trc/report/finalreport/Volume%204.pdf> (accessed March 30, 2016), p. 58.

¹⁷ The report continued, “[T]he mining industry harnessed the services of the state to shape labour supply conditions to their advantage.” Ibid., p. 33.

¹⁸ Ibid.

¹⁹ Alan B. Durning, *Apartheid's Environmental Toll* (Washington, D.C.: Worldwatch Institute, 1990), p. 16.

²⁰ Ibid.

²¹ Ibid., p. 15.

²² Ibid., p. 17.

²³ Ibid., pp. 15-16.

²⁴ Ibid., p. 16.

reasons.²⁵ Domestic and global inflation combined with international sanctions against the apartheid state put significant financial pressure on mining companies.²⁶ The gold industry's changing economic situation was exacerbated by labor and anti-apartheid unrest, which had been inflamed by the 1973 Durban labor strikes and the 1976 Soweto student uprising and gained momentum in the 1980s.²⁷ Furthermore, as the easy-to-reach gold near the surface of the Witwatersrand reef became increasingly exhausted, companies had to dig deeper and deeper mine shafts to extract gold.²⁸ Gold production in the country recorded a high of almost 7,300 metric tons in 1980, but the annual total declined after that, reaching only about 640 tons in 2006.²⁹ Abandoned operations left behind environmental damage and attendant risks to humans.

Post-Apartheid South Africa and Its Human Rights Commitments

As the heyday of gold mining began to pass, South Africa experienced dramatic political upheaval that culminated in the end of apartheid in 1994. In the course of its transition to a more just society, the post-apartheid South African government publicly embraced human rights. In 1995, it established a Truth and Reconciliation Commission that was “conceived as part of the bridge-building process designed to help lead the nation away from a deeply divided past to a future founded on the recognition of human rights and democracy.”³⁰ A primary task of the commission was to “uncover as much as possible of the truth about past gross violations of human rights.”³¹ While its investigations focused on the actions of individuals, the commission also briefly examined the role of institutions, including the mining industry, in apartheid. This approach served to “paint the backdrop against which such human rights violations occurred.”³²

The Constitution adopted in 1996 exemplifies the integral role of human rights in South Africa's new legal system. The preamble states that the document is designed to “[h]eal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights.”³³ In addition to establishing the structure of the government, the Constitution contains a Bill of Rights, which it describes as “a cornerstone of democracy in South Africa.”³⁴ The Bill of Rights enumerates not only civil and political rights, but also economic, social, and cultural ones, and the Constitution is one of few that allows for judicial enforcement of the latter.³⁵

²⁵ By mid-1989, one-fifth of the country's gold mines were reporting losses. As global gold production began to grow in the 1980s, South Africa's share of world production declined from 54 percent in 1980 to just 26 percent by 1990. During the 1990s, the Witwatersrand gold mining sector contracted significantly both in number of mines and production rate. China ultimately overtook South Africa as the world's largest gold producer in 2007. Davenport, *Digging Deep*, pp. 347-49; Hart, *Gold*, p. 115.

²⁶ Davenport, *Digging Deep*, pp. 346-47.

²⁷ John S. Saul and Patrick Bond, *South Africa—The Present as History: From Mrs Ples to Mandela and Marikana* (Suffolk: Boydell & Brewer, 2014), pp. 66-67, 112-14, 129. See also Davenport, *Digging Deep*, p. 347.

²⁸ Davenport, *Digging Deep*, p. 345. In the 1970s, mining companies could afford digging deeper mine shafts as depth became necessary. By the 1980s, however, such operations likely became burdensome because of other financial pressures. *Ibid.*, pp. 345-47.

²⁹ Kevin Crowley, “WHO Tests Hair to Probe Uranium from Johannesburg Gold Mines,” *Bloomberg*, March 15, 2016, <http://www.bloomberg.com/news/articles/2016-03-15/who-gathers-hair-to-probe-uranium-from-johannesburg-gold-mines> (accessed May 11, 2016) (quoting figures from the Chamber of Mines).

³⁰ Truth and Reconciliation Commission, *Truth and Reconciliation Commission of South Africa Report*, vol. 1, October 29, 1998, <http://www.justice.gov.za/trc/report/finalreport/Volume%201.pdf> (accessed July 8, 2016), p. 48.

³¹ *Ibid.*, p. 49.

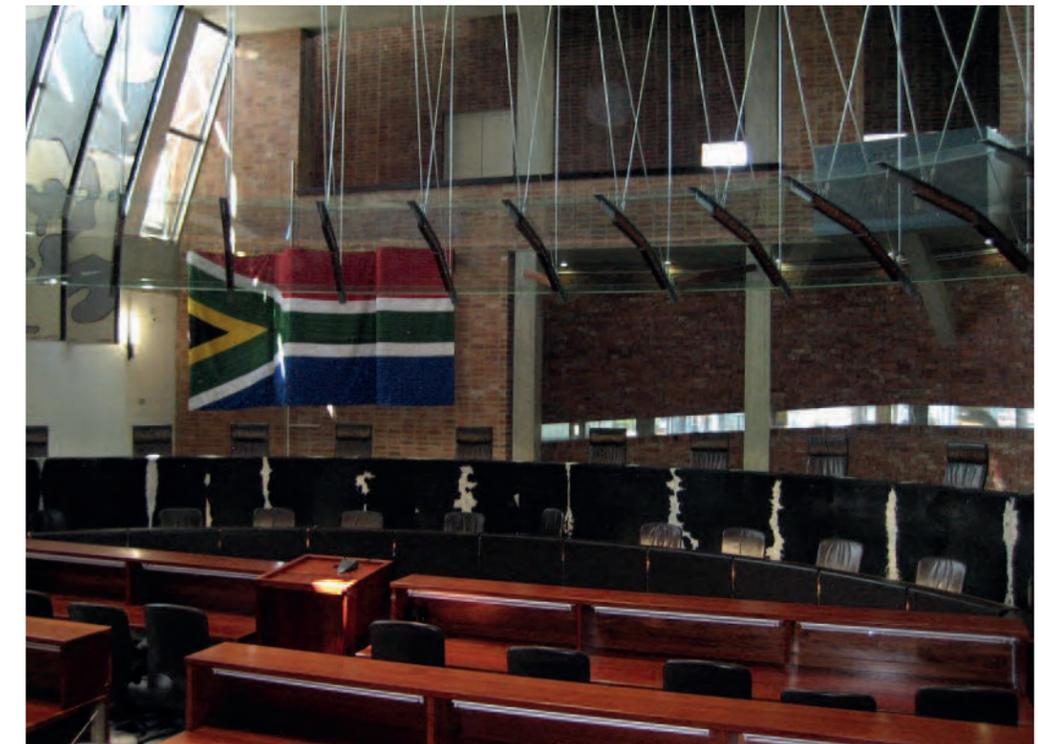
³² Truth and Reconciliation Commission, *Report*, vol. 4, p. 1.

³³ Constitution of the Republic of South Africa (South African Constitution), 1996, pmbi.

³⁴ *Ibid.*, § 7(1). The Bill of Rights “enshrines the rights of all people in our country and affirms the democratic values of human dignity, equality and freedom.” *Ibid.*

³⁵ *Ibid.*, §§ 7-35, 38.

Democratic South Africa further demonstrated its commitment to human rights with other national and international steps that were in keeping with these foundational measures. In 1995, it created the South African Human Rights Commission, a national institution that promotes and monitors observance of human rights in the country, including by conducting investigations, seeking redress for violations, and educating people about their rights.³⁶ The new government also signed or ratified six of the core human rights conventions, which will be discussed in the next chapter, before the year 2000.³⁷ The country's Constitution integrates these treaty obligations into domestic law, requiring courts to “consider international law” when interpreting the Bill of Rights.³⁸



The Constitutional Court's judgments interpreting the Bill of Rights and key international treaties exemplify the post-apartheid government's commitment to human rights. © 2010 Bonnie Docherty/IHRC.

³⁶ The South African Constitution states that:

1. The South African Human Rights Commission must
 - a) promote respect for human rights and a culture of human rights;
 - b) promote the protection, development and attainment of human rights; and
 - c) monitor and assess the observance of human rights in the Republic.

Ibid., § 184.

³⁷ During that period, South Africa ratified the International Covenant on Civil and Political Rights (ICCPR), the Convention on the Rights of the Child (CRC), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the International Convention on the Elimination of All Forms of Racial Discrimination (CERD), and the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (CAT). South Africa also signed the International Covenant on Economic, Social and Cultural Rights (ICESCR) in 1994 although it did not ratify the treaty until 2015. Office of the UN High Commissioner for Human Rights (OHCHR), “Status of Ratification,” <http://indicators.ohchr.org/> (accessed March 31, 2016).

³⁸ South African Constitution, § 39(1)(b).

Gold Mining in Modern South Africa

Despite the political transformation of the country, gold mining has continued to influence South Africa since the end of apartheid. In recent years, mining in the country has accounted for more than 10 percent of global gold production and approximately 20 percent of the country's gross domestic product (GDP).³⁹ A 2005 study estimated that several million people in the Witwatersrand still relied, directly or indirectly, on the industry for their livelihoods.⁴⁰

As this report documents, the benefits of gold mining have been accompanied by adverse effects. The industry has changed in scale and technology over the past 130 years and government regulation has increased, but mining has continued to damage the environment and endanger local populations. The remains of abandoned "legacy mines" as well as new operations, including the re-mining of old sites, have contaminated the region. Because the area has been densely populated, largely due to the industry, environmental impacts have posed risks to human health. Disadvantaged communities have borne the greatest burden: as a result of the history of discrimination and apartheid, they have often been located close to mine sites. A critical difference from the early days of mining, however, has been that South Africa has accepted explicit human rights obligations through national and international commitments. This body of law provides a basis for evaluating the long-standing problems of and recent responses to gold mining in the Witwatersrand region.

2. Human Rights Framework

South Africa has committed to a multi-layered framework of human rights law. At the national level, it has included a detailed Bill of Rights in its 1996 Constitution. It has accepted international obligations as a state party to key human rights treaties, notably the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the International Covenant on Civil and Political Rights (ICCPR). South Africa has agreed to additional responsibilities by ratifying the African Charter on Human and Peoples' Rights (Banjul Charter). It has also joined international and regional treaties dedicated to protecting the rights of specific groups, including women and children.⁴¹ Harmonizing multilateral treaties with domestic law, the country's Constitution requires courts to take international law into account when interpreting the Bill of Rights.⁴²

Many of the human rights that make up this legal corpus are applicable to the problems associated with mining. Environmental and health effects raise concerns under economic, social, and cultural rights, notably the rights to health, a healthy environment, water, and housing. Methods of engagement with the community implicate such civil and political rights as the rights to information and participation in decision making. The need for relief after infringement also implicates the right to a remedy. Human rights law establishes a corresponding obligation to realize these rights fully, and South African jurisprudence calls for the adoption of a coordinated and comprehensive program to achieve that goal.⁴³ The relevant rights and duties, introduced in this chapter, generally appear in multiple South African, international, and regional instruments.⁴⁴

Economic, Social, and Cultural Rights

Right to Health

The physical and psychological effects of mining pollution on humans trigger the right to health. The right can be divided into a "right to health care and a right to healthy conditions," the latter being particularly relevant for this report.⁴⁵ While focusing on access to health care services, the South African Constitution covers other components under the right to a healthy environment, discussed below.⁴⁶

International human rights law takes a broader view of the right to health, which is included in the ICESCR.⁴⁷ The Committee on Economic, Social and Cultural Rights (CESCR), the treaty body for this covenant, explains that the right to health is "not confined to the right to health

³⁹ "Mining in South Africa," *Africa Mining IQ*, undated, <http://www.projectsia.co.za/mining-in-south-africa.htm> (accessed March 30, 2016). See also Lawrence Williams, "South African Gold Mining's Fall from Grace," *Mineweb*, March 18, 2015, <http://www.mineweb.com/news/gold/south-african-gold-minings-fall-from-grace/> (accessed March 30, 2016) ("South Africa may have regained its position as the world's fifth largest gold producer in 2014 when all the figures have been tallied.")

⁴⁰ Wolf Uwe Reimold et al., "Economic Mineral Deposits in Impact Structures: A Review," in C. Koeberl and H. Henkel, eds., *Impact Tectonics* (Heidelberg: Springer, 2005), http://www.univie.ac.at/geochemistry/koeberl/publikation_list/265-Economics%20of%20craters-Impact%20Tectonics-2005.pdf (accessed March 30, 2016), p. 496.

⁴¹ For example, South Africa is party to the Convention on the Elimination of All Forms of Discrimination against Women, the Convention on the Rights of the Child, the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (Maputo Protocol), and the African Charter on the Rights and Welfare of the Child.

⁴² South African Constitution, § 39(1)(b).

⁴³ See *Government of the Republic of South Africa and Others v. Grootboom and Others* [2000] ZACC 19, 2001 (1) SA 46, 2000 (1) BCLR 1169 (CC).

⁴⁴ Unless otherwise indicated, South Africa is party to all of the treaties discussed in this chapter.

⁴⁵ Stuart Woolman and Michael Bishop, eds., *Constitutional Law of South Africa*, 2nd ed. (Cape Town: Juta & Company, Ltd., 2013), 56A-5.

⁴⁶ South African Constitution, § 27. See also Woolman and Bishop, *Constitutional Law of South Africa*, 56A-5 ("The Final Constitution [FC] divides these two elements of the right between FC s 27(1)(a) (the right to have access to health-care services) and FC s 24(a) (the right to a healthy environment.)" (internal citations omitted).

⁴⁷ International Covenant on Economic, Social and Cultural Rights (ICESCR), adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force January 3, 1976, ratified by South Africa on January 15, 2015, art. 12. (recognizing "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health").

care,” but “extends to the underlying determinants of health,” including food, housing, access to safe and potable water, and a healthy environment.⁴⁸ According to the CESCR, the right to health calls for “the prevention and reduction of the population’s exposure to harmful substances such as radiation and harmful chemicals or other detrimental environmental conditions that directly or indirectly impact upon human health.”⁴⁹ At the regional level, the Banjul Charter encompasses “the right to enjoy the best attainable state of physical and mental health.”⁵⁰ Other international and regional instruments make clear that rights in this area apply equally to specific groups, such as women and children.⁵¹

South Africa has corresponding duties to promote the right to health. According to the CESCR, states are obliged to “adopt measures against environmental ... health hazards,” including the formulation and implementation of “national policies aimed at reducing and eliminating pollution of ... water.”⁵² States may fail to meet their duties if they inadequately regulate the actions of third parties, including mining companies, that infringe on others’ right to health. “The failure to enact or enforce laws to prevent the pollution of water ... by extractive and manufacturing industries,” for example, may amount to a violation.⁵³

Right to a Healthy Environment

Mining implicates the right to a healthy environment because it usually contaminates the environment for the short and long term. According to the South African Constitution, this right consists of two elements: first, the right of everyone “to an environment that is not harmful to health or well-being,” and second, the right “to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures.”⁵⁴ Although the ICESCR does not reference the right to a healthy environment, its treaty body recognizes the importance of a healthy environment as an underlying determinant of the right to health.⁵⁵ The UN special rapporteur on human rights and the environment, appointed by the Human Rights Council, has also begun to explore the development and content of the emerging right to a healthy environment.⁵⁶ The Banjul Charter explicitly protects the right to a healthy environment, stating, “All peoples shall have the right to a general satisfactory environment favorable to their development.”⁵⁷ The Maputo Protocol on the Rights of Women in Africa reiterates the right to a healthy and sustainable

environment⁵⁸ and includes the right to “acceptable living conditions in a healthy environment” under the right to adequate housing.⁵⁹

Several non-binding international instruments share the South African Constitution’s concern about environmental harm and desire to protect future generations. For example, the Stockholm Declaration from the 1972 UN Conference on the Human Environment asserts that “[t]he discharge of toxic substances ... in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems.”⁶⁰ The declaration also says that natural resources “must be safeguarded for the benefit of present and future generations.”⁶¹ Taking a similarly forward-looking approach to environmental protection, a 1990 UN General Assembly resolution states that “men and women ... bear a solemn responsibility to protect and improve the environment for present and future generations.”⁶² The 1992 Rio Declaration on Environment and Development (Rio Declaration) calls for “equitably meet[ing] developmental and environmental needs of present and future generations.”⁶³

Like other rights enshrined in South African, international, and regional human rights law, the right to a healthy environment imposes duties on the state. The African Commission on Human and Peoples’ Rights has held, for example, that the state has an obligation under both the right to health and the right to a satisfactory environment to take “reasonable and other measures to prevent pollution and ecological degradation, to promote conservation, and to secure an ecologically sustainable development and use of natural resources.”⁶⁴

Right to Water

Mining’s frequent contamination of local water supplies raises concerns under the right to water, which covers both access and quality. Focusing on the former, the South African Constitution guarantees the right of everyone to have access to “sufficient” water.⁶⁵ The international right to water, as interpreted by the CESCR, encompasses elements of both

⁴⁸ UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14, The Right to the Highest Attainable Standard of Health (Art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 4.

⁴⁹ *Ibid.*, para. 15.

⁵⁰ African Charter on Human and Peoples’ Rights (Banjul Charter), adopted June 27, 1981, OAU Doc. CAB/LEG/67/3 rev. 5, 21 I.L.M. 58 (1982), entered into force July 9, 1986, ratified by South Africa on September 7, 1996, art. 16(1).

⁵¹ For example, the Convention on the Rights of the Child recognizes the right of every child to “the enjoyment of the highest attainable standard of health” and calls for states to “tak[e] into consideration the dangers and risks of environmental pollution.” Convention on the Rights of the Child (CRC), adopted November 20, 1989, G.A. Res. 44/25, annex, 44 U.N. GAOR Supp. (No. 49) at 167, U.N. Doc. A/44/49 (1989), entered into force September 2, 1990, ratified by South Africa on June 16, 1995, art. 24. See also African Charter on the Rights and Welfare of the Child, adopted July 11, 1990, OAU Doc. CAB/LEG/24.9/49 (1990), entered into force November 29, 1999, ratified by South Africa on January 7, 2000, art. 14; Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted December 18, 1979, G.A. res. 34/180, 34 U.N. GAOR Supp. (No. 46) at 193, U.N. Doc. A/34/46, entered into force September 3, 1981, ratified by South Africa on December 15, 1995, arts. 12(1), 14.

⁵² CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 36.

⁵³ *Ibid.*, para. 51.

⁵⁴ South African Constitution, § 24.

⁵⁵ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 15. See also ICESCR, art. 12(2)(b).

⁵⁶ See, e.g., UN Human Rights Council, Report of the Independent Expert on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment, John H. Knox, A/HRC/22/43, December 24, 2012, http://www.ohchr.org/Documents/HRBodies/HRCouncil/RegularSession/Session22/A-HRC-22-43_en.pdf (accessed June 23, 2016). This special rapporteur was originally appointed as an “independent expert.”

⁵⁷ Banjul Charter, art. 24.

⁵⁸ Protocol to the African Charter on Human and Peoples’ Rights on the Rights of Women in Africa (Maputo Protocol), adopted September 13, 2000, CAB/LEG/66.6, entered into force November 25, 2005, ratified by South Africa on December 17, 2014, art. 18.

⁵⁹ *Ibid.*, art. 16.

⁶⁰ Declaration of the UN Conference on the Human Environment (Stockholm Declaration), U.N. Doc. A/CONF.48/14/Rev. 1(1973), 11 I.L.M. 1416, June 16, 1972, <http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503> (accessed June 23, 2016), principle 6.

⁶¹ *Ibid.*, principle 2.

⁶² UN General Assembly, “Need to Ensure a Healthy Environment for the Well-Being of Individuals,” Resolution 45/94, U.N. GAOR, 45th Sess., Supp. No. 49A, at 178, U.N. Doc. A/45/40, December 14, 1990, <http://www.un.org/documents/ga/res/45/a45r094.htm> (accessed June 23, 2016), pmbl.

⁶³ UN Conference on Environment and Development, Rio Declaration on Environment and Development (Rio Declaration), U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I, August 12, 1992, principle 3.

⁶⁴ *Social and Economic Rights Action Centre and Another v. Nigeria*, African Commission on Human and Peoples’ Rights, No. 155/96, (2001), <http://www.cesr.org/downloads/AfricanCommissionDecision.pdf> (accessed July 9, 2016), para. 52. In this case, brought against the Nigerian government for its involvement with health and environmental harm caused by oil production in the country, the African Commission on Human and Peoples’ Rights addressed the right to health and the right to a healthy environment.

⁶⁵ South African Constitution, § 27(1)(b). The limited domestic jurisprudence interpreting the content of this right to date has approached the criteria of “sufficient” narrowly in the context of water quantity. *Mazibuko and Others v. City of Johannesburg and Others* (CCT 39/09) [2009] ZACC 28, 2010 (3) BCLR 239 (CC), 2010 (4) SA 1 (CC), October 8, 2009 (finding that the government’s provision of 25 liters of water per person per day was reasonable).

⁶⁶ UN Committee on Economic, Social and Cultural Rights, General Comment No. 15, The Right to Water (Arts. 11 and 12), U.N. Doc. E/C.12/2002/11 (2002), para. 12(b)-(c). Although a right to water is not explicitly expressed in the ICESCR, the CESCR contends the right is implied in several articles of the covenant, including those addressing the right to an adequate standard of living and the right to the highest attainable standard of health. *Ibid.*, para. 3. For discussion of the right to water and its relationship to the right to health, see UN Human Rights Council, Report of the Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health, Paul Hunt, A/62/214, August 8, 2007, paras. 73-89 (echoing many of the criteria of the CESCR). See also ICESCR, arts. 11(1), 12(1).

accessibility and quality in the context of domestic use, which includes not only drinking but also washing clothes and preparing food.⁶⁶ The CESCR explains that water must be “within safe physical reach for all sections of the population” and “within, or in the immediate vicinity, of each household, educational institution and workplace.”⁶⁷ To be of adequate quality, water must be safe, that is, free from “chemical substances and radiological hazards that pose a risk to human health” and “of an acceptable color, odour, and taste” for use.⁶⁸ International and regional treaties on women’s and children’s rights echo the need for adequate water.⁶⁹

With regard to associated duties, international law requires states to take necessary steps, such as adopting legislation, to prevent third parties, including mining companies, from polluting water resources.⁷⁰ A violation of this duty arises from the “failure to enact or enforce laws to prevent the contamination ... of water.”⁷¹ The CESCR provides examples of relevant strategies and programs to promote the right to water, one of which is “reducing and eliminating contamination of watersheds and water-related eco-systems by substances such as radiation [and] harmful chemicals.”⁷² South Africa’s obligations should be understood to extend beyond the prevention of new contamination to addressing the effects of past contamination.

Right to Housing

Health concerns associated with mining may make the right to housing relevant. The South African Constitution establishes a right to adequate housing, and the ICESCR recognizes the right to housing as part of a right to an adequate standard of living.⁷³ According to the CESCR, the location of housing in close proximity to contaminated soil, such as that left over from mining, can infringe on the right to housing. The committee found that “housing should not be built on polluted sites nor in immediate proximity to pollution sources that threaten the right to health of the inhabitants.”⁷⁴ It added that habitability means that adequate housing must protect inhabitants from threats to health and to their physical safety.⁷⁵ The African Commission on Human and Peoples’ Rights has found that the right to housing is implicitly guaranteed under the Banjul Charter’s right to property, right to health, and requirement that states protect the family unit.⁷⁶ Treaties addressing the rights of specific groups consider housing to be an important part of adequate living standards.⁷⁷

South Africa has recognized state duties associated with the right to adequate housing. In the *Grootboom* case, which is discussed in more detail below, the South African Constitutional Court interpreted the right to housing to include “a negative obligation placed upon the

⁶⁶ CESCR, General Comment No. 15, The Right to Water, para. 12(c)(i) (noting that “[h]ousehold includes a permanent or semi-permanent dwelling, or a temporary halting site”). The CESCR states that accessibility requires physical, economic, and information accessibility as well as non-discrimination. *Ibid.*, para. 12(c)(i)-(iv).

⁶⁷ *Ibid.*, para. 12(b). For examples of violations of the right to water, see UN Human Rights Council, Report of the Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, Catarina de Albuquerque, Common Violations of the Human Rights to Water and Sanitation, A/HRC/27/55, June 30, 2014.

⁶⁸ See CEDAW, art. 14(2)(h) (referring specifically to rural women); CRC, art. 24(2)(c); Maputo Protocol on the Rights of Women in Africa, art. 15.

⁶⁹ CESCR, General Comment No. 15, The Right to Water, para. 23.

⁷⁰ *Ibid.*, para. 44(b)(i).

⁷¹ *Ibid.*, para. 28.

⁷² South African Constitution, § 26(1)-(2); ICESCR, art. 11(1).

⁷³ UN Committee on Economic, Social and Cultural Rights, General Comment No. 4, The Right to Adequate Housing (Art. 11(1)), U.N. Doc. E/1992/23 (1991), para. 8(f).

⁷⁴ *Ibid.*, para. 8(d).

⁷⁵ *Social and Economic Rights Action Centre and Another v. Nigeria*, para. 60 (finding that Banjul Charter arts. 14, 16, and 18(1) establish an implicit right to housing).

⁷⁶ CEDAW, art. 14(2)(h); CRC, art. 27(3); Maputo Protocol on the Rights of Women in Africa, art. 16.

state and all other entities and persons to desist from preventing or impairing the right of access to adequate housing.”⁷⁸

Civil and Political Rights

Right to Information

Civil and political rights as well as the previously discussed economic, social, and cultural ones are applicable to an analysis of mining’s impact in South Africa. The South African Constitution provides for the freedom “to receive or impart information,”⁷⁹ and the right of access to information is necessary for the exercise of other rights.⁸⁰ The ICCPR explicitly guarantees the “freedom to seek, receive and impart information and ideas of all kinds,”⁸¹ while the ICESCR is understood to protect the right to information specifically in relation to the rights to health and water.⁸² The Banjul Charter and Convention on the Rights of the Child also address the right to information.⁸³ Under both South African and international law, the right encompasses information from the government and third parties, which could include mining companies.⁸⁴

To promote this right, states are obliged to make information available. According to the Human Rights Committee, the treaty body of the ICCPR, they should “proactively put in the public domain Government information of public interest,” and “make every effort to ensure easy, prompt, effective and practical access to such information.”⁸⁵ They should “enact the necessary procedures, whereby one may gain access to information, such as by means of freedom of information legislation.”⁸⁶ States must also ensure that people are informed about their rights under the ICCPR, which includes the right to participation in government, discussed below.⁸⁷

The right to information and the related duty to be transparent have been linked specifically to rights associated with environmental protection. The CESCR calls on states to ensure

⁷⁸ *Grootboom*, para. 34.

⁷⁹ South African Constitution, § 16(1)(b).

⁸⁰ *Ibid.*, § 32(1).

⁸¹ International Covenant on Civil and Political Rights (ICCPR), adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 52, U.N. Doc. A/6316 (1966), 999 U.N.T.S. 171, entered into force March 23, 1976, ratified by South Africa on December 10, 1998, art. 19(2).

⁸² CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 3; CESCR, General Comment No. 15, The Right to Water, para. 12.

⁸³ Banjul Charter, art. 9 (providing that everyone has the right to receive information); CRC, arts. 13(1), 24(2)(e) (using identical language as the ICCPR and also requiring that “all segments of society, in particular parents and children, are informed, have access to education and are supported in the use of basic knowledge of child health”). The African Commission has held that the Banjul Charter’s right to receive information is non-derogable, regardless of the subject of the information or the political situation in the country. Specifically, the public has a right to information, even if it contains something the government does not want the public to know. *African Commission on Human and Peoples’ Rights, Constitutional Rights Project, Civil Liberties Organisation and Media Rights Agenda v. Nigeria*, Nos. 140/94, 141/94, 145/95, November 5, 1999, para. 39. In a case decided the year before, however, it seems as though there may be an exception for national security or public order concerns, but this is of limited relevance to the situation of mining in South Africa. *African Commission on Human and Peoples’ Rights, Media Rights Agenda and Others v. Nigeria*, Nos. 105/93, 128/94, 130/94 and 152/96, October 31, 1998, para. 73.

⁸⁴ The South African Constitution provides a right to access information held by persons other than the government if necessary for the enjoyment of any other rights. South African Constitution, § 32(1)(b). According to the Human Rights Committee, the treaty body of the ICCPR, the covenant’s right encompasses access to information held by public bodies, which include all branches of state government and “other public or governmental authorities” at national, regional, or local level. Other entities may also be considered public bodies if they carry out public functions. According to the CESCR’s interpretation of the right to water, the right to information extends to that held by third parties. UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression (Article 19), U.N. Doc. C/PR/C/GC/34 (2011), paras. 7, 18; CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 48.

⁸⁵ UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression, para. 19.

⁸⁶ *Ibid.* South Africa passed the Promotion of Access to Information Act in 2000. Promotion of Access to Information Act, No. 2 of 2000, <http://www.justice.gov.za/legislation/acts/2000-002.pdf> (accessed July 8, 2016).

⁸⁷ UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression, para. 18.

transparency and dissemination of information in the protection and fulfillment of the rights to health⁸⁸ and water.⁸⁹ The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) provides further insight into the right to information in environmental contexts although South Africa is not party because the treaty is European. The Aarhus Convention requires a state to provide environmental information in its possession to requesting parties⁹⁰ and establishes an obligation to collect and disseminate information.⁹¹ Specifically, states have the duty, when there is an “imminent threat to human health or the environment, whether caused by human activities or due to natural causes,” to disseminate “all information which could enable the public to take measures to prevent or mitigate harm.”⁹²

Right to Participation

Given that addressing the problems of mining requires policy choices, the right to participation in public decision-making processes applies. The South African Constitution states that “the public must be encouraged to participate in policy-making.”⁹³ Local governments are “to encourage the involvement of communities and community organisations in the matters of local government,”⁹⁴ and each municipality has an obligation to “structure and manage its administration, and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community.”⁹⁵ The ICCPR and other treaties similarly establish the right to take part in public affairs.⁹⁶

An important way to ensure participation is for the government to engage meaningfully with the affected population. In its *Occupiers of 51 Olivia Road and Others v. Johannesburg and Others* judgment, the South African Constitutional Court described engagement as a “two-way process” and stated the government must make “reasonable efforts” to engage even if the affected people do not initially want to. The Court explained, “Engagement has the potential to contribute towards the resolution of disputes and to increased understanding and sympathetic care if both sides are willing to participate in the process.”⁹⁷ Although that case dealt with housing evictions not environmental harm, the Constitutional Court has found that meaningful engagement is important for the realization of many rights. In its *Schubart Park Residents’ Association and Others v. City of Tshwane Metropolitan Municipality* judgment, the Court stated, “Many provisions in the Constitution require the substantive involvement and engagement of people in decisions that may affect their lives. ... [T]he exercise of these often competing rights and interests can best be resolved by engagement between the

⁸⁸ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 55.

⁸⁹ CESCR, General Comment No. 15, The Right to Water, para. 49. See also UN Special Rapporteur Catarina de Albuquerque, *Realising the Human Rights to Water and Sanitation: Introduction*, 2014, http://www.ohchr.org/Documents/Issues/Water/Handbook/Book1_intro_.pdf (accessed July 8, 2016), pp. 29-38.

⁹⁰ UN Economic Commission for Europe, Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention), adopted June 25, 1998, 2161 U.N.T.S. 447, entered into force October 30, 2000, art. 4.

⁹¹ *Ibid.*, art. 5.

⁹² *Ibid.*, art. 5(1)(c).

⁹³ South African Constitution, § 195(1)(e).

⁹⁴ *Ibid.*, § 152(1)(d).

⁹⁵ *Ibid.*, § 153(a).

⁹⁶ ICCPR, art. 25(a). CEDAW asserts its concern for the political, economic, and social participation of women in their countries. It also asserts that states must ensure women have equal opportunity to “participate in the formulation of government policy and the implementation thereof.” CEDAW, arts. 3, 7(b). See also Banjul Charter, art. 13 (guaranteeing the right of every person to “participate freely in the government of his country, either directly or through freely chosen representatives in accordance with the provisions of the law”).

⁹⁷ *Occupiers of 51 Olivia Road, Berea Township and 197 Main Street Johannesburg v. City of Johannesburg and Others*, Case CCT 24/07 [2008] ZACC 1, paras. 14-15.

parties.”⁹⁸ The requirement to engage meaningfully should thus be applied in the context of mining.

The right to participation has been invoked in considerations of environmental and health issues. According to the CESCR, states parties to the ICESCR should adopt policies that promote participation in decision-making processes that affect the exercise of the rights to health and water.⁹⁹ The UN special rapporteur on the right to water laid out criteria states should meet to guarantee participation is meaningful, including allowing people to determine the terms of participation, ensuring that participation is accessible and safe, making relevant information available, and providing the opportunity to influence decision making.¹⁰⁰ The Maputo Protocol on the Rights of Women in Africa establishes a duty to provide for women’s participation specifically in the context of sustainable development and the right to a healthy and sustainable environment.¹⁰¹ The Rio Declaration recognizes that “[e]nvironmental issues are best handled with the participation of all concerned citizens” and that states should allow for access to information and involve communities in decision-making processes.¹⁰²

Right to a Remedy

Both South African and international law establish a right to a remedy that would pertain to situations in which mining operations led to human rights abuses. The South African Constitution states that a range of interested persons may seek “appropriate relief” for an infringement of or threat to any right in the Bill of Rights.¹⁰³ At the international level, the CESCR explains that individuals should have access to judicial and other remedies for violations of the rights to health or water.¹⁰⁴ Remedial measures can include “adequate reparation, which may take the form of restitution, compensation, satisfaction or guarantees of non-repetition.”¹⁰⁵

International standards on environmental protection also call for remedies. The Rio Declaration urges states to make available a remedy for environmental grievances.¹⁰⁶ The Aarhus Convention provides for access to justice for individuals who believe their right to environmental information has been violated.¹⁰⁷

⁹⁸ The Court named several areas in which it had recognized that engagement was important to promoting constitutional rights, including “political decision-making, access to information, just administrative action, freedom of expression, freedom of association and socio-economic rights.” *Schubart Park Residents’ Association and Others v. City of Tshwane Metropolitan Municipality*, Case CCT 23/12 [2012] ZACC 23, paras. 43-44 (internal citations omitted). Eric Christiansen wrote, “[S]ince the South African Constitution protects a variety of socio-economic rights (in addition to the right to housing that underlies *Olivia Road*), it seems somewhat likely that the Court will require such consultation (or some analogous process) when the state makes other decisions related to social welfare protections. ... Even if such a constitutional requirement does not spread to other categories of socio-economic rights, the occurrence of good faith community consultation in one substantive area of social welfare will influence popular expectations in other areas.” Eric C. Christiansen, “Transformative Constitutionalism in South Africa: Creative Uses of Constitutional Court Authority to Advance Substantive Justice,” *Journal of Gender, Race & Justice*, vol. 13 (2010), p. 611.

⁹⁹ CESCR, General Comment No. 15, The Right to Water, para. 48; CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 54.

¹⁰⁰ UN Human Rights Council, Report of the Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, paras. 18-31.

¹⁰¹ Maputo Protocol on the Rights of Women in Africa, arts. 18(2)(a), 19(b). For the more general expression of the right, see *ibid.*, art. 9.

¹⁰² Rio Declaration on Environment and Development, principle 10. The Aarhus Convention requires states to provide notice to the public about proposed decisions regarding the environment and to include the public in government decision-making on related issues. Aarhus Convention, art. 6(2)-(5).

¹⁰³ South African Constitution, § 38. See also *ibid.*, § 34 (providing that everyone has a right to resolve legal disputes before a court or “where appropriate, another independent and impartial tribunal or forum”).

¹⁰⁴ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 59; CESCR, General Comment No. 15, The Right to Water, para. 55.

¹⁰⁵ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 59; CESCR, General Comment No. 15, The Right to Water, para. 55.

¹⁰⁶ Rio Declaration on Environment and Development, principle 10.

¹⁰⁷ Aarhus Convention, art. 9(1).

A “Reasonable” Program to Realize Human Rights

Human rights law requires states to ensure implementation of each of the rights described above. The ICCPR mandates that states parties take immediate measures to “give effect” to civil and political rights.¹⁰⁸ The ICESCR, recognizing that greater resources may be needed in some cases, obliges states to “progressively realize” economic, social, and cultural rights.¹⁰⁹ Regardless of the right, adoption of an overarching government plan can facilitate achieving its realization.

The Constitutional Court of South Africa addressed this issue in *Grootboom*, its landmark decision on the right to housing.¹¹⁰ The Court found that the state should formulate and implement “a reasonable programme” that is coordinated and comprehensive in order to achieve progressive realization.¹¹¹ According to *Grootboom*, a reasonable program should be a joint and well-organized undertaking.¹¹² The program should be “determined by all three spheres of government in consultation with each other.”¹¹³ It should “clearly allocate responsibilities and tasks to the different spheres of government and ensure that the appropriate financial and human resources are available.”¹¹⁴ Legislative action should be “supported by appropriate, well-directed policies and programmes implemented by the executive.”¹¹⁵ Because conditions change over time, “continuous review” is necessary.¹¹⁶

A reasonable program, as envisioned by the *Grootboom* Court, must also be broad in time and scope. It “must be balanced and flexible and make appropriate provision for ... short, medium and long term needs.”¹¹⁷ A program “that excludes a significant segment of society cannot be said to be reasonable.”¹¹⁸ It must be sure to address “those whose needs are the most urgent and whose ability to enjoy all rights therefore is most in peril.”¹¹⁹ While developed for a specific case, the Court’s criteria provide useful guidelines for a program to realize all of the rights related to mining.¹²⁰

¹⁰⁸ ICCPR, art. 2(2).

¹⁰⁹ ICESCR, art. 2(1). While recognizing that limited resources may slow the process, the principle of progressive realization “imposes an obligation to move as expeditiously and effectively as possible towards that goal.” UN Committee on Economic, Social and Cultural Rights, General Comment No. 3, The Nature of States Parties’ Obligations (Art. 2(1)), December 14, 1990, para. 9.

¹¹⁰ The Court in *Grootboom* elaborates on how South Africa should implement the principle of progressive realization, but it states more generally that “there is no reason not to accept that it bears the same meaning in the Constitution as in the document [the ICESCR] from which was so clearly derived.” *Grootboom*, para. 45.

¹¹¹ *Ibid.*, paras. 39, 99. See also Sandra Liebenberg, *Socioeconomic Rights: Adjudication under a Transformative Constitution* (Cape Town: Juta & Company, Ltd., 2010), p. 152.

¹¹² The coordination prong of *Grootboom*’s reasonable program has parallels in the South African Constitution and international law. Article 41 of the Constitution requires different parts of the government to “co-operate with one another in mutual trust and good faith,” including by consulting each other on “matters of common interest” and coordinating actions and legislation. South African Constitution, § 41. While interpreted primarily as a tool for preserving a balance of power, not for promoting human rights, this constitutional provision highlights the value South Africa has placed on ensuring that government actions are coordinated. See also Stuart Woolman et al., “Co-operative Government,” in *Constitutional Law of South Africa*, 2nd ed. (Cape Town: Juta & Company, Ltd., 2013), pp. 14-17.

International bodies have encouraged countries to pursue coordinated efforts specifically to realize human rights, including those applicable to mining. In its general comment on the right to water, the CESCR declares that “steps should be taken to ensure there is sufficient coordination between the national ministries, regional and local authorities in order to reconcile water-related policies.” The CESCR notes that “good governance is essential to the effective implementation of all human rights, including the realization of the right to water.” CESCR, General Comment No. 15, The Right to Water, paras. 51, 49. The committee uses similar language in discussing a national plan to ensure the right to health. CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 55.

¹¹³ *Grootboom*, para. 40.

¹¹⁴ *Ibid.*, para. 39.

¹¹⁵ *Ibid.*, para. 42.

¹¹⁶ *Ibid.*, para. 43.

¹¹⁷ *Ibid.* See also Murray Wesson, “Grootboom and Beyond: Reassessing the Socio-Economic Jurisprudence of the South African Constitutional Court,” *South African Journal of Human Rights*, vol. 20 (2004), p. 284.

¹¹⁸ *Grootboom*, para. 43.

¹¹⁹ *Ibid.*, para. 44. Statistical success may be insufficient to meet the reasonableness test. *Ibid.*

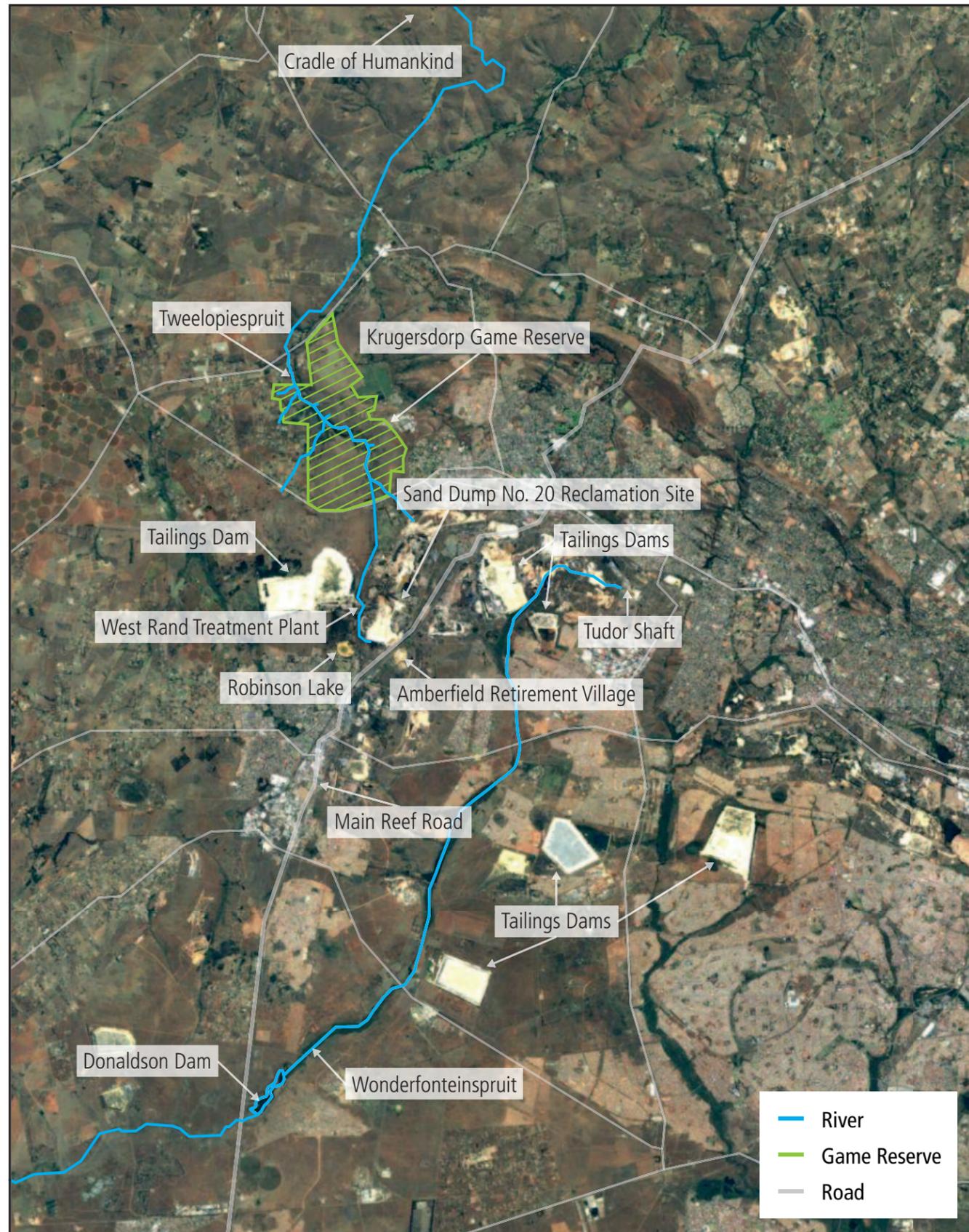
¹²⁰ The South African Constitution explicitly requires progressive realization of the rights to housing, health, and water. South African Constitution, §§ 26-27.

Conclusion

While the individual rights described in this chapter are distinct pieces of the human rights framework, they have common elements relevant to an analysis of South African mining. First, all have been applied to environmental issues: some seek to minimize the impact of contamination on human health and well-being, while others aim to empower those at risk by providing them with tools to act on their own behalf regarding environmental matters. Second, the rights address both past harm and the potential for future damage. Third, they are often tailored to meet the special needs of certain groups, notably women and children. Fourth, while corresponding duties focus on government actions, they also note the role of third parties, such as the mining industry, and require the government to ensure non-state actors respect human rights. Finally, these obligations frequently entail adoption of policies and other measures, including legislation, to realize specific human rights. A coordinated and comprehensive program of the kind described in the *Grootboom* decision could serve as a particularly valuable means to promote these rights while dealing with the adverse effects of mining documented in the rest of this report.

**PART II:
FINDINGS**

Key Landmarks in West Rand



See maps on pp. 36, 62, 64, and 92 for more detailed views.

5 km

3. Acid Mine Drainage

South Africa is a water-scarce land. It ranked among the top 40 driest countries in terms of rainfall in 2014,¹²¹ and Johannesburg is the world's largest city not built on a navigable body of water.¹²² Given South Africa's limited water supply, the problem of acid mine drainage, a toxic and often radioactive byproduct of gold mining, is especially concerning. AMD forms when water and oxygen combine with sulfide minerals, exposed in open mines and tailings dams, to produce highly acidic water.¹²³ Over the past 14 years, AMD from flooded mines as well as runoff and seepage from waste dumps has contaminated lakes and rivers in parts of the Witwatersrand. The polluted water decanted (i.e., reached the surface) for several years in the West Rand, beginning in 2002, and it has threatened to do the same in the Central Rand.

Residents of the region have been exposed to AMD through ingesting contaminated food, doing laundry, and swimming. Community members told IHRC they associated common skin irritations, such as rashes, dryness, and cracking, with the contaminated water. According to scientific studies conducted elsewhere, the elevated concentrations of heavy metals present in AMD can cause such problems as well as more serious ones, including damage to the kidneys and the nervous system, and an increased risk of cancer.¹²⁴ The environmental impacts and potential health effects created by AMD have raised serious concerns under the human rights to health, a healthy environment, and water.

While South Africa has made progress in addressing the situation, it has not fully met its obligations associated with these rights. Its initial slow response to the AMD crisis endangered community members, and the government should now take action to remediate any harm caused by its delay. Over the past five years, two new government treatment plants have largely stemmed the flow of decant; however, as officials have acknowledged, technical limitations have prevented the existing facilities from treating the water sufficiently for discharge into the natural environment.¹²⁵ In 2016, the government initiated a project to improve the treatment process, but it is not scheduled to be fully operational for at least four years.¹²⁶ South Africa should develop, adopt, and implement a more complete solution that increases plant capacity, enhances the safety of the treated water, and addresses other sources of AMD. Only then can the country meet its long-term duty to ensure full realization of the relevant human rights.

¹²¹ World Bank, "World Development Indicators: Agricultural Inputs," April 11, 2016, <http://wdi.worldbank.org/table/3.2> (accessed March 1, 2016) (recording 495 millimeters of precipitation in 2014).

¹²² Michael Ray, "City of Gold: Johannesburg," *Encyclopedia Britannica Blog*, September 20, 2011, <http://blogs.britannica.com/2011/09/place-gold-johannesburg-phot-day/> (accessed May 1, 2016); Marthinus Smuts Basson, "Water Security Issues in South Africa and Chile," Organisation for Economic Co-operation and Development (OECD) Environment Policy Committee, ENV/EPOC/WPBWE/RD(2011)6, October 24, 2011, <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPBWE/RD%282011%296&docLanguage=En> (accessed May 1, 2016), p. 4 (noting Mexico City is the other largest such city but was originally built on a lake that dried up).

¹²³ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, December 2010, <https://www.dwa.gov.za/Documents/ACIDReport.pdf> (accessed March 1, 2016), p. 20. See also Terrence S. McCarthy, "The Impact of Acid Mine Drainage in South Africa," *South African Journal of Science*, vol. 107 (2011), <http://www.sajs.co.za/sites/default/files/publications/pdf/712-5387-3-PB.pdf> (accessed March 1, 2016).

¹²⁴ The need for additional epidemiological studies of the West and Central Rand will be discussed in more depth in Chapter 5 on Information and Participation.

¹²⁵ Interview with Bashan Govender, Assistant Director, Department of Water and Sanitation, Pretoria, October 30, 2014; Sue Blaine, "Desalination Added to Mine Water Treatment," *Business Day Live*, March 9, 2009, <http://www.bdlive.co.za/articles/2012/03/09/desalination-added-to-mine-water-treatment;jsessionid=6ECC46D9B453AD613C545F790914741A.present1.bdfm> (accessed March 1, 2016).

¹²⁶ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

Creation and Spread of AMD

Acid mine drainage is created when water and oxygen mix with iron pyrite and other sulfides found at elevated levels.¹²⁷ The oxidization produces highly acidic water, which dissolves heavy metals exposed by mining.¹²⁸ AMD is most known for its chemical toxicity, but it can also contain radioactive contaminants, including uranium. Untreated AMD cannot be safely consumed by humans or animals or used for irrigation or other agricultural purposes, and it is unsuitable for anything other than some industrial uses.¹²⁹



Heavy metals from AMD have solidified among the grasses at the edge of a stream. Elevated concentrations of these metals have been widespread in the West and Central Rand. © 2010 Bonnie Docherty/IHRC.

AMD comes from two main sources. First, abandoned mine voids fill with groundwater or rainwater that reacts with unmined, underground ore to form AMD and may eventually decant at the surface. When mines are active, companies continuously pump out water in order to preserve access to the gold reserves, and this pumping helps prevent the accumulation and decanting of contaminated water.¹³⁰ Second, mine waste, known as tailings, can produce AMD when it comes in contact with water. Rain and surface water runoff from tailings dumps

and stockpiles of ore can generate AMD, as can seepage from poorly lined waste storage facilities.¹³¹ The chemical reactions that produce AMD occur naturally, but mining, such as the deep mining in South Africa, exacerbates the process by uncovering new ore and increasing the quantity of exposed sulfides.¹³²

As companies in the Witwatersrand region began to cease operations, the pumping of groundwater from mine voids was reduced and mines began to flood.¹³³ While neighboring mines could initially deal with the excess water by increasing their own pumping capacities, eventually there were no active underground mining operations to stem the flow.¹³⁴ As a result, AMD decanted in the West Rand in August 2002 and continued to do so in the years that followed.¹³⁵ By 2011, toxic water was decanting in the West Rand at a rate of about 15 to 20 million liters a day—or approximately 100 two-liter bottles per second.¹³⁶ The decanting water flowed into the region's waterways, especially the Tweelopiespruit, which has been used by communities for irrigation, watering livestock, and washing clothes.¹³⁷ Only the establishment of a government treatment plant in 2012 stopped the decant in the West Rand, although heavy rains overwhelmed the West Rand system periodically from 2014 to 2016.¹³⁸ A second government plant that came online in 2014 preempted decant in the Central Rand.¹³⁹

AMD from other sources has adversely affected the Wonderfonteinspruit, part of which passes through the Witwatersrand.¹⁴⁰ Rainwater running down tailings dams, seepage from poorly managed tailings dams, and tainted water used in mining operations have all flowed into the Wonderfonteinspruit, which has its headwaters in the West Rand.¹⁴¹ The contamination has

¹²⁷ Oelofse et al., "The Pollution and Destruction Threat of Gold Mining Waste on the Witwatersrand: A West Rand Case Study," pp. 617-18. See also Pat Manders et al., "Acid Mine Drainage in South Africa," Council for Scientific and Industrial Research Briefing Note 2000/09, August 2009, http://www.csir.co.za/nre/docs/BriefingNote2009_2_AMD_draft.pdf (accessed April 6, 2016), p. 1.

¹²⁸ It is believed by some that AMD existed in this region millions of years ago, but it went away until large-scale mining operations brought it back. Interview with Henk Coetzee, Specialist Scientist, Council for Geoscience, Pretoria, January 11, 2012; Oelofse et al., "The Pollution and Destruction Threat of Gold Mining Waste on the Witwatersrand: A West Rand Case Study."

¹²⁹ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. 19 (noting that as of 2010, there were no underground mines in operation in the West Rand). South Deep Gold Mine, which is expected not to close until 2087, has been operating nearby in the Far West Rand. Gold Fields, "South Deep," https://www.goldfields.com/gl_sa_south.php (accessed May 1, 2016).

¹³⁰ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. 19.

¹³¹ Sara E. Pratt, "All That Glitters ... Acid Mine Drainage: The Toxic Legacy of Gold Mining in South Africa," *Earth Magazine*, September 23, 2011, <http://www.earthmagazine.org/article/all-glitters-acid-mine-drainage-toxic-legacy-gold-mining-south-africa?page=1> (accessed March 12, 2016).

¹³² Mining companies built plants that began to address the problem but did not solve it. At that time, for example, a treatment plant operated by Rand Uranium could only treat 12 million liters per day, and at peak times water decanted at 60 million liters per day. Ibid.

¹³³ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

¹³⁴ After heavy rains in 2014, at least 3 million liters of untreated AMD per day were decanting. Ernest Wolmarans, "Joburg under Threat from Acid Mine Drainage," *The Citizen*, March 29, 2014, <http://citizen.co.za/151375/acid-attack/> (accessed March 10, 2016); Glen Tancott, "Excess AMD in West Rand a Big Problem," *Infrastructure News*, April 3, 2014, <http://www.infrastructurenews.com/2014/04/03/excess-amd-in-west-rand-a-big-problem/> (accessed April 6, 2016). See also email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016 (confirming overflow in 2014 and 2015); email from Mariette Liefferink, CEO, Federation for a Sustainable Environment, to IHRC, June 13, 2016 (reporting witnessing overflow in 2016).

¹³⁵ Dineo Faku, "Fall in Water Table Opens Access for Central Rand Gold," *Independent Online*, June 27, 2014, <http://www.iol.co.za/business/news/fall-in-water-table-opens-access-for-central-rand-gold-1.1710327#VLdycyF98E> (accessed April 6, 2016) (announcing success of treatment plant in Central Rand).

¹³⁶ The Wonderfonteinspruit stream bed originates "just south of the sub-continental divide, near Krugersdorp," and runs for approximately 90 kilometers before it connects with the upper Mooi River. Frank Winde, "Uranium Pollution of the Wonderfonteinspruit, 1997-2008 Part 1: Uranium Toxicity, Regional Background and Mining-Related Sources of Uranium Pollution," *Water SA*, vol. 36 (2010), p. 246.

¹³⁷ Henk Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfonteinspruit Catchment," Water Research Commission Report 1214/1/6, March 2006, <http://mwrg.co.za/Reports/WRC%201214%20Report.pdf> (accessed March 10, 2016), p. iv.

¹²⁷ Interview with Francois Durand, Department of Zoology, University of Johannesburg, Pretoria, October 31, 2014. See also McCarthy, "The Impact of Acid Mine Drainage in South Africa," *South African Journal of Science*, p. 1.

¹²⁸ S.H.H. Oelofse et al., "The Pollution and Destruction Threat of Gold Mining Waste on the Witwatersrand: A West Rand Case Study" (paper presented at the Symposium on Environmental Issues and Waste Management in Energy and Mineral Production, December 11-13, 2007), <http://www.infomine.com/publications/docs/oelofse2007b.pdf> (accessed March 1, 2016), p. 619. See also McCarthy, "The Impact of Acid Mine Drainage in South Africa," *South African Journal of Science*; Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. 2.

¹²⁹ Jackie Dugard, Jennifer MacLeod, and Anna Alcaro, "A Rights-Based Examination of Residents' Engagement with Acute Environmental Harm across Four Sites on South Africa's Witwatersrand Basin," *Social Research*, vol. 79 (2010), pp. 931, 937.

¹³⁰ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. 19.



Robinson Lake, once a popular fishing spot, can no longer sustain wildlife because it was used to store highly radioactive AMD that was decanting in the West Rand. © 2012 Bonnie Docherty/IHRC.

come from recent mining and re-mining activities and from historic operations that left behind tailings dams as well as polluted sediment on the river bed.¹⁴²

While the precise makeup of AMD varies, scientists have documented its presence in the Witwatersrand.¹⁴³ Samples taken from the Wonderfontein spruit have contained levels of arsenic, cadmium, cobalt, uranium, and zinc in excess of natural background concentrations and of regulatory concern.¹⁴⁴ The level of uranium, which is chemically toxic and radioactive,¹⁴⁵ has exemplified the contamination of the Witwatersrand. For example, a 2009 study of the Wonderfontein spruit catchment area found that the regional natural background level of uranium was 0.8 µg/l, while the average uranium level at the outflow of the Wonderfontein spruit catchment was 79 µg/l,¹⁴⁶ exceeding the South African legal uranium limit of 70 µg/l for drinking water.¹⁴⁷ In 2010, Donaldson Dam, through which the Wonderfontein spruit runs, was measured to have a uranium content of 62 µg/l (an increase of over 60 percent since 1997 and close to 41 percent since 2003),¹⁴⁸ more than double the drinking water standards of the

¹⁴² Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

¹⁴³ Interview with Henk Coetzee, Specialist Scientist, Council for Geoscience, Pretoria, January 11, 2012.

¹⁴⁴ Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Spruit Catchment," *Water Research Commission Report 1214/1/6*, p. vi.

¹⁴⁵ Interview with Henk Coetzee, Specialist Scientist, Council for Geoscience, Pretoria, January 11, 2012.

¹⁴⁶ Frank Winde, "Uranium Pollution of Water Resources in Mined-Out and Active Goldfields of South Africa: A Case Study in the Wonderfontein Spruit Catchment on Extent and Sources of U-Contamination and Associated Health Risks" (paper presented at the International Mine Water Conference, Pretoria, October 19-23, 2009), http://www.imwa.info/docs/imwa_2009/IMWA2009_Winde.pdf (accessed March 10, 2016), p. 774. The uranium levels in the Wonderfontein spruit's groundwater ranged from 10 µg/l to 478 µg/l. *Ibid.*, p. 778.

¹⁴⁷ *Ibid.*, p. 778.

¹⁴⁸ Frank Winde, "Uranium Pollution of the Wonderfontein spruit, 1997-2008 Part 2: Uranium in Water—Concentrations, Loads and Associated Risks," *Water SA*, vol. 36 (2010), p. 265.

World Health Organization and the US Environmental Protection Agency.¹⁴⁹ From 2004 to 2005, Robinson Lake, at the headwaters of the Tweelopiespruit, had an average uranium concentration of 1,219 µg/l (with a detected maximum of 3,100 µg/l).¹⁵⁰ The lake has since largely dried up.¹⁵¹

IHRC observed evidence of AMD in several locations on its three research trips to the West and Central Rand. For example, a culvert emptying into the Tweelopiespruit in the West Rand was marked with a radiation warning sign, and pools in the Central Rand were lined with reddish deposits, characteristic of AMD.¹⁵² IHRC saw heavy metal buildups, precipitated iron hydroxides known as "yellow boy," in or near pipes that were used to carry mine waste. The deposits often accumulated in older steel pipes within six months, and although these radioactive pipes should have been removed to licensed disposal sites,¹⁵³ IHRC observed some on the side of the road near Robinson Lake. Spills were also a common sight as these pipes corroded, especially at their joints.¹⁵⁴ On its 2014 trip, IHRC noted that companies had begun to replace the steel pipes with plastic ones that were less susceptible to blockage

and corrosion and thus could reduce leaks. Mariette Liefferink, head of the Federation for a Sustainable Environment (FSE), a local nongovernmental organization (NGO), however, criticized the slow pace of the conversion, which has generally happened only as old pipe sections corroded.¹⁵⁵ Furthermore, IHRC found evidence of recent spills in the West Rand, including into wetlands, even from plastic pipes.



Layers of orange AMD residue have frequently accumulated inside steel pipes. These radioactive materials should be, but have not always been, deposited in a licensed storage facility. © 2012 Bonnie Docherty/IHRC.

¹⁴⁹ World Health Organization, *Guidelines for Drinking-Water Quality* (Geneva: World Health Organization, 2011), http://apps.who.int/iris/bitstream/10665/44584/1/9789241548151_eng.pdf (accessed March 16, 2016), p. 431; US Environmental Protection Agency, "Table of Regulated Drinking Water Contaminants," May 2009, <https://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants> (accessed March 16, 2016).

¹⁵⁰ Winde, "Uranium Pollution of the Wonderfontein spruit, 1997-2008 Part 2," *Water SA*, p. 266.

¹⁵¹ Robinson Lake, which IHRC visited on each of its three field missions, is located in the West Rand near the Robin Park and Block A communities. Decanting AMD began being pumped into the lake in 2002. See Loni Prinsloo, "'Toxic' Lake Gets a Green Makeover," *Mining Weekly*, April 11, 2008, <http://www.miningweekly.com/article/Isquotoxicrsquo-lake-gets-a-green-makeover-2008-04-11> (accessed March 12, 2016).

¹⁵² Some forms of AMD can be recognized by yellow, orange, or red deposits in streambeds. Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*. Such coloration is common near the source of AMD due to "an abundance of suspended iron hydroxides particles." The color decreases as AMD flows downstream and contaminations precipitate. "As a result, acid waters can also be exceptionally clear and may give the wrong impression of being of good quality." Bernd Lottermoser, *Mine Wastes: Characterization, Treatment and Environmental Impacts* (Berlin: Springer, 2007), p. 122.

¹⁵³ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

¹⁵⁴ See, e.g., presentation and tour by Mariette Liefferink, CEO, Federation for a Sustainable Environment, West Rand, January 6, 2012.

¹⁵⁵ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016; phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, April 21, 2015.

Bekkersdal and Donaldson Dam



Exposure to AMD

People in the West Rand have been exposed to water contaminated by elevated concentrations of heavy metals in the form of AMD. Most of those affected have lived in informal settlements, densely populated and impoverished communities of shacks without running water or electricity. The settlements have often been situated near mining sites because the land has been unusable for other purposes. Exposure to AMD in the Central Rand has been less frequent because there are no major bodies of water and, as of June 2016, decanting had not occurred. Nonetheless, many residents have likely come into contact with AMD in runoff or seepage from the omnipresent tailings dams.

Water scarcity has led some community members to rely on water contaminated by AMD for their needs. A 2011 study found that 26.3 percent of surveyed residents of informal settlements in the Wonderfonteinpruit catchment did not have access to clean tap water for drinking, cooking, bathing, or laundry, while another 1.7 percent of them had an inadequate supply and as a result would use tap water only for drinking and cooking.¹⁵⁶ A 2015 study of Bekkersdal, a West Rand community, found that 10.14 percent of households used the adjacent Donaldson Dam when municipal water was unavailable or needed to be supplemented.¹⁵⁷ Residents of the Bekkersdal informal settlement told IHRC that “the [tap] water gets cut often,”¹⁵⁸ and that “when the water gets cut, people go and take water from Donaldson Dam.”¹⁵⁹ For people in such settlements, the main pathways of exposure to AMD have included ingesting contaminated foods, doing laundry in local bodies of water, and playing in polluted rivers.¹⁶⁰

Ingestion

Ingestion has most commonly involved consuming local vegetables, meat, and fish that have been contaminated by AMD.¹⁶¹ Toxins can accumulate in the tissues of these food sources,

¹⁵⁶ See Tafadza Marara et al., “Access to Potable Drinking Water in the Wonderfonteinpruit Catchment,” *Journal of Social Sciences*, vol. 29 (2011), p. 75.

¹⁵⁷ S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfonteinpruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal” (dissertation submitted to North-West University, April 2015), p. 84. The study found that the water used by this community “exceeded the guideline values of national and international standards for the following uses: drinking water, certain industrial activities, watering of certain livestock and crop types as well as aquaculture.” *Ibid.*, p. iii.

¹⁵⁸ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁵⁹ Interview with Percy Makunga, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁶⁰ In 2012 and 2010, IHRC also found evidence of exposure to contaminated water from ceremonial rituals, particularly baptisms. Researchers observed candle stubs and candle wax at a place where water entered Donaldson Dam through a pipe. Donaldson Dam caretaker Lawrence van der Walt and a minister leading a group of parishioners through the dam’s gates confirmed that baptisms were performed there. Residents of Khutsong said members of a local church had been baptized in the Wonderfonteinpruit. The practice reportedly continued in 2016. Interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, January 12, 2012; interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, March 17, 2010; interview with church leader (name withheld), Donaldson Dam, March 20, 2010; interview with Khutsong resident #5 (name withheld), Khutsong, March 19, 2010; interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statements of residents #2 and #4). For more recent reports of such practices, see email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016; S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfonteinpruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal,” p. 84.

¹⁶¹ Drinking of contaminated water seems to have declined because of increased awareness of the risks, but the government should take care to prevent it in the future. IHRC did not itself document use of AMD for drinking water on any of its field visits. Nevertheless, when asked whether people drank the water in 2014, Lucas Moloto, a resident of Bekkersdal, responded, “I suspect they still do because the situation of the tap water is still the same and the population has increased.” The 2015 study of Bekkersdal also reported that many people who used Donaldson Dam water did so for drinking. Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014; S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfonteinpruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal,” p. 84. See also Marara et al., “Access to Potable Drinking Water in the Wonderfonteinpruit Catchment,” *Journal of Social Sciences*, p. 73; interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statement of resident #2).

exposing individuals who eat them to elevated levels of uranium and other heavy metals.¹⁶²

IHRC documented the use of polluted water to sustain both crops and livestock.¹⁶³ This practice can result in contaminants entering the bodies of people who consume them.¹⁶⁴ In 2014, a community organizer from the West Rand town of Sinqobile told IHRC that residents grew gardens next to a river and adjacent marsh contaminated with AMD.¹⁶⁵ In earlier interviews, residents of Khutsong and Bekkersdal, also in the West Rand, reported irrigating gardens and crops with water from the Wonderfontein-spruit and Donaldson Dam, respectively.¹⁶⁶ Khutsong residents said that they believed community members' use of the Wonderfontein-spruit to water crops had damaged the quantity and quality of their harvest.¹⁶⁷ Lucas Moloto, resident of the Bekkersdal formal settlement and FSE community engagement facilitator, reported that some residents still gardened with Donaldson Dam water in 2016, although the practice had decreased with the installation of better potable water taps.¹⁶⁸



Cattle drink contaminated water from the channel between Donaldson Dam and the Wonderfontein-spruit. Residents who ingest their meat or milk have been indirectly exposed to toxic and radioactive AMD.
© 2010 Bonnie Docherty/IHRC.

¹⁶² Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein-spruit Catchment," *Water Research Commission Report 1214/1/6*, p. 143.

¹⁶³ See also S. Liefferink, "Determining Attainable Ecological Quality Requirements for the Upper Wonderfontein-spruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal," p. 84.

¹⁶⁴ Winde, "Uranium Pollution of Water Resources in Mined-Out and Active Goldfields of South Africa," p. 778; Fleur Scheele, *Uranium from Africa: Mitigation of Uranium Mining Impacts on Society and Environment by Industry and Governments* (Amsterdam: WISE and SOMO, 2011), p. 71.

¹⁶⁵ Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #2).

¹⁶⁶ Interview with Khutsong residents #2 and #4 (names withheld), Khutsong Extension 3, January 11, 2012; interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010; interview with Bekkersdal residents #6, #7, and #8 (names withheld), Bekkersdal, March 20, 2010 (statement of resident #7). Many Bekkersdal residents indicated in 2010 that they irrigated their gardens with water brought from Donaldson Dam, although residents that IHRC spoke to on a later visit said that they watered their gardens from the tap. The difference between IHRC findings in 2010 and 2012 could have reflected where the people lived within the settlement as well as a change in behavior.

¹⁶⁷ Interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statements of residents #2 and #4).

¹⁶⁸ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016.

Herders have brought a variety of animals to area waterways to drink.¹⁶⁹ Moloto said in 2016 that local people had frequently taken their herds to Donaldson Dam.¹⁷⁰ During its visits to the West Rand, IHRC observed cattle and goats drinking from Donaldson Dam or in the overflow channel that links the dam to the Wonderfontein-spruit. Herders told IHRC that they brought cattle, which were used for milk and meat, to drink from the dam three times a day.¹⁷¹ Although community members reportedly do not consume a large quantity of local meat, several interviewees said that the practice was also common among nearby commercial ranchers.¹⁷² Residents of Khutsong offered similar accounts of herds drinking from the Wonderfontein-spruit.¹⁷³ Such watering of livestock may have exacerbated the threat of exposure to contaminants because animals often stir up heavy metals that have settled at the bottom of water bodies affected by AMD.¹⁷⁴

Local people have fished in different sections of the Wonderfontein-spruit for many years.¹⁷⁵ For example, Donaldson Dam has been a popular West Rand fishing spot for residents of the Bekkersdal informal settlement.¹⁷⁶ The dam has a recreational side, which requires payment for entry at a gate. While a fence of concrete-covered steel rebar has surrounded the rest of the dam, local people have removed much of it to sell as scrap metal. The gaps in the fence have created easy access to the dam from the settlement.¹⁷⁷ In 2016, Lucas Moloto told IHRC that "residents find it hard to fish in Donaldson Dam because there is relatively constant security surveillance."¹⁷⁸ Surveillance has been a recent development, however, and fishing used to be more common. The 2015 study mentioned above found that 4.5 percent of Bekkersdal residents fished in Donaldson Dam and others purchased the fishermen's catch.¹⁷⁹ In 2014, Moloto said that fishing was particularly important for migrant mine workers, including those from Mozambique, for whom fish is a traditional food.¹⁸⁰ In 2012, a resident told IHRC he sold fish from Donaldson Dam for consumption,¹⁸¹ and a woman from the community said she had eaten fish caught in the dam.¹⁸²

¹⁶⁹ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016; interview with Bekkersdal resident #5 (name withheld), Bekkersdal, January 7, 2012.

¹⁷⁰ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016.

¹⁷¹ Interview with Bekkersdal residents #13 and #14 (names withheld), Donaldson Dam, March 18, 2010.

¹⁷² Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016; interview with Bekkersdal residents #13 and #14 (names withheld), Donaldson Dam, March 18, 2010.

¹⁷³ Interview with Khutsong residents #2 and #4 (names withheld), Khutsong Extension 3, January 11, 2012; interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statement of resident #2).

¹⁷⁴ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

¹⁷⁵ Peter Wade and Henk Coetzee, "Risk Assessment of Uranium in Selected Mining Areas in South Africa," in Broder Merkel and Andrea Hasche-Berger, eds., *Uranium, Mining and Hydrogeology* (Berlin: Springer-Verlag, 2008), pp. 141-42. A Khutsong resident told IHRC that he regularly fished in the Wonderfontein-spruit, some people fished there for a living, and local residents often ate the fish. Interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statement of resident #2); interview with Khutsong residents #2 and #4 (names withheld), Khutsong Extension 3, January 11, 2012.

¹⁷⁶ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016. Donaldson Dam superintendent Lawrence van der Walt told IHRC in 2012 and 2010 that residents of Bekkersdal often fished in the Donaldson Dam, and in 2010, IHRC observed fishermen casting nets from the Bekkersdal side of the lake. Interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, January 12, 2012; interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, March 17, 2010. See also National Nuclear Regulator, "Surveillance Report of the Upper Wonderfontein-spruit Catchment Area," TR-NNR-10-001, 2010, p. 19.

¹⁷⁷ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016.

¹⁷⁸ Ibid.

¹⁷⁹ S. Liefferink, "Determining Attainable Ecological Quality Requirements for the Upper Wonderfontein-spruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal," p. 85.

¹⁸⁰ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

¹⁸¹ Interview with Bekkersdal resident #3 (name withheld), Bekkersdal, January 7, 2012.

¹⁸² Interview with Bekkersdal resident #2 (name withheld), Bekkersdal, January 7, 2012. Another interviewee said that many people eat the fish from Donaldson Dam. Interview with Bekkersdal resident #4 (name withheld), Bekkersdal, January 7, 2012.

Evidence suggests the fish caught in Donaldson Dam have been contaminated. People who fish on its recreational side have been required to release what they catch. According to Lawrence van der Walt, who served as the Donaldson Dam caretaker, the rule was in force because the fish were bottom-feeders that ingested mud in which heavy metals had settled.¹⁸³ A 2010 report by the National Nuclear Regulator (NNR) demonstrated awareness of health risks, but stated that fishing in Donaldson Dam did not present an exposure problem because the “public are not permitted to eat the fish.”¹⁸⁴ The NNR report failed to acknowledge the illegal catching and consumption of fish. Even though enforcement has recently improved, the prohibition on eating fish, still in effect as of June 2016,¹⁸⁵ has thus had limited impact in practice.

Laundering

Many community members in the West Rand have had regular contact with contaminated water while doing their laundry. In June 2016, Lucas Moloto wrote IHRC that some residents of Bekkersdal’s informal settlement “wash their clothes in the very immediate downstream of [Donaldson] Dam.”¹⁸⁶ The 2015 study of Bekkersdal similarly found that washing clothes was one of the most frequent uses of Donaldson Dam water.¹⁸⁷ These reports demonstrate that a practice IHRC documented on multiple field investigations has continued. In 2014, local interviewees told IHRC that laundering clothes in the channel downstream of Donaldson Dam was especially common among those who lived far from a tap.¹⁸⁸ In January 2012 and March 2010, IHRC itself observed residents of the Bekkersdal informal settlement washing clothing and blankets in the channel, through which flowed uranium-laden water.¹⁸⁹

For residents of the Bekkersdal informal settlement, use of the channel for laundry seems to have depended on the flow of tap water and the physical accessibility of the taps. In 2014, Sanny Mogoje said, “People wash their clothes in the dam more often when the water gets cut,” a common occurrence.¹⁹⁰ While some residents who lived closer to taps relied on them for washing water,¹⁹¹ others said the taps were too far from their homes. For example, a Bekkersdal resident said in 2012 that she used the water in the Donaldson Dam channel to

¹⁸³ Interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, March 17, 2010.

¹⁸⁴ National Nuclear Regulator, “Surveillance Report of the Upper Wonderfontein Catchment Area.”

¹⁸⁵ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016 (sending photos of signs describing the catch-and-release policy at Donaldson Dam).

¹⁸⁶ Ibid.

¹⁸⁷ S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfontein Catchment, Based on Human Community Requirements: The Case of Bekkersdal,” p. 84.

¹⁸⁸ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014; interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁸⁹ IHRC researchers also spoke with several residents who were laundering their clothes in the overflow channel. See, e.g., interview with Bekkersdal resident #4 (name withheld), Bekkersdal, January 7, 2012; interview with Bekkersdal resident #2 (name withheld), Bekkersdal, January 7, 2012; interview with an onion grower (name withheld), Bekkersdal, January 16, 2012; interview with Bekkersdal resident #12 (name withheld), Donaldson Dam, March 17, 2010.

¹⁹⁰ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁹¹ For example, a Bekkersdal resident told IHRC that she would wash clothes in Donaldson Dam water if it were closer, but noted that she would not use it for fishing or drinking because it was “dirty” with mining minerals. Interview with Bekkersdal resident #11 (name withheld), Bekkersdal, January 7, 2012; interview with Bekkersdal residents #9, #10, and #11 (names withheld), Bekkersdal, March 16, 2010. Another informal settlement resident did not use the channel water but reported that others who lived closer to Donaldson Dam did. Interview with Bekkersdal resident #15 (name withheld), Bekkersdal, January 7, 2012. While the above interviewees were referring to routine washing, use of certain water sources for laundry may also be linked to cultural practices. IHRC observed a group of women drying their blankets next to the Donaldson Dam channel in 2012. When asked about their laundry habits, the women explained that while they do not regularly do laundry in the channel, they had just come from the funeral of one woman’s husband, and it was their custom to wash clothes in running water after the death of a household member. Group interview with Bekkersdal women, Bekkersdal, January 16, 2012.



A woman from Bekkersdal’s informal settlement wades through the Donaldson Dam channel while washing clothes in the uranium-laden water. © 2010 Bonnie Docherty/IHRC.

wash blankets, but she added that she would not drink the water because it was polluted with mining acid.¹⁹²

Residents of Khutsong also told IHRC that they used water from the contaminated Wonderfontein to do laundry.¹⁹³ A 2011 study that surveyed residents of Bekkersdal, Carletonville, Kagiso, and Khutsong found that 4 percent of respondents had used water from the contaminated Wonderfontein as their main source of water for domestic use and an additional 5 percent had used it exclusively for bathing or laundry.¹⁹⁴

¹⁹² Interview with Bekkersdal resident #4 (name withheld), Bekkersdal, January 7, 2012. Another resident told IHRC that she had used the Donaldson Dam channel to wash her clothes twice a week for almost 20 years. She explained that she “would use the water from the taps to wash, but it’s too far.” Interview with Bekkersdal resident #12 (name withheld), Donaldson Dam, March 17, 2010.

¹⁹³ Interview with Khutsong residents #2 and #4 (names withheld), Khutsong Extension, 3, January 11, 2012 (statements of both); interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statement of resident #1).

¹⁹⁴ Domestic use includes drinking, cooking, bathing, and laundry. See Marara et al., “Access to Potable Drinking Water in the Wonderfontein Catchment,” *Journal of Social Sciences*, p. 75.

Recreation

Many residents of the West Rand, especially children, have used polluted streams and rivers for recreational purposes.¹⁹⁵ Although education about AMD seems to have increased and deterred swimming in the contaminated water,¹⁹⁶ Lucas Moloto told IHRC in 2016 that “children of the informal settlement part of Bekkersdal do play and swim downstream of [Donaldson] Dam.”¹⁹⁷ In 2014, Sanny Mogoje gave a similar report, saying, “[I]f we went down [to the channel by Donaldson Dam] right now, we would see two children playing minimum.”¹⁹⁸ Mogoje recalled that his parents forbade him to play in the dam as a child: “They knew it was bad but they didn’t know exactly why it was bad.” He played there anyway.¹⁹⁹

On several occasions during visits to Bekkersdal informal settlement in January 2012 and March 2010, IHRC observed children playing in the water in the Donaldson Dam channel. IHRC saw children riding toy cars through the shallow water, creating a large spray, and sliding across the slippery water-covered concrete on their stomachs and feet. The splashing of contaminated water into their faces increased the children’s vulnerability to ingesting it. The government was aware of this problem at least as early as 2010. A report published that year by the NNR stated that the NNR “has been led to belie[ve] that swimming takes place” at the Donaldson Dam.²⁰⁰ The report noted that immersion during swimming was the most common way community members were exposed to radiation.²⁰¹



A boy splashes in the channel downstream of Donaldson Dam. Children playing there have been exposed to AMD through skin contact and ingestion from the water’s spray. © 2010 Bonnie Docherty/IHRC.

¹⁹⁵ See, e.g., Coetzee et al., “An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Catchment,” Water Research Commission Report 1214/1/6, p. 148 (listing swimming in rivers and dams as a possible exposure pathway).

¹⁹⁶ Interview with Percy Makunga, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁹⁷ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016. See also phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

¹⁹⁸ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

¹⁹⁹ Ibid.

²⁰⁰ National Nuclear Regulator, “Surveillance Report of the Upper Wonderfontein Catchment Area,” p. 18.

²⁰¹ Ibid.

Swimming in contaminated water has not been limited to Bekkersdal. IHRC documented swimming in three other communities during its field investigations. In 2014, for example, a community member from Sinqobile told IHRC that “the problem is young children. They will play in the water, use the water.”²⁰² On previous field visits, IHRC heard reports of swimming in the Wonderfontein spruit from residents of Khutsong and in a pond near Robinson Lake from residents of a community known as Block A.²⁰³

Health Impacts

Exposure to the contaminants in AMD—whether through ingestion, laundering, or recreation—can have immediate and long-term health effects. This report does not draw scientific conclusions about causality, and as discussed in Chapter 5, there is a need for further study of the consequences of exposure in the West and Central Rand. Nevertheless, anecdotal evidence of skin irritation and other afflictions among West Rand residents, as well as toxicological and epidemiological studies of the impact of these contaminants in other areas of the world show there is reason for concern.

Immediate Effects

Many West Rand residents have said they believe contact with contaminated water has adversely affected their health. In the 2015 study of Bekkersdal, 11.54 percent of surveyed residents attributed a range of ailments, including diarrhea and skin problems, to the water.²⁰⁴ About 15.50 percent of children used Donaldson Dam, and those who swallowed water while swimming were particularly vulnerable to these health impacts.²⁰⁵ Residents interviewed by IHRC ascribed skin irritation and rashes to local water pollution. For example, Sanny Mogoje of Bekkersdal reported that as a child he would get a “heat rash” from Donaldson Dam, which he had to hide from his parents because “they [would] know I had gone swimming.”²⁰⁶ In 2012, a woman explained that she knew a young girl who had developed “cracking in the face” from playing in the dam’s channel.²⁰⁷

Scientific studies on the effects of the contaminants often found in AMD are consistent with these findings. According to a 2006 report about the Wonderfontein spruit catchment, uranium applied to animals has caused skin irritation, severe dermal ulcers, and damaged hair follicles.²⁰⁸ A publication by the US Agency for Toxic Substances and Disease Registry (ATSDR) similarly reported that animals that had soluble uranium applied to their skin suffered from

²⁰² Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #1).

²⁰³ Interview with Khutsong residents #2 and #4 (names withheld), Khutsong Extension 3, January 11, 2012. One resident of Block A told IHRC in 2012 that children used to swim in contaminated water but no longer did so because their parents knew about the AMD and forbade it. Interview with Block A residents #2, #3, and #4 (names withheld), Block A, January 8, 2012.

²⁰⁴ S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfontein spruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal,” p. 84 (of those residents, 45.45 percent experienced diarrhea and 33.77 percent skin problems).

²⁰⁵ Ibid., p. 92.

²⁰⁶ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

²⁰⁷ Interview with Bekkersdal resident #2 (name withheld), Bekkersdal, January 7, 2012. See also interview with Bekkersdal resident #4 (name withheld), Bekkersdal, January 7, 2012. Two years earlier, interviewees noted their children had rashes after swimming in Donaldson Dam. Interview with Bekkersdal residents #9, #10, and #11 (names withheld), Bekkersdal, March 16, 2010. A different interviewee noted that he developed itchy rashes after swimming in the Wonderfontein spruit. Interview with Khutsong residents #1, #2, #3, and #4 (names withheld), Khutsong, March 18, 2010 (statement of resident #2). Another attributed skin rashes to wearing clothes washed in contaminated water. Interview with Bekkersdal residents #6, #7, and #8 (names withheld), Bekkersdal, March 20, 2010 (statement of resident #7).

²⁰⁸ The full list of effects included: “skin irritation, severe dermal ulcers, or superficial coagulation necrosis, swollen, vacuolated epidermal cells and damage to hair follicles and sebaceous glands.” Coetzee et al., “An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein spruit Catchment,” Water Research Commission Report 1214/1/6, p. 155.

skin irritation and “mild skin damage.”²⁰⁹ Other studies have found that oral arsenic exposure can result in such dermal effects as skin darkening (hyperpigmentation), skin thickening (hyperkeratosis), and formation of corns and warts.²¹⁰ According to the 2015 Bekkersdal study, the arsenic levels found in fish in Donaldson Dam were “likely to cause health issues in consumers.”²¹¹

Long-Term Effects

The high concentrations of heavy metals frequently found in AMD can cause more serious damage to vital organs and increase the risk of cancer.²¹² As will be discussed in Chapter 5, there has been limited epidemiological data collected about the long-term impacts of AMD exposure in the West and Central Rand. Several scientific reports conducted elsewhere, however, have documented adverse health effects from uranium, cadmium, cobalt, and zinc as well as the metalloid arsenic,²¹³ all of which have been found at elevated levels in the Wonderfontein spruit.²¹⁴ A primary health risk associated with uranium, for example, is kidney damage and inflammation.²¹⁵ Long-term exposure to uranium can also target the brain.²¹⁶

Elevated concentrations of non-radioactive contaminants also pose a threat to human health. Cadmium can lead to permanent damage to the kidneys.²¹⁷ Additionally, it may adversely affect lung health and make bones brittle.²¹⁸ Cobalt has been linked to “[s]erious effects on the lungs, including asthma, pneumonia, and wheezing.”²¹⁹ Ingestion of large amounts of zinc

²⁰⁹ Agency for Toxic Substances and Disease Registry (ATSDR), US Department of Health and Human Services, “Public Health Statement: Uranium,” <http://www.atsdr.cdc.gov/ToxProfiles/tp150-c1.pdf> (accessed March 27, 2016).

²¹⁰ Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services, “ToxGuide for Arsenic,” October 2007, <http://www.atsdr.cdc.gov/toxguides/toxguide-2.pdf> (accessed April 9, 2016).

²¹¹ S. Liefferink, “Determining Attainable Ecological Quality Requirements for the Upper Wonderfontein spruit Catchment, Based on Human Community Requirements: The Case of Bekkersdal,” p. 114.

²¹² Although IHRC did not corroborate this account, according to the *Guardian*, a resident of the West Rand watered his vegetables with contaminated water and his wife died of cancer two years later. He said, “Her body was riddled with cancer—lungs, heart, intestines.” He also attributed frequent miscarriages by his pets and pigs to the contamination. Eva-Lotta Jansson, “How Acid Rivers Are Corroding South Africa’s Landscape: In Pictures,” *The Guardian*, December 25, 2015, <http://www.theguardian.com/world/gallery/2015/dec/25/south-africa-acid-rivers-pollution-in-pictures> (accessed May 1, 2016).

²¹³ See, e.g., World Health Organization, “Uranium in Drinking-Water,” WHO/SDE/WSH/03.04/118/Rec/1 (2012), http://www.who.int/water_sanitation_health/publications/2012/background_uranium.pdf (accessed May 8, 2016), pp. 10-12 (reviewing literature on health impacts of chronic uranium exposure through drinking water); Marisa F. Naujokas, “The Broad Scope of Health Effects from Chronic Arsenic Exposure: Update on a Worldwide Public Health Problem,” *Environmental Health Perspectives*, vol. 121 (2013), <http://ehp.niehs.nih.gov/wp-content/uploads/121/3/ehp.1205875.pdf> (accessed May 8, 2016), p. 295 (reviewing literature on health impacts of chronic arsenic exposure); UN Environment Programme, “Final Review of Scientific Information on Cadmium,” December 2010, http://www.unep.org/chemicalsandwaste/Portals/9/Lead_Cadmium/docs/Interim_reviews/UNEP_GC26_INF_11_Add_2_Final_UNEP_Cadmium_review_and_appendix_Dec_2010.pdf (accessed May 8, 2016), pp. 44-50 (discussing health impacts of cadmium); “Opinion of the Scientific Committee on Food on the Tolerable Upper Intake Level of Zinc,” March 5, 2003, SCF/CS/NUT/UPPLEV/62, http://ec.europa.eu/food/fs/sc/scf/out177_en.pdf (accessed May 8, 2016), pp. 7-10 (reviewing literature on human-health impact of chronic elevated levels of zinc intake); First Nations Environmental Health Innovations Network, “Acid Mine Drainage Fact Sheet,” <http://focs.ca/wp-content/uploads/2012/07/Acid-Mine-Drainage-FNEHIN.pdf> (accessed May 1, 2016) (citing study by the WHO’s International Agency for Research on Cancer (IARC)).

²¹⁴ Coetzee et al., “An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein spruit Catchment,” Water Research Commission Report 1214/1/6, pp. vi, 56-67 (discussing heavy-metal contamination of various water bodies along the Wonderfontein spruit and finding that “[t]he contaminants of greatest concern are . . . uranium, cadmium, zinc and cobalt,” and recommending “further action” on uranium, arsenic, cadmium, and cobalt); *ibid.*, p. 190 (samples contained levels of each metal several times that of European Union or South African reference values).

²¹⁵ See *ibid.*, p. 190. See also World Health Organization, “Uranium in Drinking-Water” (noting that kidney damage may be reversible, depending on the level of exposure).

²¹⁶ Winde, “Uranium Pollution of Water Resources in Mined-Out and Active Goldfields of South Africa” (basing conclusions on a 2015 study with rats).

²¹⁷ Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services, “Cadmium—ToxFAQs,” October 2012, <http://www.atsdr.cdc.gov/toxfaqs/tfacts5.pdf> (accessed April 9, 2016). See also World Health Organization, *Guidelines for Drinking-Water Quality*, pp. 327-28 (cadmium is carcinogenic and toxic).

²¹⁸ ATSDR, “Cadmium—ToxFAQs.”

²¹⁹ Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services, “Public Health Statement: Cobalt,” April 2004, <http://www.atsdr.cdc.gov/toxprofiles/tp33-c1-b.pdf> (accessed April 9, 2016).

over an extended period of time may result in anemia, pancreatic damage, and decreased levels of “high-density lipoprotein cholesterol (the good form of cholesterol).”²²⁰ In addition to causing short-term skin irritation, exposure to arsenic can damage peripheral nerves, which may manifest as “numbness in the hands and feet that may progress to a painful ‘pins and needles’ sensation.”²²¹ Ingestion of arsenic over time can cause damage to the circulatory and nervous systems.²²² Finally, arsenic may increase the likelihood of bladder, lung, and skin cancer.²²³ Although IHRC did not interview individuals in the West Rand who spoke of such health impacts, long-term effects may have yet to manifest themselves widely due to the fact that significant amounts of AMD only began to flow untreated into the waterways when it decanted in 2002.

Effects on Wildlife and Cultural Heritage

AMD has also posed threats to wildlife and cultural heritage in the area. Untreated AMD used to run through the Krugersdorp Game Reserve via the Tweelopiespruit, and the acidity reportedly caused hippopotami to go blind.²²⁴ More recently, neutralized AMD, which has still high sulfate levels, has flowed into the reserve.²²⁵ In 2014, the general manager of operations for Mintails Mogale Gold, Jan Jacobs, told a South African newspaper, “The Tweelopiespruit is essentially dead. . . . While some plant species seem to flourish, you won’t find fish or frogs there.”²²⁶ Robinson Lake had once served as a recreational body of water next to a golf course, but it became unable to sustain any life, including fish, after Harmony Gold used it to catch AMD decanting to the surface.²²⁷ A couple living near the lake noted in 2012 that before the lake dried up, birds could not swim in or drink the water “because they [would] die from it.”²²⁸

Some people have contended that AMD in the Tweelopiespruit has endangered the Cradle of Humankind, a UNESCO World Heritage Site that has fossils of human ancestors dating back millions of years.²²⁹ A report issued in 2009 claimed that contaminated water was already flowing beneath the Cradle of Humankind and stated that “the entire area downstream of the [West Rand] decant point has been declared a World Heritage site in order to preserve

²²⁰ Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services, “Toxicological Profile for Zinc,” <http://www.atsdr.cdc.gov/ToxProfiles/tp60.pdf> (accessed April 9, 2016).

²²¹ ATSDR, “ToxGuide for Arsenic.”

²²² *Ibid.*

²²³ *Ibid.* See also World Health Organization, “Arsenic,” <http://www.who.int/mediacentre/factsheets/fs372/en/> (accessed May 8, 2016); Sara V. Flanagan et al., “Arsenic in Tube Well Water in Bangladesh: Health and Economic Impacts and Implications for Arsenic Mitigation,” *Bulletin of the World Health Organization*, vol. 90 (2012), <http://www.scielosp.org/pdf/bwho/v90n11/13.pdf> (accessed May 8, 2016), p. 839 (finding elevated risk of death from chronic disease where arsenic contamination of drinking water exceeded 10 µg/l); World Health Organization, *Guidelines for Drinking-Water Quality*, pp. 315-18 (reviewing research on arsenic in drinking water and concluding that “there is overwhelming evidence that consumption of elevated levels of arsenic through drinking-water is causally related to the development of cancer”).

²²⁴ Bobby Jordan, “Acid Blinding Hippos,” *Times Live*, June 30, 2010, <http://www.timeslive.co.za/local/article527642.ece/Acid-blinding-hippos> (accessed April 6, 2016).

²²⁵ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 12, 2016.

²²⁶ Wolmarans, “Joburg under Threat from Acid Mine Drainage,” *The Citizen*.

²²⁷ Steven Lang, “South Africa: Radioactive Water the Price of Gold,” *Inter Press Service*, December 3, 2007, <http://www.ipsnews.net/2007/12/environment-south-africa-radioactive-water-the-price-of-gold/> (accessed April 9, 2016); Prinsloo, “‘Toxic’ Lake Gets a Green Makeover,” *Mining Weekly*.

²²⁸ Interview with Robin Park residents #1 and #2 (names withheld), Robin Park, January 8, 2012 (statement of resident #1). Donaldson Dam caretaker Lawrence van der Walt described abnormalities in the dam’s fish in 2010, including the lack of an eye, a misplaced mouth, an unusually large size, and sterility. He stated that he had some fish from the dam tested and three or four were shown to be radioactive. Interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, March 17, 2010.

²²⁹ According to its website, the Cradle of Humankind “is the world’s richest hominin site, home to around 40% of the world’s human ancestor fossils.” Maropeng, “Fossil Sites in the Cradle of Humankind— Sterkfontein Caves,” November 22, 2013, <http://www.maropeng.co.za/news/entry/fossil-sites-in-the-cradle-of-humankind-sterkfontein-caves> (accessed April 6, 2016).

its very important caves and fossil finds for future generations.”²³⁰ In 2014, Francois Durand, lecturer at the University of Johannesburg, predicted that AMD would destroy the site: “Nothing can survive it except for sulfur-eating bacteria. ... Millions of fossils are at risk. These sites are really close to the river.”²³¹ In 2016, Bashan Govender, an assistant director of the Department of Water and Sanitation (DWS), wrote to IHRC, “The Cradle of Humankind is fortunately not impacted due to West Rand AMD.” He said the department has been monitoring the groundwater and “the fossils remain secure.”²³² The threat could extend beyond fossil beds because the Cradle of Humankind is also a reserve for rare and endangered animals, birds, and plants.²³³ Potential contamination therefore merits continued and careful monitoring.



In 2010, a pipe released decanting AMD into a culvert that flowed directly into the Krugersdorp Game Reserve, endangering wildlife. Since then, the water here has reportedly been treated, but the sulfate levels have remained unacceptable. © 2010 Bonnie Docherty/IHRC.

²³⁰ Leandi Kolver, “‘Mine Water Will Start Decanting from Central Rand Basin in a Few Years,’” *Mining Weekly*, January 23, 2009, <http://www.miningweekly.com/article/mine-water-will-start-decanting-from-central-rand-basin-in-a-few-years-2009-01-23> (accessed July 1, 2016) (quoting Garfield Krige, author of an African Environmental Development study).

²³¹ Interview with Francois Durand, Department of Zoology, University of Johannesburg, Pretoria, October 31, 2014. One report noted that the Cradle of Humankind “was the only protected area in the world ‘ostensibly threatened’ by acid water from mines. ‘The perceived threat of AMD to the area has generated wide and considerable concern for the preservation of the UNESCO-inscribed fossil sites.’” World Information Service on Energy (WISE) Uranium Project, “Decommissioning Projects: South Africa,” March 15, 2016, <http://www.wise-uranium.org/udza.html> (accessed April 6, 2016).

²³² Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²³³ Maropeng, “Today’s Landscape in the Cradle of Humankind World Heritage Site,” http://www.maropeng.co.za/content/page/todays_landscape_in_the_cradle_of_humankind_world_heritage_site (accessed April 6, 2016).

Rights and Duties

AMD and its potential health impacts have not only put communities at risk but also raised significant human rights concerns under national and international law. The relevant rights in turn impose obligations on the government to remedy past harm, minimize ongoing harm, and ensure the rights are fully realized in the future. South Africa has made some progress in addressing AMD over the past few years, but its delayed response and the need for a more complete solution call for additional remedial and forward-looking actions.

Human Rights Concerns

In the West Rand, and to a lesser degree in the Central Rand, AMD has threatened residents’ rights to health, a healthy environment, and water. It contains radiation and harmful chemicals, which can infringe on the right to health and the right to water.²³⁴ AMD has also interfered with the right—guaranteed by the South African Constitution—“to an environment that is not harmful to health or well-being.”²³⁵ Residents have been exposed to excessive concentrations of heavy metals and radioactive uranium, which have been blamed locally for skin rashes and are a known source of serious health problems in other parts of the world. If an effective long-term solution is not implemented, future generations, protected by the right to a healthy environment, will also be at risk.

Human rights law protects peoples’ right to use water in specific ways that have been made dangerous by the presence of AMD. Under the right to water, people should be able to obtain water that is safe for domestic purposes, including “washing of clothes [and] food preparation.”²³⁶ Although IHRC found little evidence that residents in the West and Central Rand have been drinking the contaminated water, those living in some settlements, notably Bekkersdal, have used it for irrigating gardens, watering livestock, fishing, doing laundry, and swimming. Such activities have left people of all ages, especially children, vulnerable to adverse health effects.

The situation has been made worse by the limited access to quality water. Taps have often been located far away and been an impractical source for tasks that require large amounts of water. Many residents thus have not had physical access “within, or in the immediate vicinity, of each household” to water that is free of “chemical substances and radiological hazards that pose a risk to human health.”²³⁷

Finally, inadequate information about the risks of AMD has exacerbated the problem, as will be discussed in Chapter 5 on the right to information.

Inadequate Measures to Address Ongoing Harm

Under domestic and international law, South Africa is required to protect against infringements of the rights to health, a healthy environment, and water. While, as described in Chapter 2, the specific duties associated with these three rights have been articulated somewhat differently, together they make clear that the government must minimize the environmental and health

²³⁴ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 15; CESCR, General Comment No. 15, The Right to Water, para. 12(b).

²³⁵ South African Constitution, § 24(1).

²³⁶ CESCR, General Comment No. 15, The Right to Water, para. 12(b)-(c).

²³⁷ *Ibid.*, para. 12.

impacts of mining, including those caused by the contamination of watersheds.²³⁸ South Africa's delayed response to the AMD threat in the West and Central Rand has meant that for many years it has not fulfilled its obligations to remedy harm and prevent further impacts. As a result, local residents have repeatedly been exposed to contaminants that could have serious health impacts, which may worsen over time if not addressed.

The South African government, along with the mining industry, has been aware of the dangers of AMD for decades. In 1937, the government acknowledged the problems of contaminated water in its Mines and Works Regulations, which required mining companies to treat water to a safe quality before it left mine property.²³⁹ The scientific community brought the risks of AMD to the attention of the government in the 1950s.²⁴⁰ In the landmark 1951 case *Rex v. Marshall and Another*, the South African judicial system found criminal liability existed for damage caused by AMD.²⁴¹ The heightened urgency of the situation was evident in 1998 when Harmony Gold submitted a report to the Department of Mineral Resources (DMR) stating that contaminated water would reach the surface in four years because it was planning to stop pumping a depleted mine.²⁴² As predicted, water began to decant in the West Rand in late August 2002.²⁴³ It took several years, however, for the government to take responsibility and begin to address the situation.

Industry initially took the lead in dealing with the water contamination crisis in the West Rand. After AMD decanted in 2002, Harmony Gold adopted emergency measures to collect the water and store it in Robinson Lake.²⁴⁴ It spent approximately R100 million "over the next five to six years in pumping it, treating it and discharging it," first into the lake and later into the Tweelopiespruit.²⁴⁵

In 2006, eight years after the prediction of decanting, the government finally made an effort to organize a response to the situation. The Department of Water Affairs (DWA), now the Department of Water and Sanitation, apportioned 90.4 percent of the responsibility for pumping and treating AMD in the Western Basin among three mining companies.²⁴⁶ ("Basin" is a term used

²³⁸ To meet their duties under the right to health, states are obliged to "prevent the pollution of water ... by extractive and manufacturing industries" and "adopt measures against environmental ... health hazards." To meet their duties under the right to water, states should "reduc[e] and eliminat[e] contamination of watersheds and water-related eco-systems by substances such as radiation [and] harmful chemicals." The right to a healthy environment requires, *inter alia*, "reasonable and other measures to prevent pollution and ecological degradation." CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 36; CESCR, General Comment No. 15, The Right to Water, para. 28; *Social and Economic Rights Action Centre and Another v. Nigeria*, para. 52.

²³⁹ Regulation 7(2) of the 1937 Mines and Works Regulations stated: "In no case may water containing any injurious matter in suspension or solution be permitted to escape without having been previously rendered innocuous." Centre for Environmental Rights, "Rex v Marshall & Another (1951) 2 All SA 440 (A)," <http://cer.org.za/wp-content/uploads/2011/12/Rex-v-Marshall.pdf> (accessed April 6, 2016) (quoting regulations).

²⁴⁰ Pratt, "All That Glitters ... Acid Mine Drainage: The Toxic Legacy of Gold Mining in South Africa," *Earth Magazine*.

²⁴¹ In this case, a group of farmers brought a suit against a coal mining company for releasing "injurious water" that ended up in a stream running through their land. Centre for Environmental Rights, "Rex v Marshall & Another (1951) 2 All SA 440 (A)."

²⁴² Pratt, "All That Glitters ... Acid Mine Drainage: The Toxic Legacy of Gold Mining in South Africa," *Earth Magazine*.

²⁴³ *Ibid.*

²⁴⁴ Prinsloo, "'Toxic' Lake Gets a Green Makeover," *Mining Weekly*.

²⁴⁵ Darren Parker, "Sins of the Fathers," *Mining Weekly*, December 5, 2008,

<http://www.miningweekly.com/article/sins-of-the-fathers-2008-12-05> (accessed April 6, 2016).

²⁴⁶ According to this apportionment, Rand Uranium, which was acquired by Sibanye Gold in 2013, bore 46 percent of the responsibility, DRD Gold 44 percent, and Mintails 0.4 percent. Karabo Keepile, "Mines Must Take 'Prime Responsibility' for Acid Drainage," *Mail & Guardian*, September 7, 2011, <http://mg.co.za/article/2010-09-07-mines-must-take-prime-responsibility-for-acid-drainage> (accessed March 5, 2016). See also Loni Prinsloo, "Urgent Decisions Necessary to Avoid Environmental Consequences," *Mining Weekly*, February 26, 2010, <http://www.miningweekly.com/article/urgent-decisions-necessary-to-avoid-environmental-disaster-2010-02-19> (accessed April 6, 2016). On history of Sibanye Gold, see Sibanye Gold, "Cooke: History," <https://www.sibanyegold.co.za/operations/cooke/history> (accessed July 8, 2016).

for the "large complexes of interconnected mines" in the region.²⁴⁷) DWA did not assign liability for the remaining 9.6 percent, although that percentage may have encompassed abandoned legacy sites for which the state should have assumed direct responsibility. The government's strategy of relying on industry actions was not enough to contain the problem, however, and AMD continued to flow from the mine voids.



Industry led early efforts to stem and treat decanting AMD in the West Rand. This facility operated by a mining company helped address the crisis but could not handle the large quantities of contaminated water. © 2012 Bonnie Docherty/IHRC.

Water treatment plants built by the industry represented a step forward for the environment, but they were not a panacea. For example, although Rand Uranium treated about 12 million liters of AMD daily, its process left between 11 million and 56 million liters of untreated AMD flowing into the West Rand water system.²⁴⁸ In addition, the treatment plants used neutralization, a common approach to dealing with AMD,²⁴⁹ but one that only partially purifies the water. Neutralization is usually achieved by treating contaminated water with lime, which raises the pH level to become more alkaline and causes the dissolved heavy metals to precipitate and leach out, forming a sludge.²⁵⁰ For this reason neutralization facilities are sometimes called

²⁴⁷ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. 19.

²⁴⁸ Keepile, "Mines Must Take 'Prime Responsibility' for Acid Drainage," *Mail & Guardian*.

²⁴⁹ J.P. Maree et al., "Neutralization of Acid Mine Water and Sludge Disposal," Water Research Commission Report 1057/1/04, November 2004, <http://www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/1057-1-04.pdf> (accessed April 9, 2016), p. ii ("Currently, acid water is neutralized with lime before it is re-used ... or discharged into public streams.")

²⁵⁰ Ata Akcil et al., "Acid Mine Drainage (AMD): Causes, Treatment and Case Studies," *Journal of Cleaner Production*, vol. 14 (2006), pp. 1139-45.

high density sludge (HDS) plants. Even after neutralization, however, water still contains high concentrations of sulfates and other salts that remain a concern.²⁵¹ The precipitated metals are also vulnerable to returning to soluble form if they are re-exposed to acidic water.²⁵² The contaminants in neutralized AMD preclude using the water safely for many activities.²⁵³

The South African government's actions from 1998 to 2010 demonstrate an awareness of the problem, but its limited efforts to respond fell short of the country's obligations under the rights to health, a healthy environment, and water. Decanting and contamination of waterways in the West Rand continued. As a result, the local population experienced ongoing exposure to contaminants that are known to have significant environmental and health impacts, including from bioaccumulation.

To address any harm that AMD caused by its delayed response, the South African government should take several remedial measures, to which affected individuals are entitled under the human right to a remedy.²⁵⁴ For example, the government should ensure cleanup of contaminated areas and arrange for epidemiological studies to identify any health impacts. It should provide free health screenings for at-risk populations and access to care for immediate and long-term effects due to the contamination. It should also consider a compensation regime for harm that can be linked to AMD. Finally, the government should guarantee that the harm caused by its weak response is not repeated.

Need for a More Complete Solution

Over the past five years, the South African government has moved beyond primary reliance on industry and increased its own efforts to address the problems of AMD in the region. As of June 2016, the government had neutralization (HDS) plants operating in both the West and Central Rand and another in the East Rand was undergoing trials and scheduled to start full operations imminently.²⁵⁵ The plants have helped stem further decanting in the region. Despite these commendable steps, the government has been slow to implement a more complete solution to AMD. It needs to take additional actions, including implementing the order to build a desalination plant and addressing runoff and seepage, in order to ensure a safe and adequate water supply and fully meet its human rights obligations.

In 2010, 12 years after the initial prediction of decant and eight years after it occurred in the West Rand, the government began to be more proactive in its response to water contamination in the region. Its increased involvement may have been inspired, at least in part, by a

²⁵¹ Department of Water Affairs, "Acid Mine Drainage: Releasing of Central Basin's Treated Acid Mine Water," media advisory, May 9, 2014, <https://www.dwa.gov.za/Communications/PressReleases/2014/Acid%20Mine%20Drainage%20-%20Releasing%20of%20Central%20Basins%20Treated%20Acid%20Mine%20Water.pdf> (accessed April 6, 2016), p. 2 (including table of water quality before and after treatment, which is reprinted later in this chapter).

²⁵² Harmony Gold, "Environmental Impact Document: Impact of the Discharge of Treated Mine Water, via the Tweelopies Spruit, on the Receiving Water Body Crocodile River System, Mogale City, Gauteng Province," Department of Water Affairs and Forestry 16/2/7/C221/C/24, December 3, 2006, p. 90.

²⁵³ Water Research Commission, *Quality of Domestic Water Supplies, Volume 1: Assessment Guide* (Pretoria: Department of Water Affairs and Forestry, Department of Health, and Water Research Commission, 1998), <https://www.dwa.gov.za/iwqs/AssessmentGuides/AssessmentGuide/AssessmentGuide.pdf> (accessed July 9, 2016), p. 93 (including South African government sulfate guidelines, which are reprinted later in this chapter).

²⁵⁴ South African Constitution, §§ 34, 38; CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 59; CESCR, General Comment No. 15, The Right to Water, para. 55.

²⁵⁵ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016. According to Govender, the West Rand plant, in the Krugersdorp-Randfontein area, was pumping and neutralizing about 32 million liters per day, and the Central Rand plant in Germiston was treating 82 million liters per day. The East Rand plant, near the town of Springs, was designed to treat around 110 million liters per day.

2009 report that predicted AMD would decant in the highly urban Central Rand in the near future.²⁵⁶ In March 2010, DWA announced that it would make a R6.9 million subsidy available over three months to help Rand Uranium and Mintails expand their treatment efforts,²⁵⁷ but the funds were insufficient and quickly depleted.²⁵⁸ In 2011, the companies estimated to Parliament that they had spent between R40 million and R60 million treating AMD and indicated that they would be unable to sustain expenditures of this magnitude in the long run.²⁵⁹

The government also commissioned its own study of AMD in the region. In September 2010, a government-appointed Inter-Ministerial Committee assigned a team of experts to assess the problem.²⁶⁰ The resulting report, entitled *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage* (AMD Report), recommended that AMD intervention measures be taken in the Western and Central Basins "as a matter of urgency."²⁶¹ It also warned of the potential shortcomings of neutralization as a treatment method, noting that "[i]n the medium to long term [neutralization] may not be sustainable as it could result in excessive salt loads on the receiving water bodies, which will require the release of clean water for dilution."²⁶² The South African Cabinet received the AMD report on February 9, 2011.²⁶³

Two months later, Minister of Water and Environmental Affairs Edna Molewa called on the Trans-Caledon Tunnel Authority (TCTA), a state-owned entity responsible for water infrastructure, "to implement the immediate and short term actions recommended in the AMD Report."²⁶⁴ In particular, she tasked it with overseeing and implementing the installation of pumps to move water from mine sites to treatment plants, the construction of "an on-site mine water treatment plant in each basin," and the "installation of infrastructure to convey treated water to nearby watercourses."²⁶⁵ The highest priorities included mitigating and containing decant in the West Rand, and lowering the underground water levels in the Central Rand to prevent decant.²⁶⁶

The TCTA collaborated with industry to meet these goals in a relatively expedient and cost-effective manner. In early 2012, the TCTA partnered with Rand Uranium (subsequently acquired by Sibanye Gold) to upgrade the company's treatment facility in the West Rand

²⁵⁶ Kolver, "'Mine Water Will Start Decanting from Central Rand Basin in a Few Years,'" *Mining Weekly* (citing Garfield Krige, author of an African Environmental Development study).

²⁵⁷ Loni Prinsloo, "SA Miners Get Subsidy to Treat Acid-Mine Drainage," *Mining Weekly*, March 18, 2010, <http://www.miningweekly.com/article/sa-miners-get-r69m-subsidy-to-treat-acid-mine-drainage-2010-03-18> (accessed April 6, 2016).

²⁵⁸ Christy van der Merwe, "Parliament Committee Visits AMD Sites in Witwatersrand Basin," *Mining Weekly*, July 27, 2010, <http://www.miningweekly.com/article/parliament-committee-visits-amd-sites-in-witwatersrand-basin-2010-07-27> (accessed April 6, 2016).

²⁵⁹ John Munro, "Rand Uranium Submission to the Parliamentary Portfolio Committee on Water and Environmental Affairs," June 28, 2011, slide 2; Mintails, "MSA Contribution to AMD Solution," presentation to Parliament, June 28, 2011, slide 3.

²⁶⁰ Christy van der Merwe, "Experts to Compile Report on Extent of AMD Problem," *Mining Weekly*, September 6, 2010, <http://www.miningweekly.com/article/experts-to-compile-report-on-extent-of-acid-water-problem-sonjica-2010-09-06> (accessed April 6, 2016).

²⁶¹ Expert Team of the Inter-Ministerial Committee on Acid Mine Drainage, *Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, p. vii.

²⁶² *Ibid.*

²⁶³ Department of Water Affairs, "Statement by Minister Edna Molewa at the Acid Mine Drainage Media Briefing," March 22, 2012, <https://www.dwa.gov.za/Communications/MinisterSpeeches/2012/Acid%20Mine%20Drainage%20media%20briefing.pdf> (accessed April 6, 2016).

²⁶⁴ Department of Water Affairs, "Media Statement on the Update on Mine Water and Acid Mine Drainage (AMD) Management in the Witwatersrand Area," June 10, 2011, <http://www.gov.za/media-statement-update-mine-water-and-acid-mine-drainage-amd-management-witwatersrand-area> (accessed July 9, 2016).

²⁶⁵ *Ibid.*

²⁶⁶ *Ibid.*



AMD finally stopped decanting after the government assumed responsibility for the West Rand Treatment Plant and increased its capacity. While a critical short-term fix, the plant has only neutralized the water and has sometimes been overwhelmed by heavy rain. © 2014 Bonnie Docherty/IHRC.

and tripled the pumping capacity to about 30 million liters of AMD per day.²⁶⁷ As of 2016, the TCTA co-managed the plant with Sibanye Gold; the TCTA bore two-thirds of the cost, and Sibanye Gold one-third.²⁶⁸

In the Central Rand, the TCTA worked with DRD Gold and Central Rand Gold. The former provided land and infrastructure for a treatment plant, while the latter supplied pumps.²⁶⁹ Without the industry's help, it would have cost about R600 million more to build the HDS plant in that area, according to DWS official Bashan Govender.²⁷⁰ Nevertheless, while these mining companies have been willing to help the TCTA neutralize the water, they have expressed reservations about the cause of AMD being attributed to their specific operations.²⁷¹

While the HDS plants have been essential to addressing the urgent problem of decanting AMD, they have not constituted a complete solution for two reasons: the limits to their capacity and their level of treatment. By the end of 2012, the plant in the West Rand could prevent normal water flows in the region from decanting, but it could not handle the increased water flow caused by heavy rains in March 2014.²⁷² A similar problem arose in April 2015 and from March to May 2016.²⁷³ DWS's Govender told IHRC in 2016 that "as soon as we hit a heavy rainfall situation, we revert back [to decant]. Work is under way ... to address the increased AMD flow during periods of high rainfall."²⁷⁴ In particular DWS was considering increasing the West Rand plant's capacity from 32 million liters per day to 50 million liters per day, a proposal that should be implemented.²⁷⁵

The need to improve the quality of treated water has presented an even more serious, long-term problem. Similar to those established by the mining companies, the TCTA facilities have neutralized rather than purified the water through desalination. Because the treated water has ceased being acidic and has contained lower concentrations of heavy metals, it has met most regulatory specifications.²⁷⁶ It has not been potable, however, and has had a high level of salinity, mostly in the form of sulfates. According to 2014 government data, the plants have reduced sulfates from an average of 4,344 mg/l to 2,400 mg/l.²⁷⁷

²⁶⁷ Brindaveni Naido, "TCTA to Approach Treasury for More AMD Funding—CRG," *Mining Weekly*, October 11, 2011, <http://www.miningweekly.com/article/tcta-to-approach-treasury-for-more-amd-funding-central-rand-gold-2011-10-10> (accessed April 6, 2016).

²⁶⁸ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁶⁹ Ibid.

²⁷⁰ Interview with Bashan Govender, Assistant Director, Department of Water and Sanitation, Pretoria, October 30, 2014.

²⁷¹ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁷² Decant from the rains flowed into the area at a rate of approximately 30 million liters per day, but the plant's capacity was 27 million liters per day. Tancott, "Excess AMD in West Rand a Big Problem," *Infrastructure News*; Wolmarans, "Joburg under Threat from Acid Mine Drainage," *The Citizen*.

²⁷³ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016 (regarding 2015); email from Mariette Liefferink, CEO, Federation for a Sustainable Environment, to IHRC, June 13, 2016 (regarding 2016).

²⁷⁴ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁷⁵ Ibid. The HDS facility in the Central Rand, which came online in May 2014, also experienced some initial "teething issues," but reportedly overcame them. Faku, "Fall in Water Table Opens Access for Central Rand Gold," *Independent Online*. Full capacity for the Central Rand HDS plant is 84 million liters of mine water per day. Leandi Kolver, "Central Basin AMD Treatment to Start May 12," *Mining Weekly*, May 9, 2014, <http://www.miningweekly.com/article/central-basin-amd-treatment-to-start-may-12-2014-05-09> (accessed April 6, 2016).

²⁷⁶ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁷⁷ Department of Water Affairs, "Acid Mine Drainage: Releasing of Central Basin's Treated Acid Mine Water," p. 2.

Treatment of AMD at Witwatersrand HDS Plants

Water quality variable	Average water quality across all three basins	HDS plant effluent standard
Sulphates	4344 mg/ℓ	2400 mg/ℓ
pH	4	6-9
Iron	768 mg/ℓ	<1 mg/ℓ
Aluminium	35 mg/ℓ	<1 mg/ℓ
Manganese	127 mg/ℓ	<3 mg/ℓ
Uranium	0.2 mg/ℓ	0.05 mg/ℓ

Table from: Department of Water Affairs, "Acid Mine Drainage: Releasing of Central Basin's Treated Acid Mine Water," media advisory, May 9, 2014, p. 2.

Such a sulfate level can cause serious problems for water users. South African water quality standards from 2015 stated that a concentration of more than 500 mg/ℓ can result in acute health effects,²⁷⁸ and an earlier industry assessment found that one above 600 mg/ℓ can cause diarrhea to which humans may not adapt.²⁷⁹ According to 1999 government water quality objectives, which remain in effect, a sulfate concentration of more than 1,000 mg/ℓ was "not acceptable" for domestic uses, such as bathing and washing clothes, and more than 2,000 mg/ℓ was "not acceptable" for watering livestock.²⁸⁰ Another set of still relevant government guidelines determined that a sulfate concentration of more than 1,000 mg/ℓ was "completely unacceptable" for drinking, food preparation, and laundry, and "poor" for bathing.²⁸¹ The residents of the West and Central Rand, who have used neutralized AMD for all these activities, have thus been exposed to unhealthy water.

²⁷⁸ Selectech, "Table of 2015 Blue Drop Limits (derived from South African National Standards (SANS 241)),
<http://selectech.co.za/what-you-should-know-about-the-new-2015-blue-drop-limits-sans-2412015-drinking-water/>
 (accessed July 9, 2016).
²⁷⁹ Harmony Gold, "Environmental Impact Document: Impact of the Discharge of Treated MineWater, via the Tweelopies Spruit, on the Receiving Water Body Crocodile River System, Mogale City, Gauteng Province," p. 91.
²⁸⁰ Department of Water Affairs and Forestry, "Water Quality Objectives: Kromdraai Catchment," 1999, pp. 37-38.
²⁸¹ Water Research Commission, *Quality of Domestic Water Supplies, Volume 1: Assessment Guide*, p. 93. For an analysis of the continued relevance of these standards, see generally A.P.M. Moolman and D. Winter, "Quality of Domestic Water Supplies Guidelines: 10 Years of Relevance to the Sector," 2010, http://www.ewisa.co.za/literature/files/266_216%20Moolman.pdf (accessed July 9, 2016).

Water Research Commission Sulphate Guidelines

Sulphate Guidelines					
Sulphate Range mg/ℓ	Drinking		Food Preparation	Bathing	Laundry
	Health	Aesthetic			
<100	No effects	No effects	No effects	No effects	No effects
100-200	No effects	No effects	No effects	No effects	Slight corrosion possible
200-400	Insignificant health effects	Insignificant health effects	Insignificant health effects	No effects	Moderate corrosion
400-600	Slight chance of initial diarrhoea in sensitive groups, but disappears with adaptation	Slight, bitter taste	Slight chance of initial diarrhoea in sensitive groups, but disappears with adaptation	Slight chance of diarrhoea if water swallowed, e.g. infants	Increasingly corrosive
600-1,000	Possibility of diarrhoea. Poor adaptation in sensitive individuals	Bitter taste	Possibility of diarrhoea. Poor adaptation in sensitive individuals	Increasing chance of diarrhoea if water is swallowed e.g. in infants	Very corrosive
>1,000	High chance of diarrhoea. No adaptation	Very bitter and salty taste	High chance of diarrhoea. No adaptation	Possibility of diarrhoea if water is swallowed	Extremely corrosive

Ideal
 Good
 Marginal
 Poor
 Completely unacceptable

Table from: Water Research Commission, *Quality of Domestic Water Supplies, Volume 1: Assessment Guide (Pretoria: Department of Water Affairs and Forestry, Department of Health, and Water Research Commission, 1998), p. 93.*

The shortcomings of the neutralization process have raised concerns about South Africa's drinking water supply as well as undermined water quality. Water from the treatment plants in the Central and East Rand has flowed into Vaal river system, just below the Vaal Dam, which is a major source of drinking water. In order to prevent environmental damage from the sulfates remaining in the neutralized water, clean water from the dam has had to be diverted to dilute the incoming water.²⁸² This practice is unsustainable. In 2015, South Africa experienced its worst drought since 1982,²⁸³ which meant that less clean water was available to dilute the neutralized water that had been released into the Vaal river system.²⁸⁴ Ironically, a comparable problem could arise if climate change produced greater "flash rainfall," as some people have predicted. In that case, the HDS plants would need to treat additional AMD caused by intense rainfall over short periods of time, and more Vaal Dam water would be needed for dilution purposes.²⁸⁵

As the growing population of South Africa increasingly depends on the Vaal Dam for its drinking water, competition for use of the dam may also result. Vaal water has been used to supply not only the Johannesburg area, but also the Limpopo region, which has experienced water shortages despite its large river system.²⁸⁶ DEA reported that 52 villages in Limpopo were without water in 2013.²⁸⁷ To complicate matters, the West Rand Treatment Plant has released its neutralized but still sulfate-laden AMD into the Tweelopiespruit, which runs into the Limpopo river system, via the Crocodile River.²⁸⁸ Bashan Govender of DWS told IHRC in 2014 that "even though we're neutralizing, it's not the optimal solution."²⁸⁹ He recognized that the combination of neutralization and dilution "can't continue, and that's why we have a long-term solution—and that's desalination."²⁹⁰

In May 2016, the minister of water and sanitation directed the TCTA to implement the "long term solution" to AMD mitigation in the Witwatersrand, i.e., desalination.²⁹¹ The project aims to produce potable water and increase water supplies in the region.²⁹² DWS stated, "The pinnacle of this approach is that a polluted resource once considered with contempt, now becomes a commodity contributing to security of the availability of water resources in the Vaal River System."²⁹³ The desalination plants are scheduled to be operational by 2020 and expected to treat 190 to 240 million liters of AMD per day.²⁹⁴ Water users will cover one-third of the cost, which the government has predicted will be between R10 billion and R12 billion. Industry will be responsible for the rest although the National Treasury plans front R600

million per year before recovering it from mining companies.²⁹⁵ The project has the potential to be a major step toward addressing the long-standing AMD problem in the region, but it will need to be implemented effectively and in a timely manner.

While the government has been dealing primarily with AMD created beneath the surface of the West and Central Rand (as well as the East Rand), it should also address other sources of AMD, including runoff and seepage. For example, AMD formed when rainwater comes in contact with tailings has entered the streams, rivers, and groundwater of the region. "The dumps are vulnerable to both water and wind erosion," explained an industry official. "After a rainstorm, you can see the red ponds laying on top of the tailings dams."²⁹⁶ The official added that since many tailings dams contain water in "paddocks," rainwater at "uncontrolled" tailings locations presents even greater risks.²⁹⁷ Salt crusts covering tailings dams, the footprint of removed dams, and polluted riverbanks have exacerbated the situation. Because they are highly soluble and have reportedly contained up to 1,100 mg/kg of uranium, they have dissolved quickly in rain and contaminated surface water.²⁹⁸ A more complete solution to the AMD problem should therefore not only ensure desalination of AMD but also address the water contaminated by tailings deposits, which are discussed in the next chapter.

Human rights law recognizes that fully realizing economic, social, and cultural rights takes time. The South African government's slow response to the AMD crisis, however, delayed efforts to deal with the problem and allowed harm to continue. Greater involvement, most notably through the creation of new treatment plants with industry assistance, has represented significant progress, but, as discussed above, the government should take responsibility for remedying past neglect. It also needs to allocate necessary financial resources and ensure timely implementation of a more complete solution. By taking these steps, South Africa could better meet its obligations under human rights law and help the residents of the West and Central Rand enjoy their rights to health, a healthy environment, and water.

²⁸² Interview with Bashan Govender, Assistant Director, Department of Water and Sanitation, Pretoria, October 30, 2014.

²⁸³ "South Africa Grapples with Worst Drought in 30 Years," *BBC*, November 30, 2015, <http://www.bbc.com/news/world-africa-34884135> (accessed May 10, 2016).

²⁸⁴ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

²⁸⁵ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁸⁶ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 12, 2016.

²⁸⁷ Mariette Liefferink, "Current Status of AMD (Immediate Treatment) and the Proposed Sludge Disposal in the East Rand (next to the Blesbokspruit)," presentation for Rand Water Dialogues, June 17, 2015, slide 18 (citing April 2013 briefing by the minister of environmental affairs).

²⁸⁸ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 12, 2016.

²⁸⁹ Interview with Bashan Govender, Assistant Director, Department of Water and Sanitation, Pretoria, October 30, 2014.

²⁹⁰ *Ibid.*

²⁹¹ Department of Water and Sanitation, "R600 Million Committed to the Long Term Permanent Solution for AMD Challenge," media statement, May 18, 2016, <http://www.gov.za/speeches/r600-million-committed-long-term-permanent-solution-amd-19-may-2016-0000> (accessed July 9, 2016).

²⁹² Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁹³ Department of Water and Sanitation, "R600 Million Committed to the Long Term Permanent Solution for AMD Challenge."

²⁹⁴ Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

²⁹⁵ Department of Water and Sanitation, "R600 Million Committed to the Long Term Permanent Solution for AMD Challenge."

²⁹⁶ Skype interview with senior mining company official (name withheld), November 2014.

²⁹⁷ Email from senior mining company official (name withheld), to IHRC, June 2016.

²⁹⁸ Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Catchment," Water Research Commission Report 1214/1/6, p. 150; Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

4. Tailings

Gold mining in the West and Central Rand has generated massive quantities of solid mine waste, known as tailings, which companies have deposited in dumps across the area for more than a century. Because Johannesburg and its environs developed alongside of the mining industry, residential areas have been built among the large hills of waste. Tailings consist of very fine particles, so dust blown from the dams has often reached neighboring communities. In addition, the soil in these tailings dams has contained high concentrations of heavy metals, such as uranium, that contaminate the environment.

Local people have been unable to escape the effects of the widespread tailings. In particular, they have inhaled and ingested dust, consumed contaminated foods, come in contact with polluted soil, and used traditional medicines made of tailings. Residents have reported suffering from respiratory problems and skin and eye irritations that could be attributable to this exposure. Scientific studies suggest they could face more serious, long-term impacts, such as organ damage and increased likelihood of cancer. Thus, like acid mine drainage, the tailings found in the West and Central Rand have raised concerns under the rights to health and a healthy environment. The proximity of many homes to tailings dams has also threatened residents' right to adequate housing.

South Africa has responded to the tailings problem with a hands-off approach that is inconsistent with its human rights obligations. It has relocated residents living on a highly radioactive dump to safer homes, but it has elsewhere allowed construction of new housing projects near tailings dams. It has also insufficiently addressed the danger of contaminated dust. Longer-range efforts to reduce the prevalence of contaminated waste, notably remaining operations and the proposed removal of tailings to mega dumps, have been largely driven by industry. To promote realization of human rights, the government should take immediate steps to address the situation and actively collaborate with industry and communities in the design and implementation of a plan to help eliminate the underlying problem in the future.

Creation and Spread of Tailings

Mining brings ore to the surface to be refined, and because the ore does not consist exclusively of economically valuable minerals, processing it creates waste. For 130 years, this waste has been piled into large tailings dams in the West and Central Rand. There were an estimated 220 tailings dams in the Johannesburg area in 2014,²⁹⁹ and the large hills have dominated much of the landscape in and around the metropolitan area. Many of the dams have been abandoned, the legacy of mines once owned by now-defunct companies. Some, however, have remained in active use, being re-mined and removed by modern companies. The color of tailings dams varies according to their mineral composition; some are red, while others are yellow or white in color.

²⁹⁹ Emmanuel Maphorogo, Parks Manager, Johannesburg City Parks, "Mines, People and Parks," August 28, 2014, <http://www.worldurbanparks.org/en/news-events/news/127-mines-people-and-parks> (accessed July 12, 2016). According to another estimate from 2004, there were 270 tailings dams in the Witwatersrand Basin, covering an area of 400 square kilometers. Oelofse et al., "The Pollution and Destruction Threat of Gold Mining Waste on the Witwatersrand: A West Rand Case Study," p. 617 (citing a 2004 AngloGold Ashanti study).



This large tailings dam, which was being remined in 2014, was situated near the Afrikaner community of Mindalore in the West Rand. © 2014 Bonnie Docherty/IHRC.

Mine tailings in the region have contained high concentrations of heavy metals, such as cadmium, cobalt, lead, uranium, and zinc, as well as the metalloid arsenic.³⁰⁰ While all of these contaminants have endangered the environment and human health, uranium, which is also radioactive, has been of particular concern. Tailings dams in the West Rand and Far West Rand reportedly contained an estimated 100,000 tons of uranium in 1998.³⁰¹ A 2006 study published by South Africa's Water Research Commission found that the average uranium concentration in the dumps was two orders of magnitude above natural background levels.³⁰²

The location of the tailings dams has exacerbated the problems caused by their contaminants. Johannesburg was founded as a result of a nineteenth-century gold rush. As the city grew, townships, especially those inhabited by black mine workers, were built among the tailings dams, and these hills of waste have become part of the urban sprawl.³⁰³ In addition, indigent people and migrant workers in the West Rand established informal settlements of

³⁰⁰ T. Rösner and A. van Schalkwyk, "The Environmental Impact of Gold Mine Tailings Footprints in the Johannesburg Region, South Africa," *Bulletin of Engineering Geology and the Environment*, vol. 49 (2000) p. 143. See also Sheree Bega, "Living in SA's Own Chernobyl," *Saturday Star*, January 8, 2011, www.ibcmt.com/2011-01-11-IBCMT-SouthAfrica-ToxicAndRadioactiveShacks.pdf (accessed March 11, 2016).

³⁰¹ Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Catchment," Water Research Commission Report 1214/1/6, p. 19; Winde, "Uranium Pollution of the Wonderfontein Catchment, 1997-2008 Part 1," *Water SA*, p. 248 (both citing D. Wymer, South Africa Chamber of Mines, "Compilation of Volumes and Uranium Concentration of Milled Ore and Tailings of South African Goldmines," 1999).

³⁰² Coetzee et al., "An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Catchment," Water Research Commission Report 1214/1/6, p. 19. See also Winde, "Uranium Pollution of the Wonderfontein Catchment, 1997-2008 Part 1," *Water SA*, p. 248.

³⁰³ Mara Kardas-Nelson, "The Reef and the City," in Jason Larkin, ed., *Tales from the City of Gold* (Berlin: Kehrer, 2013), p. 6; Pete Brook, "The Toxic Landscape of Johannesburg's Gold Mines," *Wired*, June 18, 2014, <http://www.wired.com/2014/06/jason-larkin-ales-from-the-city-of-gold/> (accessed March 12, 2016).

improvised, corrugated metal shacks on or adjacent to tailings dams. Certain white communities in the region have been situated within a few hundred meters of tailings dams, but black and coloured communities have comprised most of the settlements in close proximity to tailings dams.

After 1994, the post-apartheid government committed to providing "decent, well-located and affordable shelter for all" through its Reconstruction and Development Programme (RDP).³⁰⁴ In its haste to build homes, however, the government constructed several RDP housing projects close to tailings dams.³⁰⁵ "I think the intention, the political drive was to provide houses as soon as possible—just churn them out," said Angela Mathee, director of the Environmental Health Research Unit of the South African Medical Research Council (SAMRC). "Not all are close to mine dumps, but Johannesburg has a unique situation. Unfortunately the vacant land available was mostly next to mine dumps."³⁰⁶ In West and Central Rand communities such as Sinqobile and Soweto, only a road has separated residential neighborhoods from a tailings dam.³⁰⁷ Informal settlements have also been situated in close proximity to tailings. Until recently, some of the shacks in the Tudor Shaft informal settlement were located directly on a hill of mining waste.³⁰⁸



Homes were under construction at the foot of a tailings dam near Meadowlands in the Central Rand in 2014. The government should require a greater buffer between new residences and waste dumps. © 2014 Bonnie Docherty/IHRC.

³⁰⁴ African National Congress, "A Basic Guide to the Reconstruction and Development Programme," undated, http://www.africa.upenn.edu/Govern_Political/ANC_Recon.html (accessed March 12, 2016). The government acted in order to "finally get rid of apartheid and build a democratic, non racial and non sexist future."

³⁰⁵ Mariette Liefferink, Federation for a Sustainable Environment, presentation to the South African Institute of Mining and Metallurgy, undated, http://www.saimm.co.za/download/branches/Johannesburg/SAIMM_PRESENTATION.pdf (accessed March 12, 2016), p. 11.

³⁰⁶ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

³⁰⁷ Ibid.; interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #1).

³⁰⁸ Geoffrey York, "Inaction on Waste Condemns South Africa's Poor to Life in Toxic Dumps," *Globe and Mail*, March 10, 2015, <http://www.theglobeandmail.com/news/world/inaction-on-waste-condemns-south-africas-poor-to-life-in-toxic-dumps/article23399776/> (accessed March 12, 2016).

Contamination and Communities in West Rand



IHRC documented new construction of housing projects near tailings during its visits. In 2014, IHRC drove past a housing construction site at the foot of a tailings dam near Meadowlands in the Central Rand. In 2010, it observed a retirement village, called Amberfield, being erected across a highway from Sand Dump No. 20, the largest tailings dam in the West Rand. At the time of this report's publication, Amberfield remained uninhabited in large part because of the threat of contamination.³⁰⁹ Mariette Liefferink of the Federation for a Sustainable Environment said in 2016, "More and more houses are built in close proximity to tailings dams, and communities, especially the poor, are very vulnerable."³¹⁰

Tailings have regularly infiltrated local communities. As described in the previous chapter, runoff from tailings dams has created AMD and washed through residential areas.³¹¹ Tailings dust has filled the air in many communities in the vicinity of tailings dams. Some settlements, including Tudor Shaft in the West Rand, have been located so close to tailings dams that residents could not avoid contact with the contaminated soil.³¹² This combination of factors has left residents throughout the region vulnerable to exposure and negative health impacts.

Exposure to Tailings

Tailings dams in the West and Central Rand have exposed residents to elevated levels of heavy metals through several pathways. They have included inhalation and ingestion of dust, cultivation and consumption of contaminated food, direct contact with soil, and use of traditional medicines.³¹³ Discussing tailings, a former miner who lived in Tudor Shaft told IHRC, "When you touch that stuff [at a mine], you have to wear full gloves and a mask for protection."³¹⁴ The precautions mining employees have had to take indicate the danger of contaminated tailings to residents, especially children, who have not had protection.

Inhalation and Ingestion of Dust

The fine materials of tailings have been easily blown about by the wind, which has blanketed surrounding communities with clouds of dust. "When it's windy, this whole area gets white with uranium dust," a resident of Mindalore told IHRC in 2014.³¹⁵ This largely Afrikaner

³⁰⁹ For more information on Amberfield, see Mara Kardas-Nelson, "There's No Place Like Home," *Mail & Guardian*, November 26, 2010, <http://mg.co.za/article/2010-11-26-theres-no-place-like-home> (accessed March 12, 2016). By 2016, the tailings dam across from Amberfield (Sand Dump No. 20) had been almost completely removed and reclaimed, but the homes still faced a risk of structural damage and collapse due to sinkholes because the development had been built on top of an old mine. Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

³¹⁰ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

³¹¹ For more information, see Chapter 3 on Acid Mine Drainage. Local residents have observed runoff from tailings piles. See, e.g., interview with Davidsonville residents #1 and #2 (names withheld), Davidsonville, January 10, 2012 (statement of resident #2). Mining officials have also been aware of the problem. Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014.

³¹² There have also been allegations that tailings from West Rand mine dumps have been used to create bricks, which have then been sold at a premium, and used in the construction of homes throughout the area. See, e.g., Livhuwani Mamburu, "Tailings Dams and Radioactive Bricks: Acid Water in Gauteng," *Business Day Live*, December 8, 2010, <http://www.bdlive.co.za/articles/2010/12/08/tailings-dams-and-radioactive-bricks--acid-water-in-gauteng> (accessed March 12, 2016); interview with Mindalore resident (name withheld), Mindalore, November 1, 2014. Regarding the reports of radioactive bricks, Werner Eiselen of the Department of Environmental Affairs said in 2015, "Thankfully, it turned out it was not the case." Other sources, however, have contended that brickmaking using material from tailings dams has continued. Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015; Sheree Bega, "Mindalore Left to Choke on Toxic Mine Dust," *Saturday Star*, March 28, 2015, <http://www.environment.co.za/poisoning-carcinogens-heavy-metals-mining/mindalore-left-to-choke-on-toxic-mine-dust.html> (accessed March 13, 2016).

³¹³ Tailings have also exposed communities in close physical proximity to tailings dams to ambient radiation. A 2010 NNR study identified radon gas as a key source of radiation exposure to residents because of its potential to accumulate within homes built on or near contaminated soil, like those in Tudor Shaft. National Nuclear Regulator, "Surveillance Report of the Upper Wonderfontein Catchment Area," p. 12. Because the ambient radiation is not visible, IHRC did not itself document this threat.

³¹⁴ Interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012.

³¹⁵ Interview with Mindalore resident (name withheld), Mindalore, November 1, 2014.

Tailings Dams and Communities in Central Rand



▲
North

1 km

community in the West Rand sits next to a tailings dam that was then being remined.³¹⁶ Residents of other communities adjacent to tailings dams in the West and Central Rand offered similar accounts.³¹⁷ Ruth Masango of Meadowlands said in 2014 that the situation had grown worse in her neighborhood,³¹⁸ and IHRC had already documented significant problems there in 2012. At that time, another woman from the community told IHRC that when the wind comes, “you can’t even see where you’re walking” because of the dust.³¹⁹ Although the dust problem has been most acute during the windy season in August and September,³²⁰ inhalation has not been limited to those months.³²¹ IHRC researchers visited the region in January, March, and October, and on each field visit they observed clouds of dust emanating from tailings dams.



Wind blows clouds of dust from a tailings dam near Mindalore. Dust has blanketed homes across the region, causing residents to inhale and ingest the toxic and radioactive particles. © 2014 Bonnie Docherty/IHRC.

³¹⁶ Ibid.

³¹⁷ See, e.g., interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #2); interview with Noordgesig resident #1 (name withheld), Noordgesig, January 10, 2012; interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Perth Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statements of all three); interview with Bosmont residents (names withheld), Bosmont, January 9, 2012.

³¹⁸ Interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Perth Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statement of Ruth Masango).

³¹⁹ Interview with Deborah Matswee, Meadowlands resident, and Meadowlands resident #4 (name withheld), Meadowlands, January 9, 2012 (statement of resident #4).

³²⁰ Interview with Block A resident #1 (name withheld), Block A, January 8, 2012 (during August and September, “everyone is coughing”); interview with Bosmont residents (names withheld), Bosmont, January 9, 2012 (“We mainly get the dust in August.”); interview with Noordgesig resident #1 (name withheld), Noordgesig, January 10, 2012 (“During the windy months, August through September, there’s a hell of a lot of dust that blows over this place.”).

³²¹ Interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Perth Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statement of Ruth Masango).

Many of the people whom IHRC interviewed reported that they could not escape the dust. In 2014, for example, Charlie Sowa of Sinqobile said, “The wind blows dust into our homes.”³²² A Mindalore resident described a similar situation in his community, adding that local women have had twice as much exposure as men because a large number of them have worked at home.³²³ The problem has been a long-standing one, and in 2012, residents of both the West and Central Rand recounted failed efforts to avoid the dust.³²⁴ Stella Adams, who lived in the Central Rand community of Diepkloof, said: “It’s hell. ... You can put every item in your wardrobe and wet towels around the windows, but [the tailings dust] still comes in.”³²⁵ A man from nearby Davidsonville told IHRC, “You can sweep it out. You can dust it off ten times a day, and you still won’t get rid of it.”³²⁶ A resident of Robin Park, a middle-class, primarily white community located near a large tailings dam in the West Rand, said, “There is nothing you can do when that wind starts blowing. ... [The dust] contaminates absolutely everything.”³²⁷

Under these conditions, local people have been unable to avoid breathing and ingesting the pervasive dust from tailings dams. In 2014, a resident of Tudor Shaft told IHRC that “dust gets in the lungs.”³²⁸ Angela Mathee of the SAMRC, was doing a study of the effects of dust in certain communities in the region. She said that on windy days, “[y]ou just feel that crunchy soil in your mouth and we started to wonder what’s happening there.”³²⁹ These descriptions echoed similar complaints in 2012 from three Central Rand communities: Crown Mines, Diepkloof, and Mathoeshville.³³⁰ For example, a teacher at the Crown Mines campus of Central Johannesburg College explained that during the dry season, “the dust ... gets in your mouth and between your teeth.”³³¹ Stella Adams of Diepkloof said, “When the wind is there and dust is there, I don’t even cook because you eat dust.”³³²

Cultivation and Consumption of Contaminated Food

While dust has affected a broad swath of the region, those living in closest proximity to the tailings have faced additional problems from contaminated soil. In many areas, soil contamination has made the cultivation of small-scale vegetable gardens both difficult and hazardous. On each of its three field investigations, IHRC documented failed efforts to plant gardens

³²² Interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 (statement of Charlie Sowa).

³²³ Interview with Mindalore resident (name withheld), Mindalore, November 1, 2014.

³²⁴ Additionally, in 2010 IHRC visited a home in Kagiso, the ceiling of which was collapsing because so much dust had accumulated between it and the roof.

³²⁵ Interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012.

³²⁶ Interview with Davidsonville residents #1 and #2 (names withheld), Davidsonville, January 10, 2012 (statement of resident #2).

³²⁷ Interview with Robin Park residents #1 and #2 (names withheld), Robin Park, January 8, 2012. Many other interviewees expressed the impossibility of keeping tailings dust out of the home. See, e.g., interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Pertha Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statement of Ruth Masango) (dust goes “inside the homes” all year long); interview with Noordgesig resident #2 (name withheld), Noordgesig, January 13, 2012 (“There is nothing you can do. When wind blows, that dust is all over.”); interview with Davidsonville resident #3 (name withheld), Davidsonville, January 10, 2012 (“Dust comes right through the closed windows.”); interview with Bosmont residents (names withheld), Bosmont, January 9, 2012 (Tailings dust gets into houses, and “you can feel it on all the furniture.”).

³²⁸ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014.

³²⁹ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

³³⁰ Interview with Central Johannesburg College lecturer #1 (name withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012. Interview with Mathoeshville resident #1 (name withheld), Mathoeshville, January 9, 2012; interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012.

³³¹ Interview with Central Johannesburg College lecturer #1 (name withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012. Similarly, a member of the Central Rand community of Mathoeshville said, “If you open your mouth, there will be dust in it.” Interview with Mathoeshville resident #1 (name withheld), Mathoeshville, January 9, 2012.

³³² Interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012.

near tailings dams. A Tudor Shaft resident told IHRC in 2014 that vegetables would not grow in Tudor Shaft because the soil was too acidic.³³³ In 2012, another resident of Tudor Shaft, who was unemployed, said he had planted vegetables over the course of several years without success. He explained that crops would not grow “because the soil is full of chemicals.”³³⁴ Two years earlier, he had told IHRC, “I tried to plant some vegetables, but they don’t grow in this soil. I tried to plant cabbages, potatoes, and carrots.”³³⁵ Other interviewees in Tudor Shaft and neighboring Soul City similarly attributed their crops’ failure to take root to poor soil quality.³³⁶ Because vegetable gardens can serve as important sources of food and income, the obstacles to growing crops have had a significant impact on residents without jobs.³³⁷

Even when plants have survived, they may have been unhealthy to eat due to the toxicity and radioactivity of the soil. A 2012 study of a school in the Johannesburg area showed that growing vegetables near tailings dams can cause the crops to absorb heavy metals such as lead and mercury, although scientists concluded that the elevated levels in that specific community were still within “acceptable limits.”³³⁸ Chris Busby, who conducted a widely publicized and controversial study of Tudor Shaft in 2010,³³⁹ found radiation at the tailings dam in the settlement was 15 times greater than normal background levels in the region.³⁴⁰ According to Mariette Liefferink of FSE, the process of bioaccumulation had concentrated uranium and other heavy metals in vegetables grown in the settlement and thus posed potentially severe health threats to residents.³⁴¹ Demonstrating government awareness of a problem, a 2010 National Nuclear Regulator study of radiation risks identified traces of radiation in spinach plants grown in a Tudor Shaft vegetable garden and noted that ingestion was one source of “potential exposure.”³⁴² The consumption of vegetables contaminated by mining waste has likely exposed residents of Tudor Shaft and perhaps other communities to significant levels of toxicity and radiation.

³³³ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014.

³³⁴ Interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, January 7, 2012.

³³⁵ Interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, March 17, 2010.

³³⁶ For example, a Soul City resident said that due to mine-related contamination, the soil in his settlement was unsuitable for growing vegetables and he and his neighbors had ceased planting altogether. Interview with Soul City resident #1 (name withheld), Soul City, January 14, 2012. See also interview with Tudor Shaft resident #10, Tudor Shaft, March 17, 2010; interview with Soul City resident #2 (name withheld), Soul City, January 7, 2012; interview with former Tudor Shaft resident (name withheld), Soul City Extension 2, January 14, 2012.

³³⁷ Bega, “Living in SA’s Own Chernobyl,” *Saturday Star*.

³³⁸ T. Kootbodien et al., “Scientific Letter: Heavy Metal Contamination in a School Vegetable Garden in Johannesburg,” *South African Medical Journal*, vol. 102 (2012), <http://www.scielo.org.za/pdf/samj/v102n4/16.pdf> (accessed July 1, 2016), p. 226. Another study conducted in Germany found that plants grown near waste dumps from uranium mining contained concentrations of uranium up to eight times higher than control plants grown in non-contaminated soil. M. Anke et al. “Uranium Transfer in the Food Chain from Soil to Plants, Animals, and Man,” *Geochemistry*, vol. 69 (2009), p. 78.

³³⁹ Tracy-Lynn Humby, “Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields,” *Revue générale de droit*, vol. 43 (2013), <http://www.erudit.org/revue/rgd/2013/v43/nrgd01063/1021211ar.pdf?vue=resume> (accessed April 29, 2016), p. 98. See also George Monbiot, “Christopher Busby’s Wild Claims Hurt Green Movement and Green Party,” blog, *The Guardian*, November 22, 2011, <http://www.theguardian.com/environment/georgemonbiot/2011/nov/22/christopher-busby-nuclear-green-party> (accessed April 29, 2016).

³⁴⁰ Environment.co.za, “FSE: Relocation from Toxic Mine Dump–Tudor Shaft/Dam Informal Settlement Area,” February 26, 2011, <http://www.environment.co.za/acid-mine-drainage-amd/fse-relocation-from-toxic-mine-dump-tudor-shaft-dam-informal-settlement-area.html> (accessed April 28, 2016) (quoting a letter from Busby to Mariette Liefferink, CEO, Federation for a Sustainable Environment). Busby measured an exposure level of 2900 nSv/h over an assumed background level of about 200 nSv/h. Chris Busby, “Radioactivity in the Upper Wonderfonteinsspruit Catchment Area: Review of National Nuclear Regulator Surveillance Report,” <http://earthlife.org.za/www/wp-content/uploads/2011/01/Prof-Busbys-review-of-NNRs-surveillance-report.pdf> (accessed March 27, 2016), p. 6.

³⁴¹ Bega, “Living in SA’s Own Chernobyl,” *Saturday Star*.

³⁴² National Nuclear Regulator, “Surveillance Report of the Upper Wonderfonteinsspruit Catchment Area,” p. 12. NNR stated that other sources of potential exposure included inhalation of dust in the air, ingestion by children playing in the soil, and radon exposure for residents. *Ibid*.



Residents of Tudor Shaft informal settlement lived in shacks on top of a radioactive tailings dam, until they were relocated in 2011. The rest of the community has remained at the foot of the dam, where gardens and playing children have been put at risk. © 2010 Bonnie Docherty/IHRC.

Direct Contact with Soil

People living in settlements on or near tailings dams reported that they have also routinely had skin contact with soil from the dumps. Children have been especially at risk. In 2014 a Tudor Shaft resident told IHRC, “Children play in this soil, and the soil is radioactive.”³⁴³ Similarly, Nomzamo Zondo, from the Socio-Economic Rights Institute (SERI), said, “Kids spend half the day outside ... running around, causing the dust to rise up.”³⁴⁴ SERI, a Johannesburg-based NGO, estimated that as of October 2014 about 1,800 people lived in the more than 445 shacks of Tudor Shaft, and that half of them were children.³⁴⁵ IHRC heard comparable accounts in 2012 from residents of Matholesville in the Central Rand and Block A and Soul City in the West Rand.³⁴⁶

In addition to touching the soil, children have been prone to ingesting it. Echoing the concerns of other parents in Tudor Shaft, one father told IHRC in 2012, “The children play and eat it. They don’t know. You have to watch them all the time.”³⁴⁷ The 2010 NNR study of Tudor Shaft and nearby communities recognized this threat to children, finding that “[a] likely exposure for the children would be ingestion of soil as children were playing on the ground with toys.”³⁴⁸

³⁴³ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014. See also interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012; interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, January 7, 2012 (“Our kids are playing [in it]. It is full of chemicals that can damage their skin.”); interview with Tudor Shaft resident #4 (name withheld), Tudor Shaft, January 7, 2012.

³⁴⁴ Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nomzamo Zondo).

³⁴⁵ Ibid. (statement of Nkosinathi Sithole).

³⁴⁶ A resident of Matholesville said that young children from his town played on the nearby tailings dam, and that he considered the area so toxic he would not bring his own children to live with him. Interview with Matholesville resident (name withheld), Matholesville, January 9, 2012. See also interview with Soul City resident #1 (name withheld), Soul City, January 14, 2012 (“You might see kids taking things from the dump to play with, and at the end of the day, they have a rash.”); interview with Block A residents #2, #3, and #4 (names withheld), Block A, January 8, 2012 (statement of resident #4) (Children play in the dust because “[t]here’s nothing for kids to play with.”).

³⁴⁷ Interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012.

³⁴⁸ National Nuclear Regulator, “Surveillance Report of the Upper Wonderfontein Catchment Area,” p. 12.

For adults as well as children, the possibility of skin contact with tailings has been greater during the rainy season.³⁴⁹ One Tudor Shaft resident, who had previously worked as a miner, told IHRC in 2012 that after heavy rains, floodwaters had risen high enough to bring contaminated water and sediment into the homes of Tudor Shaft.³⁵⁰ A man from Davidsonville said, “If you go through this whole park area, there’s a lot of slime coming down from the mines. That’s in the rainy season and in the winter there’s dust.”³⁵¹

Use of Traditional Medicines

Traditional medicines have served as another pathway of exposure to tailings. On each of its research visits, IHRC found evidence that some residents of the region, particularly women and children, ate small blocks of baked river sediments sold at local shops.³⁵² In many cases, the pica reportedly consisted of tailings.³⁵³ Local people have also used the tailings in order to create traditional medicines, which are known collectively as *muti*.³⁵⁴ While geophagy, the practice of eating soil, is more common elsewhere in Africa, immigrants have brought it to the West and Central Rand. In a survey conducted in a Johannesburg hospital, the SAMRC found that about 20 percent of pregnant women, and almost a third of pregnant women born outside of South Africa, said they ate soil.³⁵⁵



Local shops sell blocks of soil, known as pica, which residents eat because they believe it contains nutrients. Some pica has been cut from tailings dams in the area. © 2010 Bonnie Docherty/IHRC.

³⁴⁹ Interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012 (“The rain washes the yellow tailings down” and floods houses.). See also interview with relocated Tudor Shaft residents #2 and #3 (names withheld), Soul City Extension 2, January 15, 2012 (statement of resident #2) (remembering “water coming inside the room” at Tudor Shaft).

³⁵⁰ Interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012.

³⁵¹ Interview with Davidsonville residents #1 and #2 (names withheld), Davidsonville, January 10, 2012 (statement of resident #2).

³⁵² See, e.g., phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, April 21, 2015; email from Mindalore resident (name withheld), to IHRC, April 19, 2015; interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014; interview with Tudor Shaft resident #4 (name withheld), Tudor Shaft, January 7, 2012 (interviewee ate pica three days per week, and although she understood that eating pica could be dangerous, she continued to eat it because she “crave[d] it”); interview with group of Kgothlang School students (names withheld), Bekkersdal, March 16, 2010 (saying that they or their mothers ate pica).

³⁵³ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, April 21, 2015.

³⁵⁴ Ibid.; Frank Winde and Emile Hoffman, “Virtual Geographical Environments as a Tool to Map Human Exposure to Mining-Related Radionuclides,” in Broder J. Merkel and Alireza Arab, eds., *Uranium—Past and Future Challenges: Proceedings of the 7th International Conference on Uranium Mining and Hydrogeology* (Cham, Switzerland: Springer International, 2014), p. 194.

³⁵⁵ Of 307 pregnant women surveyed, 60 reported geophagic practices; this rate was almost twice as high for immigrants (19 out of 60) than for native South Africans (41 out of 247). Angela Mathee et al., “A Cross-Sectional Analytical Study of Geophagia Practices and Blood Metal Concentrations in Pregnant Women in Johannesburg, South Africa,” *South African Medical Journal*, vol. 104 (2014), p. 570.

Some local women also use contaminated soil as a skin treatment. IHRC researchers observed several women with the clay-like soil smeared on their faces in 2014 and 2012. A mother living in Tudor Shaft explained to the *Saturday Star* that spreading sediment on her skin “really works to cure pimples and other people in my area are using it.” She added, “I don’t think it can be bad for me.”³⁵⁶

Health Impacts

Expert studies of sites in other parts of the world have found that the contaminants in tailings can cause severe immediate and long-term health problems.³⁵⁷ While this report does not draw scientific conclusions about causality, the prevalence of symptoms among residents of the West and Central Rand combined with toxicological and epidemiological research elsewhere has raised serious concerns. As discussed more in Chapter 5, additional studies focused on this region should be done to gain a better understanding of the specific situation. The evidence has strongly suggested, however, that local exposure to contaminated tailings could have had adverse effects on human health or increased the risk of such harm occurring.

Immediate Effects

Respiratory Problems

The community members whom IHRC interviewed frequently referred to respiratory problems when they were asked about the effects of tailings dust. Residents of at least 10 communities in the West and Central Rand said that they believed that dust had caused breathing difficulties or given them or their family members chronic coughs or sinus irritation.³⁵⁸ In 2014, for example, two brothers living in Sinqobile said that they had been healthy until mining activities stirred up dust the previous year. At the time of their interview, both boys reported having

³⁵⁶ Sheree Bega, “Residents Use Radioactive Mud as Acne Cure,” *Saturday Star*, November 15, 2011, <http://www.iol.co.za/saturday-star/residents-use-radioactive-mud-as-an-acne-cure-1.1178933> (accessed March 15, 2016). See also email from Mindalore resident (name withheld), to IHRC, April 19, 2015 (“The red stone clay deposits that are dug and eaten are also used as a paste to combat skin problems such as acne and to color their faces for coming of age rituals and ceremonies.”).

³⁵⁷ Janae Csavina, “Metal and Metalloid Contaminants in Atmospheric Aerosols from Mining Operations,” *Water, Air, & Soil Pollution*, vol. 221 (2011), p. 150 (measurements near a tailings facility in Arizona showed concentrations of airborne arsenic ten times the WHO’s guideline level); Geoffrey S. Plumlee and Suzette A. Morman, “Mine Wastes and Human Health,” *Elements*, vol. 7 (2011), p. 402 (reviewing impact of tailings on nearby communities in Nigeria, the Philippines, and Zambia); Howard Hu, James Shine, and Robert O. Wright, “The Challenge Posed to Children’s Health by Mixtures of Toxic Waste: The Tar Creek Superfund Site as a Case-Study,” *Pediatric Clinics of North America*, vol. 54 (2007), p. 155 (discussing impact of Oklahoma mine tailings on children living nearby); Abraham Kumah, “Sustainability and Gold Mining in the Developing World,” *Journal of Cleaner Production*, vol. 14 (2006), p. 319 (list of major public-health impacts resulting from mine-related toxic contamination, including from tailings and mine waste).

³⁵⁸ See, e.g., interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statements of residents #1 and #3); interview with Davidsonville resident #6 (name withheld), Davidsonville, January 15, 2012 (daughter “coughing”); interview with Snake Park resident #1 (name withheld), Snake Park, January 15, 2012 (“I have TB [tuberculosis] because of the dust.”); interview with Davidsonville residents #4 and #5 (names withheld), Davidsonville, January 10, 2012 (statements of both) (“My older brother has breathing problems”; “My daughter is not breathing properly all the time. She is coughing a lot.”); interview with Meadowlands residents #1, #2, and #3 (names withheld), Meadowlands, January 10, 2012 (statement of resident #1) (My “[u]ncles died from TB because of [the tailings] dams.”); interview with Bram Fischerville residents #1 and #2 (names withheld), Bram Fischerville, January 9, 2012 (statement of resident #1) (“The dust is always in the chest.”); Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012 (“The little boy [interviewee’s grandson] has asthma ... My sister died of lung cancer. The doctors said it was a work hazard but she worked in retail. ... My mom died of asthma.”); interview with Senzeni Marasena, Central Johannesburg College staff member, and Central Johannesburg College staff members #1 and #2 (names withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012 (statement of staff member #1) (staff members have suffered from chronic sinusitis, which “takes [one staff member] away for a week once per month” and “has affected students beyond comprehension”); interview with Kagiso resident #1 (name withheld), Kagiso, January 8, 2012 (“[M]y wife has been coughing ... continuously through mornings and evenings.”); interview with Block A resident #1 (name withheld), Block A, January 8, 2012 (during August and September, “everyone is coughing”); interview with Tudor Shaft resident #4 (name withheld), Tudor Shaft, January 7, 2012; interview with Tudor Shaft residents #5 and #6 (names withheld), Tudor Shaft, January 7, 2012 (statement of resident #6) (experiencing “coughing”); interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, January 7, 2012 (experiencing “coughing,” sometimes with “a little blood”).

developed severe lung problems, including bronchitis.³⁵⁹ Charlie Sowa, also from Sinqobile, joked that dust was such a problem that “[people] would cough, and that is how we say hello.”³⁶⁰ Sowa and Ruth Masango of Meadowlands reported cases of asthma in their communities in 2014.³⁶¹ IHRC also collected testimony of widespread breathing problems on its earlier missions. For example, one interviewee, from Noordgesig in the Central Rand, told IHRC that many people in the area, including his whole family, suffered from asthma.³⁶² A resident of Tudor Shaft said that the dust “damages our lungs when we breathe it in—people are coughing a lot.”³⁶³

Numerous people across the West and Central Rand also reported having suffered from significant sinus irritations.³⁶⁴ In 2014, a Mindalore resident said that in his community, “[p]eople’s noses [are] bleeding, and throats and sinuses [are affected].”³⁶⁵ Several teachers from the Crown Mines campus of Central Johannesburg College in the Central Rand complained in 2012 of having sinus problems from the dust.³⁶⁶ One, who described the clouds of dust as “appalling,” told IHRC, “I’ve never in my life suffered from sinus problems, and now every day my sinuses are bad and I have itchy eyes.”³⁶⁷

Some medical research suggests there is a correlation between tailings dust and respiratory problems. For example, Professor Clark Lantz, deputy director at the University of Arizona’s Southwest Environmental Health Science Center, concluded that tailings dust can cause or exacerbate respiratory problems such as asthma and bronchitis, particularly in children and the

³⁵⁹ Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #3). The boys’ grandmother told IHRC that “[the government] found strategies to avoid answering” all of her families concerns. *Ibid.*

³⁶⁰ Interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 (statement of Charlie Sowa).

³⁶¹ *Ibid.*; interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Perth Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statement of Ruth Masango).

³⁶² Interview with Noordgesig resident #2 (name withheld), Noordgesig, January 13, 2012.

³⁶³ Interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, March 17, 2010. For accounts of asthma among children, see, e.g., interview with Davidsonville residents #1 and #2 (names withheld), Davidsonville, January 10, 2012 (statement of resident #2) (There are “a lot of young children with asthma.”). For accounts of asthma among adults, see, e.g., interview with relocated Soul City resident #2 (name withheld), Soul City Extension 2, January 15, 2012 (interviewee had asthma); interview with Noordgesig resident #2 (name withheld), Noordgesig, January 13, 2012 (“Lots of people in the area suffer from asthma. Sixty percent of people in this area [are] asthmatic. All in my family are asthmatic.”); interview with woman (name withheld), Central Johannesburg College, Highveld Campus, January 10, 2012 (interviewee diagnosed with asthma or bronchitis); interview with Davidsonville resident #3 (name withheld), Davidsonville, January 10, 2012; interview with Davidsonville residents #1 and #2 (names withheld), Davidsonville, January 10, 2012 (one interviewee had asthma); interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012 (interviewee’s grandson had asthma; mother died of asthma); interview with Tudor Shaft resident #7 (name withheld), Tudor Shaft, January 7, 2012 (interviewee had asthma).

³⁶⁴ See, e.g., interview with Block A residents #2 and #5 (names withheld), Block A, January 8, 2012 (statement of resident #5) (“My kids suffer sinus problems.”); interview with Bram Fischerville residents #1 and #2 (names withheld), Bram Fischerville, January 9, 2012 (statement of resident #2) (“I have sinus issues.”). In 2010, one interviewee, a former long-distance runner, lived in an informal settlement on the edge of the West Rand community of Kagiso, less than 100 meters from a tailings dam. She told IHRC, “My chest—sometimes I struggle to breathe. And my sinuses are killing me. It’s from the slime [tailings] dam.” Interview with Kagiso Extension 8 resident #2 (name withheld), Kagiso Extension 8, March 20, 2010.

³⁶⁵ Interview with Mindalore resident (name withheld), Mindalore, November 1, 2014.

³⁶⁶ See, e.g., interview with Central Johannesburg College lecturers #2, #3, and #4 (names withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012; interview with Central Johannesburg College lecturer #1 (name withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012 (“There are 16 lecturers [at Crown Mines College], and most are suffering from severe sinusitis—acute and chronic sinusitis.”); interview with Central Johannesburg College lecturer #5 (name withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012 (“There is dust everywhere. I had sinus problems before, but it’s gotten worse.”).

³⁶⁷ Interview with Central Johannesburg College lecturers #2, #3, and #4 (names withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012 (statement of lecturer #3).

³⁶⁸ Tony Davis, “UA Finds Tailings Have Troubling Tiny Particles,” *Arizona Daily Star*, July 21, 2010, http://tucson.com/news/science/environment/ua-finds-tailings-have-troubling-tiny-particles/article_3c5209e6-0e94-513e-8488-22867993fad8.html (accessed March 18, 2016) (“Depending on the dust levels that people living near the tailings breathed during the storms, the dust can provoke or aggravate symptoms of asthma and bronchitis, including coughing and wheezing, [Professor Clark Lantz] said. It also can cause irregular heartbeats, changes in heart rate and shortness of breath, he said. While all people can potentially be affected by high dust levels, children, the elderly and people with existing health problems will be most affected, he said.”).

elderly.³⁶⁸ A study, published in 2015, of adolescents living primarily in Gauteng province, which encompasses Johannesburg, found that “[a] high prevalence of wheeze (a symptom of asthma), and rhinoconjunctivitis among adolescents in communities located near mine dumps was observed.”³⁶⁹ Dr. Robin Green, a South African expert on childhood asthma, told IHRC in 2012 that it is “hard to prove” that mining-related pollution causes asthma and expressed doubts there is a link, but he added, “We’re long overdue for some research. I think we need to know.”³⁷⁰

Eye and Skin Irritation

Residents of at least six communities told IHRC they believed that contact with contaminated tailings had caused eye or skin irritation.³⁷¹ Ruth Masango, who lived in Meadowlands, reported in 2014 that the dust from the tailings dams had irritated her eyes, and she had to wear glasses to protect them, especially when it was windy.³⁷² Pertha Sesawanane of the same community said that rashes often appeared “when it’s dusty” and typically lasted four to five days.³⁷³ In 2012, IHRC documented a range of additional cases of skin problems, including psoriasis and general itchiness, particularly among children.³⁷⁴

Long-Term Effects

Exposure to toxic and radioactive tailings also has the potential to contribute to other more serious health problems. As noted in the previous chapter, ingestion of elevated concentrations of heavy metals can have significant long-term impacts, such as kidney damage and a greater likelihood of cancer.³⁷⁵ The uranium in tailings has presented risks in the West and Central Rand; an NNR study found that radiation was of particular concern in Tudor Shaft informal settlement located on and next to a tailings dam.³⁷⁶

³⁶⁸ Vusumuzi Nkosi, Janine Wichmann, and Kuku Voyi, “Mine Dumps, Wheeze, Asthma, and Rhinoconjunctivitis among Adolescents in South Africa: Any Association?” *International Journal of Environmental Health Research*, vol. 25 (2015), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4673552/> (accessed April 28, 2016), p. 597.

³⁷⁰ Interview with Dr. Robin Green, Director of Paediatric Services and Paediatric Pulmonology, Paediatric Intensive Care and Allergy Services, Steve Biko Academic Hospital, Pretoria, January 17, 2012.

³⁷¹ See, e.g., interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Pertha Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statements of Ruth Masango and Pertha Sesawanane); interview with Davidsonville resident #6 (name withheld), Davidsonville, January 15, 2012 (“Sometimes my eyes are burning, especially when it’s windy.”); interview with Snake Park resident #2 (name withheld), Snake Park, January 15, 2012 (interviewee’s eyes “turn red”); interview with Tudor Shaft residents #8 and #9 (names withheld), Tudor Shaft, January 14, 2012 (statement of resident #9) (interviewee suffered from itchy skin “[f]rom the soil”); interview with Tudor Shaft residents #8 and #9 (names withheld), Tudor Shaft, January 14, 2012 (statement of resident #8) (“Some of the babies have got sores.”); interview with relocated Tudor Shaft resident #4 (name withheld), Soul City Extension 2, January 14, 2012 (While living in Tudor Shaft, “[m]y kids had skin problems—rashes,” which a nearby clinic attributed to contact with the soil; the rashes disappeared after relocation.); interview with Central Johannesburg College lecturer #1 (name withheld), Central Johannesburg College, Crown Mines campus, January 9, 2012 (“In the dry season people get skin rashes and irritation when the dust blows. . . . The dust burns your eyes.”); interview with Matholesville resident #2 (name withheld), Durban Deep Primary School, Matholesville, January 9, 2012 (Tailings dust “hurts my eyes.”).

³⁷² Interview with Godfrey Makomene, Meadowlands community leader, Ruth Masango, Meadowlands resident, and Pertha Sesawanane, Meadowlands resident, Meadowlands, October 28, 2014 (statement of Ruth Masango).

³⁷³ *Ibid.* (statement of Pertha Sesawanane).

³⁷⁴ For example, a teenager who had suffered from psoriasis told IHRC that the doctors had identified tailings dust as one cause of his malady. He noted that he developed these skin problems only after moving to Davidsonville, which is located adjacent to a tailings dam. Interview with Davidsonville residents #4 and #5 (names withheld), Davidsonville, January 10, 2012 (statement of resident #4). See also interview with Davidsonville resident #6 (name withheld), Davidsonville, January 15, 2012 (interviewee’s daughter “plays outside and has a rash” that “looks like ringworm” and which “goes away and comes back” even with treatment); interview with Soul City resident #2 (name withheld), Soul City, January 7, 2012 (interviewee’s child had extensive skin rashes, preventing her from sleeping). Recognizing the risks, a mother of five children, living in Tudor Shaft, said that “the soil isn’t healthy for us and for our children,” and that it is “mixed with chemicals. It can harm us.” Interview with Tudor Shaft resident #11, Tudor Shaft, January 14, 2012. Adults have also been affected. See, e.g., interview with Meadowlands residents #1, #2, and #3 (names withheld), Meadowlands, January 10, 2012 (statement of resident #1) (interviewee complained of “[i]tchy skin.”).

³⁷⁵ A 1998 study noted, for example, that the long-term health threats to communities near tailings from uranium mines were “similar to that of nuclear workers.” W.W. Au et al., “Population Monitoring: Experience with Residents Exposed to Uranium Mining/Milling Waste,” *Mutation Research*, vol. 405 (1998), https://www.researchgate.net/publication/13536524_Population_monitoring_Experience_with_residents_exposed_to_uranium_miningmilling_waste (accessed April 28, 2016), p. 244.

³⁷⁶ National Nuclear Regulator, “Surveillance Report of the Upper Wonderfontein spruit Catchment Area,” p. 4.

Children, who have lived and frequently played on tailings dams, have faced especially serious health risks. Pre- and post-natal exposure to contaminants such as arsenic, cadmium, and lead can cause enduring harm to a child’s health, including neurological damage, skin lesions, and cancer.³⁷⁷ For example, a 2008 study of children in Rochester, NY, showed that low levels of lead exposure can lead to a decline of around five IQ points. While this figure may not seem significant, if it affected all children there would be “a 57 percent increase in the number of children categorized as mentally deficient.”³⁷⁸ Despite uncertainty about the full extent and severity of the health consequences of tailings in the West and Central Rand, existing research and testimonial evidence has raised serious concerns and demonstrated a need for rigorous new epidemiological studies in the area.

Rights and Duties

The problems of tailings, like those associated with AMD, have threatened the human rights that the people of the West and Central Rand are entitled to enjoy. In addition, the government response has fallen short of meeting the legal obligations associated with these rights. Effectively dealing with tailings is a monumental task given the number of waste dumps in the region. Even if one takes that challenge into account, however, the government’s actions have been insufficient. It moved some members of a particularly at-risk community, but that was only a partial fix for one situation. To deal with the broader problem, South Africa should take immediate steps to improve mitigation of ongoing harm and work actively toward implementing a more complete solution for the future.

Human Rights Concerns

The prevalence of tailings in the West and Central Rand has raised concerns under the rights to health and a healthy environment.³⁷⁹ The tailings have put people in contact with “harmful substances such as radiation and harmful chemicals,” a kind of exposure that the international right to health seeks to prevent.³⁸⁰ Furthermore, despite the protections laid out in the South African Constitution, mining waste, whether in the form of dust or soil, has created conditions that may be unacceptably “harmful to health or well-being.”³⁸¹ The dust blanketing communities has interfered with residents’ welfare and presented a health hazard that seems to have already caused respiratory problems. Contaminated soil has likely posed additional immediate and long-term health threats. Toxicity and radioactivity have impeded the ability

³⁷⁷ See, e.g., Habibur Ahsan et al., “Arsenic Exposure from Drinking Water and Risk of Premalignant Skin Lesions in Bangladesh: Baseline Results from the Health Effects of Arsenic Longitudinal Study,” *American Journal of Epidemiology*, vol. 163 (2006) (finding correlation between arsenic exposure and both skin lesions and impaired child development); Leticia Yáñez et al., “DNA Damage in Blood Cells from Children Exposed to Arsenic and Lead in a Mining Area,” *Environmental Research*, vol. 93 (2003) (finding that increased exposure to arsenic and lead in communities, as a result of proximity to mining sites, increased DNA damage); Claire de Burbure et al., “Renal and Neurologic Effects of Cadmium, Lead, Mercury, and Arsenic in Children: Evidence of Early Effects and Multiple Interactions at Environmental Exposure Levels,” *Environmental Health Perspectives*, vol. 114 (2006) (finding that lead, cadmium, and arsenic each induce physiological changes in children even at very low levels); Lars Jarup, “Hazards of Heavy Metal Contamination,” *British Medical Bulletin*, vol. 68 (2003), p. 167 (reviewing health hazards of heavy-metal exposure and noting that children “are particularly susceptible to lead exposure”).

³⁷⁸ Abby D. Benninghoff and Wendy Hessler, “Low Lead Exposures Lower Child Intelligence,” *Environmental Health News*, February 25, 2008, <http://www.environmentalhealthnews.org/ehs/news/science/low-lead-lowers-child-intelligence> (accessed March 18, 2016). Similarly, the Cincinnati Lead Study followed children from birth to between 19 and 24 years of age, tracking their blood lead concentration and finding that lead exposure correlated with neurological impact and behavior. David C. Bellinger, “Neurological and Behavioral Consequences of Childhood Lead Exposure,” *PLoS Med*, vol. 5 (2008), p. 691 (reviewing studies showing correlation between lead exposure and reduced grey-matter volume, and between lead exposure and arrest records).

³⁷⁹ These two rights are intertwined because, according to the CESC, one of the “underlying determinants of health” is a healthy environment. CESC, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 4.

³⁸⁰ *Ibid.*, para. 15.

³⁸¹ South African Constitution § 24(1).

to grow healthy food, an “underlying determinant[] of health.”³⁸² When children have played in the contaminated dirt outside their homes, their particular rights have been vulnerable to infringement.³⁸³ Due to the scale of the problem and the inadequate response thus far, tailings in the region could also endanger future generations to whom the right to a healthy environment applies.³⁸⁴ Residents’ limited access to information about these risks has implicated the right to information, which is discussed below in Chapter 5.

Tailings and in particular contaminated soil have further implicated the right to housing. According to the Committee on Economic, Social and Cultural Rights, “[a]dequate housing must ... protect [inhabitants] from ... threats to health,” and “housing should not be built on polluted sites nor in immediate proximity to pollution sources that threaten the right to health of the inhabitants.”³⁸⁵ Yet until relocated in 2011, some residents of Tudor Shaft lived directly on a radioactive tailings dam, and many communities have remained in the near vicinity. Furthermore, as discussed above, the post-apartheid government has also increased the risk of additional harm by allowing the construction of new homes very near to tailings dams.³⁸⁶

Inadequate Measures to Address Ongoing Harm

Although the mining waste that has accumulated over the past 130 years cannot be eliminated overnight,³⁸⁷ greater efforts could be made to suppress toxic dust and to remove or buffer communities from contaminated environments. The government, however, has taken few steps either to implement such measures itself or to ensure adequate implementation by industry, and thus has fallen short of meeting its human rights obligations.

Dust Control

The government has underutilized dust control measures that could reduce the adverse effects of tailings in the West and Central Rand. While irrigation and vegetation do not prevent exposure to contaminated soil or address the underlying problem of omnipresent tailings dams, they can help suppress the dust that permeates homes and causes respiratory problems. IHRC observed some sprinklers and plants on tailings dams in the region, but they were not widespread. Liefferink said dust control had not improved by 2016.³⁸⁸ The government has neither systematically implemented such measures at unclaimed legacy sites for which it should assume responsibility, nor has it ensured that mining companies have taken adequate steps to minimize dust originating from their operations.³⁸⁹

³⁸² CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 4.

³⁸³ CRC, art. 24; African Charter on the Rights and Welfare of the Child, art. 14.

³⁸⁴ South African Constitution, § 24(2).

³⁸⁵ CESCR, General Comment No. 4, The Right to Adequate Housing, para. 8(d), (f).

³⁸⁶ See, e.g., Mariette Liefferink, presentation to the South African Institute of Mining and Metallurgy, p. 11; interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

³⁸⁷ Interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metallurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014 (statement of senior official) (It has “taken 130 years to create the problem, so the solution to the problem is not going to be an overnight thing.”); Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014 (“As much as anyone would like this to be cleaned up instantaneously, it can’t be.”).

³⁸⁸ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

³⁸⁹ Evidence suggests the government could improve its enforcement of existing regulations on dust. Any activity that produces more than a certain minimum of dust requires a dust management plan under regulations promulgated pursuant to the National Environmental Management: Air Quality Act. Department of Environmental Affairs, “National Dust Control Regulations,” November 1, 2013, <http://faolex.fao.org/docs/pdf/saf128920.pdf> (accessed March 26, 2016), para. 4. The owners of tailings dams may also be obliged to take steps to limit heavy-metal contamination of the air or water, under the relevant statutes. See, e.g., National Environment Management: Air Quality Act, *Government Gazette*, No. 39 of 2004, https://www.environment.gov.za/sites/default/files/legislations/nema_amendment_act39.pdf (accessed March 26, 2016), § 42; National Water Act, No. 36 of 1998, https://www.dwa.gov.za/Documents/Legislature/nw_act/NWA.pdf (accessed March 26, 2016), § 19.

Watering down tailings can help reduce, although not eliminate, dust,³⁹⁰ yet the practice has been limited in the region. Residents of the Central Rand communities of Diepkloof, Meadowlands, and Snake Park told IHRC in 2012 that irrigation equipment had operated from time to time on tailings dams in their area.³⁹¹ During its three visits, however, IHRC saw sprinklers on only a small number of tailings dams. In 2014, a resident of Mindalore criticized mining companies for using community water to dampen mine roads in order to protect truck engines, rather than using it to suppress dust from the tailings dams.³⁹² Angela Mathee of the SAMRC told IHRC in 2014 that she observed insufficient use of irrigation at the remaining sites she visited for her research. She said, “I’ve seen [that the companies] have only one truck, dampening one spot, and the actual processing occurs at an entirely different spot.”³⁹³



Sprinklers and vegetation helped control dust at this tailings dam next to Riverlea in the Central Rand, but they did not eliminate the problem. The government has not ensured the systematic and effective use of such measures in the region. © 2012 Bonnie Docherty/IHRC.

³⁹⁰ Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nomzamo Zondo).

³⁹¹ Interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012 (recounting the neglect of irrigation projects begun under the previous administration); interview with Meadowlands residents #1, #2, and #3 (names withheld), Meadowlands, January 10, 2012 (statement of resident #1) (explaining that mining companies had planted grass and provided irrigation on a nearby tailings dump); interview with Snake Park resident #3 (name withheld), Snake Park, January 15, 2012 (explaining that irrigation of one tailings dam had stopped after the water pump was stolen); interview with Snake Park resident #2 (name withheld), Snake Park, January 15, 2012 (same).

³⁹² Interview with Mindalore resident (name withheld), Mindalore, November 1, 2014.

³⁹³ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

While theft of equipment has exacerbated the problem and may have deterred installation of sprinklers,³⁹⁴ greater efforts could have been made to take advantage of irrigation systems.

Grass and other vegetation have also helped to suppress dust in the West and Central Rand.³⁹⁵ A Department of Mineral Resources official said in 2016 that vegetation has been a more common dust control tool than irrigation and the department has required it as part of mine rehabilitation plans.³⁹⁶ In some cases vegetation has grown naturally, but in others it has been planted, especially by mining companies. In 2014, a senior mining official told IHRC that his company, which operated in the region, “vegetates ... the tailings dams,” particularly with barley, a nitrogen fixer that could help other indigenous vegetation grow.³⁹⁷ An AngloGold Ashanti official told IHRC in 2012 that vegetation on tailings dams can help “take up pollutants from the environment” although “you need a very specific type of vegetation to plant on the side of tailings [dams]” because the tailings are acidic.³⁹⁸

Vegetation has proven an effective means of dust control in some places. In 2015, a resident of Mindalore described it as “the number one solution to capping the mined area.”³⁹⁹ He explained that vegetation “binds the soil particles together through the plant root system and breaks the wind velocity and lift capacity. It also prevents soil erosion and the spread of the uranium and other more toxic heavy metal contamination to the flood plains and waterways which provide our drinking water and irrigation systems for our farm production of animals and vegetables.”⁴⁰⁰ One interviewee, who had been a long-distance runner, told IHRC that she developed sinus problems when she moved to a home in Kagiso that was less than 100 meters from a bare tailings dam.⁴⁰¹ When IHRC revisited the site in 2012, two years after interviewing her, it found plantings covered part of the dam, and her mother reported that she was no longer having trouble breathing.⁴⁰²

Several community members, however, told IHRC that vegetation had been inadequate and poorly maintained. Nolan Borman, a resident of Noordgesig, said in 2012, “On some dumps they put grass, but they’re not putting sufficient grass.”⁴⁰³ According to a resident of Bram Fischerville, “There should be grass covering the dust. There was grass.”⁴⁰⁴

³⁹⁴ Two people who lived in the Snake Park settlement mentioned that the pumps used for watering a nearby tailings dam were stolen about five years earlier and had not been replaced as of January 2012. Interview with Snake Park resident #2 (name withheld), Snake Park, January 15, 2012 (“There used to be [an irrigation system], but someone from the community stole [the] pumps.”); interview with Snake Park resident #3 (name withheld), January 15, 2012 (explaining that irrigation of one tailings dam had stopped after the water pump was stolen five years ago).

³⁹⁵ Interview with George Jackson, Fleurhof resident, Fleurhof, January 9, 2012 (“We fought for the tailings to be grassed. My drive used to be white from the dust during August and the windier months.”); interview with Meadowlands residents #1, #2, and #3 (names withheld), Meadowlands, January 10, 2012 (statement of resident #1) (stating that the mining companies had planted grass, which had ameliorated the dust problem). One man said that people (he did not know whom) had laid topsoil over the tailings and planted grass or trees. Interview with Kagiso Extension 8 resident #1 (name withheld), January 8, 2012 (“People came and put topsoil and at least it is better because there is grass and trees.”).

³⁹⁶ Phone interview with Mosa Mabuzza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Andreas Moatshe).

³⁹⁷ Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

³⁹⁸ Interview with AngloGold Ashanti official (name withheld), Johannesburg, January 13, 2012.

³⁹⁹ Email from Mindalore resident (name withheld), to IHRC, April 19, 2015.

⁴⁰⁰ *Ibid.*

⁴⁰¹ Interview with Kagiso Extension 8 resident #2 (name withheld), Kagiso Extension 8, March 20, 2010.

⁴⁰² Interview with Kagiso Extension 8 residents #3, #4, and #5 (names withheld), Kagiso Extension 8, January 8, 2012 (statement of resident #3).

⁴⁰³ Interview with Noordgesig resident #2 (name withheld), Noordgesig, January 13, 2012.

⁴⁰⁴ Interview with Bram Fischerville residents #1 and #2 (names withheld), Bram Fischerville, January 9, 2012 (statement of resident #2). See also interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012 (suggesting that the government “apply vegetation and put in sprinklers” as a short-term solution to the tailings dust problem).

The use of plants to suppress dust from tailings dams presents certain challenges that can be difficult to overcome. An AngloGold Ashanti official explained that his company had vegetated some tailings dams only partially “because there’s a challenge of the slope angles.”⁴⁰⁵ Another obstacle is the composition of tailings. “You can’t get anything to grow in [the dirt], partly because of its chemical characteristics, and because of its physical characteristics. There is no water-holding quality,” said Werner Eiselen, deputy director of reactive administrative enforcement at the Department of Environmental Affairs (DEA). “[T]here has not been a lot which establishes on these tailings dams, so you will always have a certain amount of legacy that remains.”⁴⁰⁶ Nevertheless, the government could do more to promote the use of this dust control measure.

The government and industry have allowed destruction of existing vegetation. In particular, they have failed to protect tailings dams from recreational users. These people do not live in the local settlements but have used the hills of waste for motor biking or “tailings boarding,” which resembles snowboarding.⁴⁰⁷ The activities have torn up the plants, eroded any topsoil, and exacerbated the dust problem. George Jackson of Fleurhof in the Central Rand said, “Now the leisure bikers are using the dumps that we have already grassed. They are riding for their pleasure, which erodes the vegetation. They don’t worry because it’s far from their homes.”⁴⁰⁸ IHRC observed motor biking in the West Rand in 2012 and 2010. Mariette Liefkerink confirmed that the practice continued in 2016 and called for tailings dams “to be fenced off with clear warning signs.”⁴⁰⁹

In addition, the government’s Working for Water program has potentially interfered with the use of vegetation as a dust control measure. The program has sought to increase employment and protect the region’s water supply by hiring South Africans to remove alien plant species that could adversely affect biological diversity, the local ecology, and water security.⁴¹⁰ Non-native plants generally pose a threat to the environment, but many of the species best able to grow on tailings, including vetiver and acacia, have been considered invasive and thus removed.⁴¹¹ While it is unclear whether the program’s work on the tailings dams in the balance has benefited or harmed the environment, critics of the program point out that the plants had helped suppress dust and their removal has exacerbated the dust problem.⁴¹² A resident of Mindalore wrote IHRC in 2015 that after the Working for Water program removed vegetation on dams near his community, “there has been a noticeable increase [in dust], worse than ever. The vegetation would act as a windbreak.”⁴¹³

⁴⁰⁵ Interview with AngloGold Ashanti official (name withheld), Johannesburg, January 13, 2012.

⁴⁰⁶ He concluded, “So you will always have a certain amount of residual dust coming from these structures.” Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁴⁰⁷ Phone interview with Mariette Liefkerink, CEO, Federation for a Sustainable Environment, April 21, 2015.

⁴⁰⁸ Interview with George Jackson, Fleurhof resident, Fleurhof, January 9, 2012. See also interview with Snake Park resident #3 (name withheld), January 15, 2012 (“The white people ride motorbikes [on the tailings dams] and make the dust worse.”).

⁴⁰⁹ Phone interview with Mariette Liefkerink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁴¹⁰ Department of Environmental Affairs, “Working for Water (WfW) Programme,” 2016, <https://www.environment.gov.za/projectsprogrammes/wfw> (accessed June 17, 2016).

⁴¹¹ Vetiver, for example, “has a deep-rooted structure,” and can “grow in hostile environments.” Interview with Mindalore resident (name withheld), Mindalore, November 1, 2014.

⁴¹² See, e.g., *ibid.*; phone interview with Mariette Liefkerink, CEO, Federation for a Sustainable Environment, April 21, 2015.

⁴¹³ The resident continued, “But the vegetation is recovering fast and coming back with a vengeance. Hopefully our ‘responsible and clever’ authorities will forget about the superficial job creation program for a while, that being the case we will have cleaner air.” Email from Mindalore resident (name withheld), to IHRC, April 19, 2015.

Relocation

The government's most notable accomplishment in addressing the dangers of tailings in the region has been to relocate community members who lived directly on the tailings dam in Tudor Shaft. The families' new homes presented fewer health risks, but the relocation project was narrow in scope and failed to provide a satisfactory, long-term living situation for the affected households.

While the dangers faced by the residents of Tudor Shaft had existed for years, the government took significant action against a backdrop of outside pressure. The informal settlement "was created in 1996 when the local government forcibly relocated hundreds of people to this site from another informal settlement a few kilometres away."⁴¹⁴ An abandoned mine building at the site is dated 1934, predating the settlement by more than 60 years. After the media and NGOs publicized the dangerous living conditions in Tudor Shaft and other parts of the Wonderfontein spruit, the NNR conducted a study of radiation risks from tailings dams in the region.⁴¹⁵ Its 2010 report concluded that areas in the West Rand, including Tudor Shaft, were "high radiation risk areas," but that "the level of radiological risk is acceptable and is within the NNR limits for this category of hazard."⁴¹⁶ A peer review of NNR's study commissioned by FSE subsequently alleged that calculation errors had led to an underreporting of radiological risk.⁴¹⁷ In February 2011, after the release of the review, NNR recommended the relocation of the residents of Tudor Shaft living directly on the settlement's mound of tailings and asked the Mogale City municipality to execute it.⁴¹⁸ The municipality moved those families to a section of a neighboring informal settlement known Soul City Extension 2.⁴¹⁹

The relocation program was an insufficient solution to the dangers presented by tailings in the region. First, relocation did not extend to families living at the foot of, but not directly on, the Tudor Shaft tailings dam. In 2014, one Tudor Shaft resident expressed his frustration with the government's failure to take further action.⁴²⁰ He told IHRC that community members have been afraid of "sickness" from the tailings dam, and that they "all must try [to get] out of this place" and be moved "to a proper shelter."⁴²¹ In particular, the resident emphasized concern for the children who would grow up next to the tailings dam, play in the contaminated soil, and potentially develop illnesses that could linger throughout their lives.⁴²² Such disillusionment and fears were not new. During interviews conducted by IHRC in 2012, multiple residents of Tudor Shaft said they wished to be relocated to escape the soil contamination in the settlement.⁴²³ "We should move where I can plant cabbage, beetroot, and everything ...," said one father. "Give us a better place where we can stay—like a person."⁴²⁴ Other residents of

⁴¹⁴ York, "Inaction on Waste Condemns South Africa's Poor to Life in Toxic Dumps," *Globe and Mail*.

⁴¹⁵ National Nuclear Regulator, "Surveillance Report of the Upper Wonderfontein spruit Catchment Area," p. 5.

⁴¹⁶ *Ibid.*, p. 4. See also Humby, "Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields," *Revue générale de droit*, p. 97.

⁴¹⁷ Busby, "Radioactivity in the Upper Wonderfontein spruit Catchment Area: Review of National Nuclear Regulator Surveillance Report."

⁴¹⁸ Francis Hweshu, "Parliament Presses on for Tudor Shaft Community Relocation," *BuaNews*, March 1, 2011, <http://www.sanews.gov.za/south-africa/parliament-presses-tudor-shaft-community-relocation> (accessed March 27, 2016).

⁴¹⁹ While IHRC could not confirm the exact number of people relocated, Mariette Liefferink of FSE stated that only about 13 shacks were moved. Presentation and tour by Mariette Liefferink, CEO, Federation for a Sustainable Environment, West Rand, January 6, 2012.

⁴²⁰ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014 ("The role of the local government is to guard the communities.")

⁴²¹ *Ibid.*

⁴²² *Ibid.*

⁴²³ Interview with Tudor Shaft residents #5 and #6 (names withheld), Tudor Shaft, January 7, 2012 (statement of resident #6); interview with Tudor Shaft resident #3 (name withheld), Tudor Shaft, January 7, 2012.

⁴²⁴ Interview with Tudor Shaft resident #2 (name withheld), Tudor Shaft, January 7, 2012.

Tudor Shaft reported that they had repeatedly asked local officials to relocate them but were generally met with responses of "next year, next year."⁴²⁵ Despite reports that the government was building new homes for the members of the community, as of July 2016 there had been no additional relocations since the initial ones.⁴²⁶

Second, while the people moved to Soul City Extension 2 found healthier living conditions than in their old settlement,⁴²⁷ they were still vulnerable to exposure to tailings dust. IHRC observed that their new homes were located near another tailings dam, although not as close as those remaining in Tudor Shaft. Many of these individuals told IHRC that the government had promised them formal housing to replace their shacks.⁴²⁸ FSE's Liefferink said in July 2016 that she was unaware of any of the relocated households leaving Soul City Extension 2.⁴²⁹

Finally, the government's relocation of the most at-risk residents of Tudor Shaft did not begin to address the larger issue, namely the proximity of many settlements in the West and Central Rand to tailings dams. The government appears not to have initiated comparable relocations of other communities situated near tailings dams. Moreover, instead of advancing the rights of people exposed to the harms by moving them away from the contamination, the government, as discussed above, has allowed the construction of new homes adjacent to waste dumps in the West and Central Rand, thus contravening its human rights obligations.

South Africa's efforts to address the ongoing harm caused by tailings in the West and Central Rand have to date been inadequate to meet its human rights obligations. The government has not ensured widespread adoption of measures to suppress dust, and its relocation of Tudor Shaft residents, while essential, benefited only that community. As a result, contaminated tailings have continued to endanger the local population. The government should take steps to remedy the situation, comparable to those IHRC recommended for dealing with AMD. For example, it should require cleanup, commission studies, provide for health screening and medical care, and consider compensation. The government should also help prevent repetition of the problem by ensuring greater use of measures to mitigate dust, relocating other at-risk communities to adequate housing, and prohibiting the building of new homes in toxic areas.

Need for a More Complete Solution

Short-term fixes and remedial measures have an important role to play in reducing the adverse effects of mining, but the West and Central Rand also needs a more complete solution

⁴²⁵ Interview with Tudor Shaft residents #5 and #6 (names withheld), Tudor Shaft, January 7, 2012 (statement of resident #6).

⁴²⁶ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 11, 2016. Mogale City Local Municipality and South Africa's Housing Development Agency have reportedly set aside funds to develop housing and infrastructure outside of Tudor Shaft, but some residents of the settlement have resisted relocation. Ntombi Nkosi, "Residents Reject New Houses," *The New Age Online*, January 25, 2016, <http://www.thenewage.co.za/residents-reject-new-houses/> (accessed May 7, 2016); Chantelle Fourie, "West Rand Protester 'Killed' by Police Casspir," *The Citizen*, January 27, 2016, <http://citizen.co.za/964350/west-rand-protester-killed-by-police-casspir/> (accessed May 7, 2016).

⁴²⁷ See, e.g., interview with relocated Tudor Shaft resident #4 (name withheld), Soul City Extension 2, January 14, 2012 (interviewee's children suffered from rashes while living in Tudor Shaft, but they stopped occurring after relocation); interview with relocated Tudor Shaft resident #5 (name withheld), Soul City Extension 2, January 14, 2012 (interviewee's chronic rash stopped recurring after relocation); interview with relocated Tudor Shaft resident #1 (name withheld), Soul City Extension 2, January 14, 2012 (interviewee's cough stopped after relocation).

⁴²⁸ Several relocated Tudor Shaft residents said that the government had told them they would only be in Soul City Extension 2 temporarily, but had not given them a timeline for a second move. See, e.g., interview with relocated Tudor Shaft residents #2 and #3 (names withheld), Soul City Extension 2, January 15, 2012 (statement of resident #2); interview with relocated Tudor Shaft resident #5 (name withheld), Soul City Extension 2, January 14, 2012.

⁴²⁹ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

that addresses the prevalence of contaminated tailings in close proximity to densely populated neighborhoods. Industry has approached the problem through re-mining operations and proposals to transport tailings to remote mega dumps. In contrast to its increasing involvement in treating AMD, however, the government has not engaged significantly in the development of a long-term solution to the tailings problem. The government should take action on this front in order to help realize the human rights of the region's residents.

Remining

Remining in South Africa has been a for-profit enterprise that has had positive and negative effects on the environment. Rather than digging deeper into existing mines, which has largely become prohibitively expensive, companies have reprocessed waste from earlier operations. They have used more efficient modern technology in order to extract gold left behind by older and cruder equipment. The financial gains of remining have incentivized companies to process and remove tailings, which has in turn helped consolidate waste and eliminate tailings dams in populated areas. As an AngloGold Ashanti official explained, "The idea is to reprocess and then relocate those dams to more stable, much more suitable areas."⁴³⁰ In addition, because uranium has become profitable to extract, remining has had the capacity to produce cleaner tailings by removing that radioactive element.⁴³¹ According to Mariette Liefferink of FSE, Sibanye Gold's remining and removal of Sand Dump No. 20, one of the world's largest tailings dams, which had been located across from the Amberfield development, was "quite a success." Liefferink reported that by 2016, grass was growing on natural soil in its footprint.⁴³²



This remining operation, shown in 2014, had almost completely eliminated Sand Dump No. 20 by 2016. While such reclamation has helped address the tailings problem, it must be done carefully because the process stirs up contaminated dust. © 2014 Bonnie Docherty/IHRC.

⁴³⁰ Interview with AngloGold Ashanti official (name withheld), Johannesburg, January 13, 2012.

⁴³¹ Ibid.

⁴³² Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

While remining has had the potential to reduce some risks posed by tailings, it has had other shortcomings from an environmental and health perspective. The process of remining has exacerbated the health threat posed by tailings because disturbing the waste increases dust and radiation exposure. Commenting in 2014 on the increase in remining in the area, Angela Mathee of the SAMRC said, "At this moment, I think exposure levels are probably higher than they have been for a long time. ... During that processing time, people are highly exposed."⁴³³ The same year, IHRC heard reports of multiple West and Central Rand communities, such as Mindaloro and Riverlea, experiencing adverse effects from nearby remining.⁴³⁴ By 2016, the remining of a tailings dam near Riverlea was nearing completion and the tailings were almost gone, but during the process, "the community suffered significantly from the dust."⁴³⁵

The nature of remining has made it difficult to avoid an increase in dust. An AngloGold Ashanti official told IHRC that remining "makes it challenging for concurrent rehabilitation because if you plan to dig it up, how much vegetation do you plant?"⁴³⁶ When a tailings dam is being remined, he said, "you can't really do containment [of contamination] because there's always an exposed area of the dam."⁴³⁷ FSE's Liefferink explained that "if you're diligent and spray [water] while remining, that will suppress the dust."⁴³⁸ The use of water for dust control and remining must be carefully managed through collection in lined dams, however, because the low quality water that companies employ can create new AMD.⁴³⁹



Remining can generate AMD because it uses water cannons to process the tailings, as shown here at the Sand Dump No. 20 reclamation site. © 2014 Bonnie Docherty/IHRC.

⁴³³ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

⁴³⁴ See, e.g., interview with Mindaloro resident (name withheld), Mindaloro, November 1, 2014 (reporting dust problems resulting from remining in Mindaloro and Riverlea).

⁴³⁵ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁴³⁶ Interview with AngloGold Ashanti official (name withheld), Johannesburg, January 13, 2012.

⁴³⁷ Ibid.

⁴³⁸ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁴³⁹ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

Remining by itself cannot eliminate the threats to the environment and human health. Although some companies have been extracting uranium in addition to gold,⁴⁴⁰ remining does not remove all contaminants from the tailings.⁴⁴¹ It also leaves behind a crust of salts on which few plants can grow,⁴⁴² and the sites of former tailings dams cannot always be returned to a usable state.⁴⁴³ In addition, some companies may abandon remining projects if the grade of gold is too low to be profitable, which leaves communities exposed to the open and unremediated mine tailings.⁴⁴⁴ Because remining has been a for-profit venture, the government has not been engaged directly in the practice itself. It could consider encouraging additional reprocessing of tailings in order to decrease contamination, although only if the process is performed carefully to minimize the harms discussed above.

The government has recently sought to promote remining of legacy mines through a proposed amendment to the Mineral and Petroleum Resources Development Act (MPRDA). The new law, still being debated as of June 2016, would allow DMR to grant “reclamation permits” for unclaimed mines. Mosa Mabuza, deputy director-general of mineral policy and promotion at DMR, explained, “Our intention is to be able to deal with the legacy of dumps.”⁴⁴⁵ Owners of abandoned mines or waste dumps would have two years to apply for reclamation permits that would grant them the right to remine the remaining material for residual gold. If the owners failed to apply for a license within that period, mining rights to the tailings would expire.⁴⁴⁶ The amendment aims to capitalize on the potential profitability of remining to incentivize and expedite operations. While the amendment, if adopted, could help eliminate more old tailings dams, the government will still need to formulate a plan for any legacy sites that remain unclaimed.

Mega Dumps

Given the prevalence of tailings dams in the West and Central Rand, the government must also address the proximity of waste to populated areas. One option that has been explored by industry could be a piece of the solution to mitigating the tailings problem: the creation of mega dumps. The proposal involves removing tailings and consolidating them into giant dumps located a safe distance away from any human settlements. It could be done in conjunction with remining in order to maximize efficiency and reduce cost.

Several companies have investigated the possibility of creating mega dumps. Mark Brune, chairman of Mintails, told IHRC in 2014 that his company had proposed a mega dump of up

to one billion metric tons.⁴⁴⁷ He suggested that the dump be “coordinated by the government with a toll charge for companies depositing into it, which builds up a trust to close it.” This approach would enable the government to receive some funding while mining companies are still active in the region.⁴⁴⁸ Brune also suggested that the mega dump could be used as a site for biofuel production or other revenue-generating activity. Such use would provide money to help maintain the facility, and allow the dump to somewhat mitigate the environmental impact of mining waste.⁴⁴⁹ As of May 2016, severe financial constraints had prevented Mintails from pursuing the proposal further.⁴⁵⁰

Sibanye Gold has also been developing a remining and mega-dump project, the West Rand Tailings Retreatment Project (WRTRP). The plan has called for remining existing tailings for gold and uranium and then moving the remaining material into one “central deposition site” at the company’s West Witwatersrand operations.⁴⁵¹ According to James Wellsted, senior vice president of investor relations at Sibanye Gold, the WRTRP would benefit local communities and the environment. Unlike some existing tailings dams, the new facility would be “properly constructed” so as to contain the contaminants, and harmful uranium and sulfur would be removed.⁴⁵² The project could cost approximately R9 billion.⁴⁵³ Sibanye Gold concluded an internal feasibility study on the WRTRP and began the process of obtaining the necessary permits in the summer of 2015.⁴⁵⁴ Since then, the company has commissioned a stakeholder survey, which is part of the requirement to develop an environmental impact assessment for the project.⁴⁵⁵ In May 2016, Wellsted wrote IHRC that the company was working to obtain permits and secure financing, and that it expected to take the proposal to its board of directors for approval in the next six months.⁴⁵⁶

Mega dumps have the potential to contribute to environmental protection. NNR wrote to IHRC that although it would require a safety assessment report before approving such a facility, “[i]n principle, the NNR would support the idea of mega dumps because it does lead to consolidation of several sources of exposure and hence it become[s] easier to manage and may lead to a decrease in exposure by some members of the public.”⁴⁵⁷ Andreas Moatshe, chief director of mine environmental management at DMR, had a similar reaction to the mega-dump proposal as NNR. While DMR would require an environmental impact assessment, Moatshe said, “We welcome any initiative which would assist us with any challenges experienced in the country.”⁴⁵⁸

⁴⁴⁰ See, e.g., interview with AngloGold Ashanti official (name withheld), Johannesburg, January 13, 2012 (“We’re looking to sterilize the tailings before we put [them] back again.”).

⁴⁴¹ Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁴⁴² Ibid. See also Skype interview with Mariette Lieferrink, CEO, Federation for a Sustainable Environment, July 8, 2016.

⁴⁴³ Interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metallurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014 (statement of senior official) (explaining that if the tailing footprints could be used, the area would be “properly vegetated” and maintained, and Sibanye Gold would retain environmental liability until it could get a waiver).

⁴⁴⁴ Presentation and tour by Mariette Lieferrink, CEO, Federation for a Sustainable Environment, West Rand, October 27, 2014 (discussing a company that had begun a remining operation in one area, but abandoned it after finding that the concentration of gold in the tailings was too low for the project to be profitable).

⁴⁴⁵ Phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

⁴⁴⁶ Mineral and Petroleum Resources Development Amendment Bill, No. B15–2013, https://juralaw.co.za/media/filestore/2013/06/b015_2013.pdf (accessed March 28, 2016), § 29 (proposing insertion of new § 42A). The bill has been delayed several years, and its fate is uncertain. See SabinetLaw, “MPRDA Bill Referred to House of Traditional Leaders,” March 3, 2016, <http://www.sabinetlaw.co.za/mining-and-energy/articles/mprda-bill-referred-house-traditional-leaders> (accessed July 12, 2016).

⁴⁴⁷ Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014.

⁴⁴⁸ Ibid.

⁴⁴⁹ Ibid.

⁴⁵⁰ Email from Sylvan Montshonyane, Stakeholder Relations Manager, Mintails Ltd., May 31, 2016.

⁴⁵¹ Interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metallurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014 (statement of James Wellsted).

⁴⁵² Email from James Wellsted, Senior Vice President of Investor Relations, Sibanye Gold, to IHRC, May 9, 2016.

⁴⁵³ Ibid. A senior official at another mine in the region described Sibanye Gold’s plan as “a fantastic project.” Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

⁴⁵⁴ Sibanye Gold, “Sibanye Gold Reports Significantly Improved Operating Results for the June Quarter,” August 6, 2015, <https://www.sibanyegold.co.za/investors/news/company-announcements/2015/item/164-sibanye-reports-improved-operating-results-june-quarter> (accessed March 28, 2016).

⁴⁵⁵ See Digby Wells Environmental, *The West Rand Tailings Retreatment Project: Public Participation Report*, January 2016, <https://s3-eu-west-1.amazonaws.com/s3.amazonaws.com/sourceafrica.net/documents/24557/GOL2376-SGL-PPP-Report-DEIAR-29012016-Final-D1.pdf> (accessed March 28, 2016).

⁴⁵⁶ Email from James Wellsted, Senior Vice President of Investor Relations, Sibanye Gold, to IHRC, May 9, 2016. Wellsted added that Sibanye Gold would “involve the community at the appropriate time.”

⁴⁵⁷ Letter from C.O. Phillips, Senior Manager, Safety Assessment Review and Authorization, National Nuclear Regulator, to IHRC, May 27, 2015 (enclosing “NNR Response to Harvard University Questions,” May 2015).

⁴⁵⁸ Phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Andreas Moatshe).

FSE's Mariette Liefferink agreed that mega dumps could be a good idea if companies remained and managed the facilities responsibly.⁴⁵⁹ She explained that unlike earlier dams, a new mega dump could be lined and built on shale rather than porous dolomite. It could also be designed with a more gradual slope, which would reduce dust.⁴⁶⁰ She told IHRC, "The best practical environmental option is to reclaim tailings dams and move them off dolomite into lined areas and in better engineered regional tailings storage facilities ... that won't have an impact on communities."⁴⁶¹

A number of issues must be resolved to make mega dumps effective from a health and environmental perspective. First, the new dumps must be carefully capped and sealed to prevent the spread of contamination.⁴⁶² Second, tailings should not be moved to a location where they will simply affect other people. Stella Adams, a resident of Diepkloof, said, "They shouldn't move the dump from me and dump it in your yard. If that happens, someone else will suffer. How can you take my rubbish and dump it in your yard?"⁴⁶³ Third, the expense of moving the tailings and then maintaining the dump sites in perpetuity must also be taken into account. A mining official recommended establishing a permanent trust that would pay for ongoing costs associated with the projects.⁴⁶⁴ Finally, stakeholders should agree on predetermined, sustainable land use for the former sites of the relocated tailings dams.⁴⁶⁵ Liefferink said, "Sustainable land use does not mean you have to restore it to pre-mining conditions. New land use can be wind farms, solar panels, industrial facilities, landfills, or graveyards."⁴⁶⁶

In interviews with IHRC, industry representatives called for more active government involvement in the planning of mega dumps and other projects to deal with contaminated mining waste. According to Sibanye Gold officials, the national government has contributed little in this area and the local government has been challenging to work with.⁴⁶⁷ Mark Brune of Mintails told IHRC in 2016, "[I]t is in the interest for the government to take a more proactive role in coordinating disposal in a manner that is technically up to date and in an economically and environmentally sustainable manner."⁴⁶⁸ In 2014, a senior official at a different company said long-term plans "depend on the proactive role of the government" because industry is financially "ailing."⁴⁶⁹ Another mining official warned that the "responsibility [of remediation] will fall to the state at some point."⁴⁷⁰ Because the environmental liability in the region exceeds the value of gold remaining, mining companies will eventually leave or cease to exist. Therefore, that official predicted, the window for formulating an effective remediation plan aided by mining companies is "within the next 10 years."⁴⁷¹

Despite the challenges of dealing with tailings dams, South Africa must strive for full realization of the human rights to health, a healthy environment, and housing. At this point, however, the government has left industry to take the lead on the design and implementation of steps

to meet that goal. In addition to implementing the enhanced short-term fixes and remedial measures described above, the government should play a more active role in developing a long-term strategy to address tailings. It should evaluate and regulate industry proposals, including re-mining operations and mega-dump construction, for safety and effectiveness. It should also, if necessary, consider other proposals for supplementary or alternative approaches. The government should then operationalize the chosen options itself or in partnerships with stakeholders, and increase oversight and monitoring of industry efforts to minimize exposure to tailings and the harm that results. It should ensure any solution encompasses both privately owned mine sites and legacy mines that have reverted to the state.

⁴⁵⁹ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁴⁶⁰ Ibid.

⁴⁶¹ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

⁴⁶² Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

⁴⁶³ Interview with Stella Adams, Diepkloof resident, Diepkloof, January 9, 2012.

⁴⁶⁴ Skype interview with senior mining company official (name withheld), November 2014.

⁴⁶⁵ Email from Mariette Liefferink, CEO, Federation for a Sustainable Environment, to IHRC, May 28, 2016.

⁴⁶⁶ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

⁴⁶⁷ Interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metallurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014.

⁴⁶⁸ Email from Mark Brune, Chairman, Mintails Ltd., to IHRC, May 31, 2016.

⁴⁶⁹ Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

⁴⁷⁰ Skype interview with senior mining company official (name withheld), November 2014.

⁴⁷¹ Ibid.

5. Information and Participation

The inadequacy of measures to involve local people in mining-related matters has exacerbated the problems created by acid mine drainage and tailings. Residents of the West and Central Rand have often been poorly informed about environmental health risks due to insufficient warnings and inadequate scientific studies. They have had little notice of new operations or mitigation efforts. In addition, community members have frequently been left out of policy-making processes. The situation has interfered with their ability to protect themselves and led to violence, litigation, and feelings of mistrust. It has also infringed on residents' human rights to receive information and to participate in decisions that affect their lives.

The government has contributed to the situation by failing to meet its obligations to promote these rights. While it has recently supported new research to fill a long-standing gap in epidemiological information, it has been slow to do so and it could have done more. It has also made several key policy decisions without engaging or even notifying residents in advance. Attitudes may be changing, but industry, too, has a weak record of informing or working with communities. Going forward, the government should take steps to ensure that its representatives and mining companies provide residents with greater access to pertinent information and the opportunity to participate in decisions about mining.

Limited Access to Information

Communities in the West and Central Rand have for many years had limited access to information about the impacts of mining. Information can take a variety of forms including *in situ* warnings, scientific studies, and advance notice of proposed projects, but they have all been insufficient. The dearth of information available to the people affected by mining has impinged on their awareness and understanding of the situation and thus magnified the threats they face. It has also deprived them of data necessary to identify better protections for the environment and their health.

Warnings

Residents of the region have not always received the most basic information about the dangers of specific sites. While government agencies and mining companies have posted signs and constructed fences around some hazardous areas,⁴⁷² such warnings have not been present in all locations and have often been poorly maintained.⁴⁷³ In 2014, several people from Sinqobile complained that there were no barriers separating their community from a mine site across the street.⁴⁷⁴ "Kids are playing really close. There's no sign. There's nothing," said one member of the community.⁴⁷⁵ The same year, Sanny Mogoje told IHRC that neither government nor industry had alerted the people of Bekkersdal to the contamination of Donaldson Dam and its channel. "People don't know about the problems. ... The water looks like a nice

⁴⁷² For example, during its multiple visits to the region, IHRC observed warning signs at Robinson Lake and by a pipe that at one point released untreated AMD into the Tweelopiespruit near the Krugersdorp Game Reserve.

⁴⁷³ For example, the contaminated tailings dams IHRC visited rarely had warning signs or barriers. IHRC also saw unfenced open mine pits next to the Tudor Shaft informal settlement that endangered children who played in the area. In the Central Rand, IHRC observed many people following a well-worn path over a tailings dam into the community of Meadowlands and saw no barrier or sign to discourage them.

⁴⁷⁴ See, e.g., interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 ("They promised they would make a fence, but they did not. Kids play over there [in the mine area].").

⁴⁷⁵ Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #1). Earlier that year, DMR suspended Mintails' mining operations in part because of a failure to install warning signs around the perimeter of the site near Sinqobile. "Shabangu Suspends Mintails Mine," *Independent Online*, January 17, 2014, <http://www.iol.co.za/business/companies/shabangu-suspends-mintails-mine-1633182#.VYpP3vVhBc> (accessed May 6, 2016).

place to go swimming. [The government and industry] should put up posters, fences. Right now there is easy access,” he said.⁴⁷⁶



Signs posted in 2010 alerted paying visitors to the Donaldson Dam recreational area about the hazards of contaminated water. These notices had disappeared by 2012, and Bekkersdal residents accessing the dam's other side through a broken fence have not received comparable warnings. © 2010 Bonnie Docherty/IHRC.

The situation at Donaldson Dam exemplifies the inconsistency and inadequacy of information provided to the public. In March 2010, IHRC observed signs within the Donaldson Dam recreation area, visible only to those who paid admission, cautioning people not to use the dam for drinking, swimming, watering cattle, irrigating gardens, or washing clothes; the signs were gone in January 2012. In 2016, Lucas Moloto sent IHRC a photograph of a sign posted by the Gauteng Provincial Government at the entrance to recreational area that read in three languages:

For your own health:

- Do not swim in this water
- Do not drink this water
- Do not use this water to wash your food.⁴⁷⁷

The notice represented a step toward better communication, but Moloto reported finding no comparable signs on the community side of Donaldson Dam or near its adjacent overflow channel. This absence is significant because residents have had easy access to the polluted dam through holes in the concrete and rebar palisade around the dam's recreational area. Moloto documented at least three large gaps in the barrier in 2016,⁴⁷⁸ and IHRC found many

⁴⁷⁶ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

⁴⁷⁷ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016.

⁴⁷⁸ Ibid. As mentioned earlier, however, Moloto said that surveillance security had increased, which had helped to reduce illegal fishing in the dam.

breaks in the fence and no community warning signs during its earlier field trips to Bekkersdal. Theft has been a major hurdle to maintaining signs and barriers because local people steal them for scrap metal.⁴⁷⁹ Nevertheless, the government and industry should continue and increase efforts to provide effective warnings to the people living in the area.



Large gaps in the fence surrounding Donaldson Dam have given Bekkersdal residents easy access to the contaminated body of water. Local people have stolen the concrete-covered rebar to sell for scrap metal, and the government has not adopted a better solution to cordoning off the dam. © 2010 Bonnie Docherty/IHRC.

Scientific Studies

Existing evidence of pollution has been sufficient to justify such *in situ* warnings, but community members need additional scientific information to know the full extent of prior and potential health impacts. Scientists have produced many reports documenting the elevated levels of contamination in the Witwatersrand.⁴⁸⁰ The studies conducted so far, however, have provided an incomplete picture of the situation: there have been few attempts to determine whether the health effects attributed to the same contaminants elsewhere in the world have occurred in the region's communities.⁴⁸¹ In 2016, Angela Mathee of the South African Medical Research

⁴⁷⁹ Interview with Lawrence van der Walt, Caretaker of Donaldson Dam, Donaldson Dam, January 12, 2012 (“Palisades won't help because they'll break it. Can you blame them? They haven't got a job. They need the iron inside. They go sell it at scrap yards.”).

⁴⁸⁰ See Winde, “Uranium Pollution of Water: A Global Perspective on the Situation in South Africa”; Winde, “Uranium Pollution of the Wonderfontein, 1997-2008 Part 1,” *Water SA*, p. 248; Coetzee et al., “An Assessment of Sources, Pathways, Mechanisms and Risks of Current and Potential Future Pollution of Water and Sediments in Gold-Mining Areas of the Wonderfontein Catchment,” Water Research Commission Report 1214/1/6.

⁴⁸¹ In a 2013 report, Frank Winde provided a survey of the available literature on uranium contamination in South Africa. He added, “So far, however, there are no supporting epidemiological data available. Apart from the rather short research time in [South Africa], which did not allow for long-term studies as well as the methodological challenges, lack of resources and apparent disinterest of the 28 authorities and the mining industry combine to explain the lack of relevant data.” The migration of workers has also made it difficult to document long-term effects of diseases, such as cancer, that manifest slowly. Frank Winde, “Uranium Pollution of Water: A Global Perspective on the Situation in South Africa,” Vaal Triangle Occasional Paper: Inaugural Lecture, October 2013, <http://www.mwrg.co.za/Inaugural%20lecture%20Frank%20Winde.pdf> (accessed May 8, 2016), pp. 10-15, 27-28.

Council described “a paucity ... of research information on the health consequences of mining in South Africa.”⁴⁸² The same year, the World Health Organization said, “To date, there has been little epidemiologic research on the exposure of these populations and their risk of cancer and other adverse health outcomes.”⁴⁸³ Echoing that assessment, Mariette Liefferink of the Federation for a Sustainable Environment told IHRC, “There is a significant reticence to doing epidemiological studies. We have studies on toxicological risks—they are not in dispute and are well-established—but ... there has not been a causal link [made] between mine waste, including radioactive metals, and human health.”⁴⁸⁴ Evidence of human exposure to AMD and contaminated tailings combined with accounts of potentially related illnesses warrant such epidemiological research in the region. As Liefferink said, filling this “gap in information is extremely important to do.”⁴⁸⁵

The lack of hard data can lead to speculation, which often creates fear, and weaken community efforts to protect themselves. A member of the Greater Westonia Concerned Residents Association described being uncertain about the effects of dust. She noted in 2014 that she had observed a higher rate of cancer in Bekkersdal, and said, “Somehow, somehow, I think the mining is part of the problem. ... I don’t know if it’s actually because of the mines, but I think there is a link.”⁴⁸⁶ Further studies could help communities determine which fears are justified and how to address the environmental and health effects of mining.

Advance Notice of Mining Projects

In many cases, local people have not been informed in advance of mining projects that directly relate to their lives. Parliamentarian Gareth Morgan, shadow minister of water and environmental affairs, told IHRC in 2012 that “the most common email I get from communities about mining is that ‘there is a mine going in down the street from me and nobody told me about it.’”⁴⁸⁷ The case studies of Sinqobile and Tudor Shaft illustrate this problem.

Residents of Sinqobile said they were unaware of Mintails’ plans to commence open-cast mining at the Princess Pit across the street, and they were surprised when blasting began in 2013.⁴⁸⁸ One community member told IHRC in October 2014, “They gave us no warning. And they blasted all through the night. We were never told when they were blasting. Children would be out playing, and we wouldn’t be warned.”⁴⁸⁹ Several residents showed IHRC researchers large cracks in their walls and said they feared their homes would collapse.⁴⁹⁰ Angry about the failure to be notified and the damage caused by the blasting, the people of Sinqobile took to the streets. For two weeks in January 2014, they burned tires and staged

⁴⁸² Email from Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, to IHRC, June 2, 2016.

⁴⁸³ Crowley, “WHO Tests Hair to Probe Uranium from Johannesburg Gold Mines,” *Bloomberg*.

⁴⁸⁴ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, April 21, 2015.

⁴⁸⁵ *Ibid.*

⁴⁸⁶ Interview with members of Greater Westonia Concerned Residents Association, Bekkersdal, October 29, 2014. Lucas Moloto of Bekkersdal said he would like the community to be trained to do some of its own research, such as taking water samples. He said, “If we infuse the community with expertise, they can do it themselves. ... If communities have their own way to take samples, they can see the results with their own eyes.” Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁴⁸⁷ Interview with Gareth Morgan, Shadow Minister of Water and Environmental Affairs, Cape Town, January 19, 2012.

⁴⁸⁸ Nkululeko Ncana, “Kagiso Homes Turn to Dust Dreams,” *Sunday World*, January 13, 2014, <http://www.sundayworld.co.za/news/2014/01/13/kagiso-homes-turn-to-dust-dreams> (accessed May 5, 2016).

⁴⁸⁹ Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #1).

⁴⁹⁰ See, e.g., interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014; interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014.

protests.⁴⁹¹ As discussed below, the rioting subsided only after the government and industry reached out to the community. But even in late 2014, one resident said, “People are angry. They’ve had enough. And they don’t know anything. They aren’t told anything.”⁴⁹²

The government similarly failed to provide timely notice of pending relocation efforts to the people of Tudor Shaft. In 2011 the Mogale City municipality moved the most at-risk residents of Tudor Shaft, along with a few from adjacent Soul City, to Soul City Extension 2 to reduce their exposure to mine tailings. Unlike the mining activities in Sinqobile, the relocation project likely benefited the affected residents, and some of them told IHRC that their living conditions had improved.⁴⁹³ Nonetheless, these individuals confirmed that no one had communicated with them about the possibility of moving during the planning stages.⁴⁹⁴ Multiple residents told IHRC that they first learned about the relocation when their local ward committee told them to prepare to move.⁴⁹⁵ The Socio-Economic Rights Institute has advocated for this community’s housing rights. According to Nomzamo Zondo, SERI’s director of litigation, “The community felt that they were not consulted. ... [I]t felt more like they had been evicted. [It was as if] all of a sudden, I come home, my shack has an ‘X’ on it, and I’m going.”⁴⁹⁶ Although Tudor Shaft residents may have had an option to stay, the inadequacy of the government’s notice exemplifies the failure to inform community members even of efforts to help them.

Risks of Limited Information

Inadequate access to information about the effects of mining has prevented the people of the West and Central Rand from gaining a proper understanding of the risks they face. In 2014, Sanny Mogoje of Bekkersdal told IHRC that “[i]gnorance is very high” in the community.⁴⁹⁷ Some residents may have unknowingly exposed themselves or their children to sources of contamination that could have been avoided if they had been aware of the risks. Mogoje used to swim in the channel downstream of Donaldson Dam as a child, and said, “Just today I learned that the water is contaminated.”⁴⁹⁸ Those with a greater awareness of the potential harm have also been disadvantaged by the insufficiency of information. They need additional scientific data and advance notice of proposed projects in order to advocate for their own interests before decisions are made.

Inability to Participate in Decision Making

Community members have also been left out of decisions about policies that affect the environment and their health, a corollary to the lack of notice of new projects discussed above.

⁴⁹¹ See, e.g., Anna Cox, “Cops and Protesters in Running Battles,” *Independent Online*, January 6, 2014, <http://www.iol.co.za/news/crime-courts/cops-and-protesters-in-running-battles-1628881#.VYpOTvIVhBc> (accessed May 6, 2016); interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014.

⁴⁹² Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #1).

⁴⁹³ See, e.g., interview with relocated Tudor Shaft resident #1 (name withheld), Soul City Extension 2, January 14, 2012; interview with relocated Tudor Shaft resident #5 (name withheld), Soul City Extension 2, January 14, 2012; interview with relocated Soul City resident #1 (name withheld), Soul City Extension 2, January 15, 2012. Soul City is located adjacent to Tudor Shaft so it is contaminated by the same mine site.

⁴⁹⁴ See, e.g., interview with relocated Tudor Shaft resident #1 (name withheld), Soul City Extension 2, January 14, 2012; interview with relocated Tudor Shaft resident #5 (name withheld), Soul City Extension 2, January 14, 2012; interview with relocated Soul City resident #1 (name withheld), Soul City Extension 2, January 15, 2012 (“They called a meeting and told us they were moving us” from Soul City).

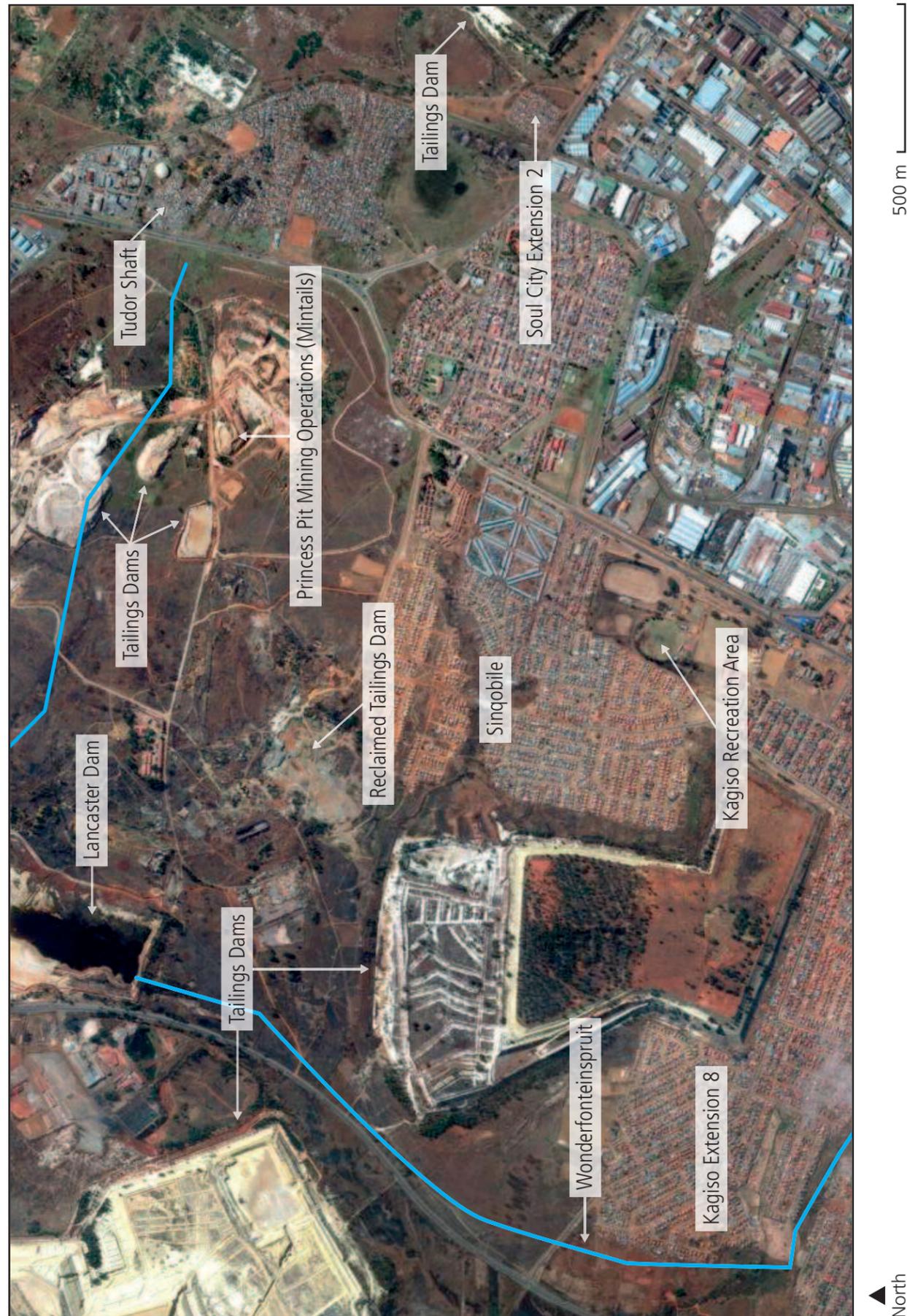
⁴⁹⁵ Interview with relocated Tudor Shaft resident #6 (name withheld), Soul City Extension 2, January 15, 2012; interview with relocated Soul City resident #1 (name withheld), Soul City Extension 2, January 15, 2012.

⁴⁹⁶ Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nomzamo Zondo).

⁴⁹⁷ Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

⁴⁹⁸ *Ibid.*

Sinqobile, Tudor Shaft, and Kagiso Extension 8



Many people told IHRC that the government and industry have seldom engaged them in discussions about new mining activities or plans to respond to ongoing threats. The inability to participate in decision making has denied communities the chance to influence efforts to protect them from the impacts of mining.

Residents interviewed by IHRC expressed frustration that the government and industry have made minimal efforts to consult with communities on mining-related matters, let alone meaningfully engage with them. In 2014 Percy Makunga, who had lived in the Bekkersdal area for more than 30 years, told IHRC that there was very little opportunity to speak to mining companies.⁴⁹⁹ He argued that the mining companies “should come to us and ask us [what we want],” but instead they go to the local government which is “not to be trusted.”⁵⁰⁰ According to Makunga, officials have told residents, “‘The land belongs to the government. It doesn’t belong to you, and the mining resources belong to the government, not to you.’ They don’t consult us.”⁵⁰¹ Discussing the mining project near Sinqobile, Charlie Sowa said, “We feel like we have to strike in order for our voice to be heard.”⁵⁰²

Illustrating the problem, after the most at-risk residents of Tudor Shaft were relocated with minimal notice in 2011, the remaining residents were left out of a decision about how to deal with the residual contamination in their settlement. The government decided to reduce the threat of radiation and heavy metals by removing the tailings dam adjacent to Tudor Shaft’s remaining homes, and Mintails agreed to conduct the operation to dispose of the material.⁵⁰³ The decision-making process involved weighing the pros and cons of multiple options. According to an affidavit from the litigation that resulted, the National Nuclear Regulator and the local municipality determined that removal of the tailings dam would be “the most appropriate and effective manner” of reducing radiation exposure because they believed relocating the whole community was “not a viable option” from a resource perspective.⁵⁰⁴ An official from a mining company operating in the region told IHRC that relocating the remaining residents might have been “easiest,” but he said he understood that some people would not want to leave their community.⁵⁰⁵ He explained that the chosen solution of “[m]echanically mining and moving [the tailings dump] does liberate the dust,” but noted that it could be “done within two weeks so you wouldn’t have the exposure of living by it for years.”⁵⁰⁶

The plan seemed to be well intended, but it made assumptions about what the local people wanted. Tracy-Lynn Humby, a law professor at the University of Witwatersrand, described the residents as “passive receptors of scientific, media, civil society and government scrutiny and action.”⁵⁰⁷ Due to the lack of community involvement, they became aware of the plan only when bulldozers arrived to remove dirt in 2012. Some residents immediately expressed

⁴⁹⁹ Interview with Percy Makunga, Bekkersdal resident, Bekkersdal, October 29, 2014.

⁵⁰⁰ Ibid.

⁵⁰¹ Ibid.

⁵⁰² Interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 (statement of Charlie Sowa).

⁵⁰³ Humby, “Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields,” *Revue générale de droit*, p. 100.

⁵⁰⁴ Ibid.

⁵⁰⁵ Skype interview with senior mining company official (name withheld), November 2014. Nkosinathi Sithole of SERI argued, by contrast, that “the best possible way to deal with this thing would be to first relocate the whole community, and then they can deal with the rehabilitation of these tailings.” Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nkosinathi Sithole).

⁵⁰⁶ Skype interview with senior mining company official (name withheld), November 2014. He said the more significant challenge would be to remediate the footprint down to clean soil.

⁵⁰⁷ Humby, “Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields,” *Revue générale de droit*, p. 101.

their concerns to FSE's Liefferink, who had advocated for their interests in the past. She in turn joined with the Legal Resources Centre (LRC) to file suit to halt the project.⁵⁰⁸

While remaining had the potential to help the community, the project reached a stalemate in large part because of the flawed process behind it. In an interview with IHRC in 2014, a Tudor Shaft resident said he would welcome remediation efforts in principle, but that he was upset about the inability of residents to participate in the decision making. He said that the local government and mining companies are "supposed to ask the community and listen to our complaints," but neither had done so.⁵⁰⁹ A study of community engagement in the region reported that residents "found the idea that they could participate in change regarding the environment frankly laughable."⁵¹⁰ Other opponents of the project, including FSE and LRC, criticized both the failure to discuss the health risks with the residents of Tudor Shaft in advance and the lack of an adequate environmental impact assessment.⁵¹¹ According to the *Globe and Mail*, "About half of the soil was removed, but environmentalists were alarmed that it was being done without risk-assessment studies or consultations, and they obtained a court order to suspend it."⁵¹²

Due to ongoing litigation, the project was still on hold in July 2016. The Department of Environmental Affairs had recently completed a risk assessment report, and the parties in the FSE suit were discussing possibilities for mediation.⁵¹³ According to Mariette Liefferink, FSE wanted the court to shut down the project and the government to clean the site up properly. Such cleanup would entail consultation with the community, a risk assessment, removal of tailings, and remediation that would leave healthy water and soil.⁵¹⁴ SERI has represented Tudor Shaft residents in a second suit, which has been separated from the FSE suit and calls for relocation.⁵¹⁵

Obstacles to participation, exemplified by the events in Sinqobile and Tudor Shaft, have arisen at other times in different communities. Some of the residents of the West and Central Rand whom IHRC interviewed in 2012 said that the government had not engaged with them to discuss ways to address contamination from tailings dams. "There has been no consultation," a resident from Riverlea told IHRC. "When we ask the government, they say we had a meeting. But the government didn't consult us and didn't give us any notice. We need notice about the meetings."⁵¹⁶ Peter Swartz of Matholesville similarly said, "The government doesn't come to the community."⁵¹⁷ People from several other communities also complained that government did not reach out to residents.⁵¹⁸ Such failures to engage have prevented community members from meaningfully participating in decision making about both future mining

⁵⁰⁸ Ibid., p. 103.

⁵⁰⁹ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014.

⁵¹⁰ Dugard, MacLeod, and Alcaro, "A Rights-Based Examination of Residents' Engagement with Acute Environmental Harm across Four Sites on South Africa's Witwatersrand Basin," *Social Research*, pp. 931, 949.

⁵¹¹ Humby, "Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields," *Revue générale de droit*, p. 103.

⁵¹² York, "Inaction on Waste Condemns South Africa's Poor to Life in Toxic Dumps," *Globe and Mail*.

⁵¹³ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

⁵¹⁴ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁵¹⁵ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

⁵¹⁶ Interview with Riverlea residents #1 and #2 (names withheld), Riverlea, January 9, 2012.

⁵¹⁷ Interview with Matholesville resident #1 (name withheld), Matholesville, January 9, 2012.

⁵¹⁸ See, e.g., interview with Snake Park resident #2 (name withheld), Snake Park, January 15, 2012; interview with Meadowlands residents #1, #2, and #3 (names withheld), Meadowlands, January 10, 2012 (statement of resident #1); interview with Tudor Shaft resident #4 (name withheld), Tudor Shaft, January 7, 2012; interview with Tudor Shaft residents #5 and #6 (names withheld), Tudor Shaft, January 7, 2012 (statement of resident #6) (saying "you don't find the government").

operations and efforts to address past harm. The exclusion has left many residents feeling frustrated, angry, and disempowered.⁵¹⁹

Rights and Duties

National and international human rights law guarantees the people of the West and Central Rand the right to receive information and the right to participate in decision making, and it imposes on South Africa the duty to ensure they can exercise these rights. Many community members interviewed by IHRC, however, described being ill informed and poorly consulted about matters related to mining. The government and industry have taken some steps to improve the situation through new scientific research and community meetings, but their actions have been limited. Inadequate engagement has led to violent protests and litigation and thus worsened the plight of residents, whose rights associated with the environment and health have already been put at risk.

Information

The obstacles residents have encountered to receiving information about the effects of mining have threatened to contravene the right to information. According to emerging international norms, to realize that right, the government should ensure both the collection of data with which to assess potential harm and the dissemination of information to those most at risk.⁵²⁰ While collection seems to have been improving, shortcomings have continued. South Africa has also not fully met its duty under domestic and international law to make "information of public interest" available.⁵²¹ In many cases, community members have not been given sufficient warning of a dangerous site or notice of a pending operation.

Responding to the dearth of research, in 2015 the WHO's International Agency for Research on Cancer (IARC), in conjunction with the Mine Water Research Group (MWRG) of South Africa's North-West University, initiated a study of uranium exposure from mines in and around Johannesburg. It commissioned FSE to assist with the collection of about 1,500 hair samples from 10 at-risk communities as well as control samples from three communities identified by the MWRG.⁵²² The WHO explained that "[t]his pilot should be critical in opening the door to further research in order to assist governmental authorities with putting in place the best possible strategies to prevent uranium contamination in the affected areas."⁵²³ FSE's Mariette Liefferink described the project as "a wonderful victory because even though it is just a screening, at least we will be able to see how to build on it. ... Then we can follow up with epidemiology."⁵²⁴ FSE submitted the hair samples in March 2016, and as of July, testing was ongoing.⁵²⁵

The South African government, which should not rely exclusively on the research of international organizations, has recently taken some steps to facilitate better data gathering through its support of epidemiological studies of communities in the region. Mary Gulumian at the

⁵¹⁹ Shadow Minister Gareth Morgan told IHRC, "The most common thing is that people feel so disempowered by the process that leads to application and licensing of mines." Interview with Gareth Morgan, Shadow Minister of Water and Environmental Affairs, Cape Town, January 19, 2012.

⁵²⁰ Aarhus Convention, art. 5.

⁵²¹ UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression, para. 19. See also South African Constitution, § 32(1).

⁵²² The at-risk communities are: Azaadville, Kagiso Extension 6, Kagiso Extension 8, Khutsong, Lenasia, Mindalore (Witpoortje), Orlando, Riverside (Rietvallei), Soweto (Diepkloof Zone 4), and Tudor Shaft. The control sites are: Alexandra, Laudium, and Randburg. Table of Exposure in IARC Study, courtesy of Mariette Liefferink, March 18, 2016.

⁵²³ Crowley, "WHO Tests Hair to Probe Uranium from Johannesburg Gold Mines," *Bloomberg*.

⁵²⁴ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁵²⁵ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

National Institute for Occupational Health (NIOH) has been leading an investigation into the health effects of dust in the Central and East Rand. Her team reported in 2016 that they expected to release results later in the year.⁵²⁶ Gulumian told IHRC that “[o]ne part [of the research] was to assess the toxicological effects. The next is to do epidemiological studies in schools and in communities around [the area].”⁵²⁷ Her study was using “an internationally accepted questionnaire” to document such symptoms as coughing, asthma, and lung diseases.⁵²⁸ NIOH is part of the Department of Health, and the study was commissioned by the Mine Health and Safety Council, which advises the minister of mineral resources.⁵²⁹ At the time of her IHRC interview in 2014, Angela Mathee of the SAMRC also had initiated a mining health and safety study,⁵³⁰ and she was collecting data in June 2016.⁵³¹ Mathee has done prior investigations into dust contamination, but the new study represented the “first time we will combine exposure data with actual health data.”⁵³² The SAMRC conducts research “of its own accord ... or on behalf of the State.”⁵³³ The role of government entities in these studies will help South Africa meet its obligation to ensure data collection about matters of public interest.

The leaders of both studies noted the importance of disseminating the results of their research to the people affected. Gulumian told IHRC that she planned to hold workshops bringing together communities, the Mine Health and Safety Council, and mining companies, as she has for past studies. She said, “We communicate the information, hopefully in an understandable manner, and then people can ask questions. ... We ask some government agencies [to come, and] hopefully get some interest.”⁵³⁴ Mathee said she expected to “develop quite a close relationship with the community” during the course of her study. She added that “[o]ur usual practice” has been to educate the local people about a study’s findings through “oral feedback or mini feedback reports.”⁵³⁵

Despite these researchers’ sensitivity to the importance of sharing findings with the community, the government has to date had a poor track record of disseminating information about mining to the people of the West and Central Rand. In 2014, Lucas Moloto of Bekkersdal told IHRC that the “government wouldn’t ever come to communities and enlighten [us].”⁵³⁶ FSE’s Lieferrink confirmed that the government agencies that deal with mining pollution rarely reach out to affected communities to raise their level of awareness or educate them about exposure risks.⁵³⁷ She said in 2015 that “many of those communities are so ill-informed ... [and] there

⁵²⁶ Email from member of Mary Gulumian’s research team, National Institute for Occupational Health, June 2, 2016.

⁵²⁷ Interview with Mary Gulumian, Manager, Toxicology Section, National Institute for Occupational Health, Johannesburg, October 28, 2014.

⁵²⁸ *Ibid.*

⁵²⁹ The council is a “national public entity” that “comprises a tripartite board represented by State, Employer, and Labour members under chairmanship of the Chief Inspector of Mines. The MHSC is funded by public revenue and is accountable to Parliament.” Mine Health and Safety Council, “Overview,” <http://www.mhsc.org.za/about-mhsc/overview> (accessed May 5, 2016).

⁵³⁰ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

⁵³¹ Email from Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, to IHRC, June 2, 2016.

⁵³² Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

⁵³³ South African Medical Research Council Act, No. 58 of 1991, <http://www.mrc.ac.za/about/MRCAct.pdf> (accessed May 5, 2016), § 4(1).

⁵³⁴ Interview with Mary Gulumian, Manager, Toxicology Section, National Institute for Occupational Health, Johannesburg, October 28, 2014.

⁵³⁵ Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014.

⁵³⁶ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁵³⁷ Phone interview with Mariette Lieferrink, CEO, Federation for a Sustainable Environment, April 21, 2015.

is systematic risk to these communities because of government failure to engage them.”⁵³⁸ Even without additional epidemiological studies, the government could do more to inform residents about known contamination and the dangers of exposure.⁵³⁹

The right to information also applies to material held by third parties,⁵⁴⁰ but the government has neglected to ensure that mining companies share their knowledge, and not all mining companies have been forthcoming. A member of the Greater Westonaria Concerned Residents Association complained in 2014 that mining companies “don’t even ... come and educate people about the effects they are causing.”⁵⁴¹ Sanny Mogoje of Bekkersdal said, “Let the mines and municipality come to the community and teach us about these issues so that we can take an interest.”⁵⁴² Angela Kariuki, a research associate at the South African Human Rights Commission, said, “[Mining companies] give you this blank look when you talk about human rights,” including the right to information. She added that “we are drilling it into them that they are functioning in a community, they have implications, and they have a role and they need to take it more seriously.”⁵⁴³

While adequate mechanisms for information-sharing have not yet been put in place, IHRC found some evidence of growing industry appreciation for developing open relationships with the community. In 2012, officials from multiple mining companies expressed skepticism about holding discussions with community members, contending in part that the issues required too much expertise.⁵⁴⁴ In 2014, by contrast, several company officials noted the value of reaching out.⁵⁴⁵ For example, Mark Brune of Mintails told IHRC that “communication is 90 percent of the solution” to mistrust, and that “transparency is key. [Communities] have to understand what we are doing. ... We need to lay it on the line—warts and all, these are the challenges.”⁵⁴⁶ This evolution in rhetoric represents progress, but the need for effective implementation through dissemination of accessible information remains.

The government bears primary legal responsibility to ensure residents receive information, yet so far it has largely neglected its duty to “proactively put in the public domain Government information of public interest.”⁵⁴⁷ The main conduit of information about mining contamination in the region has been neither government nor industry, but civil society. Among the

⁵³⁸ *Ibid.*

⁵³⁹ Information should also be disseminated in a form that laypeople can understand. For example, while environmental impact assessments are critical, without explanation they can be too technical for the general public to grasp. In addition, most settlement residents would likely be unaware of the assessments or face barriers, such as language or Internet availability, to accessing them.

⁵⁴⁰ South African Constitution, § 32(1)(b); UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression, paras. 7, 18; CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health, para. 48.

⁵⁴¹ Interview with members of Greater Westonaria Concerned Residents Association, Bekkersdal, October 29, 2014.

⁵⁴² Interview with Sanny Mogoje, Bekkersdal resident, Bekkersdal, October 29, 2014.

⁵⁴³ Interview with Angela Kariuki, Research Associate, South African Human Rights Commission, Braamfontein, November 1, 2014. Kariuki acknowledged that industry may have become more aware of human rights, but added that “in reality not much has actually changed.” See also interview with Janet Love, Commissioner, Yuri Ramkissoo, Senior Environment Researcher, and Angela Kariuki, Research Associate, South African Human Rights Commission, Braamfontein, January 12, 2012 (statement of Yuri Ramkissoo) (saying that the mining industry in South Africa had failed to address overriding issues that impact communities, such as “a lack of participation and of prior and informed consent, and a lack of planning from a human rights perspective”).

⁵⁴⁴ These officials generally requested anonymity during 2012 interviews with IHRC.

⁵⁴⁵ A representative of one company operating in the region said, “We could certainly improve our relationships with the community.” Skype interview with senior official of mining company in the region (name withheld), December 4, 2014. Officials from Sibanye Gold told IHRC in 2014 that, whereas the company used to leave community engagement to the municipal government, it has started to do direct outreach. Interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metallurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014 (statement of James Wellsted).

⁵⁴⁶ Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014.

⁵⁴⁷ UN Human Rights Committee, General Comment No. 34, Freedoms of Opinion and Expression, para. 19.

community members IHRC interviewed, a large portion of those who were aware of the risks of mining attributed their knowledge to Mariette Liefferink and her staff at FSE. For example, Lucas Moloto, who later joined the organization as a community engagement facilitator, said he first learned about the problems in Bekkersdal “through FSE reports, the media, and research institutions.”⁵⁴⁸ Although not all companies operating in the West and Central Rand have a good relationship with FSE, a few companies in the region have collaborated with and/or provided funding to the organization.⁵⁴⁹ Gold Fields, for example, has worked with FSE to inform communities that have been affected by mining pollution about the potential health and environmental impacts.⁵⁵⁰



School children in Bekkersdal attend a presentation by Mariette Liefferink of the Federation for a Sustainable Environment. Local people have received much of their information about the dangers of mining from civil society, rather than the government or industry. © 2010 Bonnie Docherty/IHRC.

While it has been encouraging that certain companies have supported raising public awareness of mining issues, the significant reliance on FSE has presented problems of practicality and principle. The organization cannot single handedly educate all of the affected communities in the West and Central Rand. It has also been troubling that the government and industry have not done more direct educational outreach and in the process developed personal relationships with communities.⁵⁵¹ According to Percy Makunga of Bekkersdal, mining officials “send Mariette [Liefferink] to come and teach us about tailings dams and acid mine drainage, but do not come personally.”⁵⁵²

⁵⁴⁸ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁵⁴⁹ A representative of one of these companies said that there is “a lot of misunderstanding around the risks associated with mining” and NGOs, like FSE, can “provide education around the mines on what the key environmental issues are.” He added that an NGO “also gives credibility; people would be less likely to believe the mining companies.” This interviewee appreciated NGOs’ value as watchdogs, and added, “They are important to have because they can flag issues in the industry that they’re not comfortable with.” Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

⁵⁵⁰ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁵⁵¹ For example, a resident of Bekkersdal told IHRC, “Mining companies don’t come into the community. We don’t get information from them.” Interview with Bekkersdal resident #5 (name withheld), Bekkersdal, January 7, 2012.

⁵⁵² Interview with Percy Makunga, Bekkersdal resident, Bekkersdal, October 29, 2014.

The government’s failure to ensure the accessibility of information relevant to gold mining in the West and Central Rand has exacerbated the adverse impacts of AMD and contaminated tailings. Without proper warnings about health threats, local people have been left ill equipped to minimize their exposure or lobby for greater environmental protection. To meet its human rights obligations going forward, South Africa should continue to encourage and support epidemiological research. A better understanding of the problem could both help the government identify residents who should receive remedial help, including health care, and inform the design of measures to prevent future harm. The government should also take steps to guarantee that community members have adequate notice of the risks they face as well as the information they need to advocate on their own behalf.

Participation

Residents of the West and Central Rand have also encountered hurdles to exercising their right to participate in decisions relevant to mining in the region. The South African Constitution states that “the public must be encouraged to participate in policy-making,” and Constitutional Court jurisprudence requires the government to promote participation by engaging meaningfully with affected communities.⁵⁵³ The government’s efforts have often been inadequate, however. For example, the government met with the people in Sinqobile about a mining project only after they began to protest, and it did not include residents of Tudor Shaft in planning for either relocation or the removal of tailings from their settlement. In such cases, the government has not lived up to its human rights obligation to facilitate community involvement and to ensure industry does the same. While engagement would not necessarily eliminate differences of opinion among stakeholders, the failure to give communities a voice has exacerbated tensions and in some instances caused a backlash that has impeded efforts to address environmental and health threats in a timely fashion.

Approaches to Engagement

Critics have challenged the effectiveness of the government’s mechanisms for directly engaging with the community. For example, a quarterly forum has brought together representatives from government, industry, and civil society, but according to Lucas Moloto of Bekkersdal, residents of local settlements should also be included.⁵⁵⁴ FSE’s Liefferink described the meetings as “talk shops.” She said, “They have been in existence for more than 15 years, and the same issues that arose 15 years ago still arise today. [Government officials] are trying to show a paper trail that they have been trying to engage.”⁵⁵⁵

An official at the Department of Mineral Resources said that his department has improved its engagement with the community over the past decade. DMR official Mosa Mabuza explained that when the Mineral and Petroleum Resources Development Act came into effect in 2004, the attention paid to the social and environmental effects of mining increased. “One of the key principles contained in [the MPRDA] is management of the relationship with the community where mining takes place,” Mabuza said. “Engagement with communities is a critical requirement.”⁵⁵⁶

⁵⁵³ South African Constitution, § 195(1)(e); *Schubart Park Residents’ Association*, paras. 43–44.

⁵⁵⁴ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁵⁵⁵ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, April 21, 2015.

⁵⁵⁶ Phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

While acknowledging that the government has had failures, Mabuza highlighted certain areas that he considered successes. For example, he praised the requirement that mining companies produce a five-year social and labor plan before receiving a license. In such a plan, a mining company commits to using some of its revenue to promote community development, such as through the construction of a school or health facility.⁵⁵⁷ The needs of the community are determined through discussions with local councilors who “might engage with communities.”⁵⁵⁸ Mabuza also noted that “[a]ny application for prospecting and for mining requires that an applicant consult with not only landowners but also local occupiers of land. Those who occupy the land—in the form of the community—constitute a key stakeholder that must be consulted, and [the company] must prove consultation has taken place.”⁵⁵⁹ He emphasized that the law requires consultation with but not the consent of the community.⁵⁶⁰

Other parties have developed alternative approaches to engagement over the past few years. Moloto contrasted the government forum described above with “community engagement meetings” that Gold Fields and FSE started to convene around 2013. He explained that the meetings, held in communities in the environs of Gold Field’s South Deep Mine, have been designed to empower local people and “to help to mitigate or avoid pollution.”⁵⁶¹ Generally, a preliminary session with FSE and about 20 community leaders is followed by a second meeting with FSE, Gold Fields, and a larger number of community members, who have the chance to ask questions. Moloto praised the initiative, saying, “It is a very good step. It should be applauded.”⁵⁶²

In 2016, Liefferink described the results of the FSE-Gold Fields model as “very encouraging.” She said, “The first meetings were just shouting and anger and threats of burning down mines. Suddenly it all changed.”⁵⁶³ After a survey showed that the community had little trust in Gold Fields, the company “worked hard to establish trust with the communities.” They have since responded to many of the communities’ requests, including by building a school, elderly housing, and a clinic. “I now actually applaud Gold Fields because we’ve seen tangible investment in the community,” Liefferink said.⁵⁶⁴

Another mechanism for engagement has involved industry (Gold Fields and Sibanye Gold), the local municipality, and community organizations and has sought to advance the socioeconomic development of Westonaria, which is part of the West Rand. Moloto, who has been helping to plan roundtables for this process, told IHRC that he believed, “if concerted effort of the three parties is aligned and all [are] treated equally, then there is guaranteed significant future success to attaining most of the development goals identified.”⁵⁶⁵ Liefferink, who has not been major player in this initiative, said, “We need to make sure that aspirations are implemented,” but she supported such efforts by mining companies to “work together to develop sustainable end land uses and to give communities sustainable and viable work opportunities post mining.”⁵⁶⁶ The government could consider these approaches as possible

⁵⁵⁷ Ibid.

⁵⁵⁸ Ibid.

⁵⁵⁹ Ibid.

⁵⁶⁰ Ibid.

⁵⁶¹ Interview with Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, Bekkersdal, October 29, 2014.

⁵⁶² Ibid.

⁵⁶³ Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁵⁶⁴ Ibid.

⁵⁶⁵ Email from Lucas Moloto, Bekkersdal resident and Community Engagement Workshop Facilitator, Federation for a Sustainable Environment, to IHRC, June 2, 2016.

⁵⁶⁶ Skype interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, July 8, 2016.

models for further reform. Whatever approach it takes, the government should ensure that community members have a seat at the table in the design of engagement mechanisms as well as in the decision-making processes that affect their lives.

Violence in Sinqobile

While progress seems to have been made in some areas, inadequate efforts to ensure community participation in decisions about specific projects have had serious, counterproductive consequences. For example, in Sinqobile, the failure of the government and industry to engage meaningfully with local residents about the Princess Pit mining operations led to two weeks of violence. In early January 2014, community members held protests, and police responded as the unrest escalated, “turning the quiet township into what looks like a war-zone.”⁵⁶⁷ According to resident Charlie Sowa, “Tires were burning in the streets. People were getting shot with rubber bullets.”⁵⁶⁸ Responding to the riots, the minister of mineral resources and the mayor of Mogale City eventually met with the community.⁵⁶⁹ Mineral Resources Minister Susan Shabangu told journalists that “she was satisfied that all processes, including public consultations, [had been] conducted,” but residents disputed that in interviews with IHRC as well as the media.⁵⁷⁰ A few days after her visit, the minister suspended mining operations because DMR found that Mintails had not taken sufficient steps to prevent unauthorized access to the site.⁵⁷¹ DMR lifted the suspension in February 2016.⁵⁷²

After the protests ended, the government and industry reportedly took some steps to improve engagement. Commenting in November 2014 on the events in Sinqobile, Mark Brune of Mintails said, “The relationships were not doing well last year. There was a series of civil unrest that led to mobs from communities storming the mining sites, burning vehicles. ... There was a real separation between local counselors and the DMR, communities, and ourselves.”⁵⁷³ Brune recognized that Mintails was not “blameless” for the incident and said the company has since sought to develop a “social license to mine” as well as a legal one.⁵⁷⁴ “By taking that on board, we have started to reestablish those relationships,” he said.⁵⁷⁵

Since the riots, Mintails has participated in two forums—at the local municipality and district levels—that have brought government officials, Mintails representatives, and community members together on a regular basis.⁵⁷⁶ Sylvan Montshonyane, stakeholder relations manager at the company, explained in 2016 that these mechanisms sought to “identif[y] challenges

⁵⁶⁷ Ncana, “Kagiso Homes Turn to Dust Dreams,” *Sunday World*.

⁵⁶⁸ Interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 (statement of Charlie Sowa). For similar reports, see “Man Arrested for Firing Shot in Kagiso Protest,” *News24*, January 6, 2014, <http://www.news24.com/Archives/City-Press/Man-arrested-for-firing-shot-in-Kagiso-protest-20150429> (accessed May 6, 2016); Cox, “Cops and Protesters in Running Battles,” *Independent Online*.

⁵⁶⁹ Ncana, “Kagiso Homes Turn to Dust Dreams,” *Sunday World*; interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014.

⁵⁷⁰ Ncana, “Kagiso Homes Turn to Dust Dreams,” *Sunday World*. See also interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014.

⁵⁷¹ “Shabangu Suspends Mintails Mine,” *Independent Online*.

⁵⁷² Email from Mark Brune, Chairman, Mintails Ltd., to IHRC, May 31, 2016.

⁵⁷³ Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014.

⁵⁷⁴ Ibid. (“We certainly underestimated the degree of engagement that we had to have. And we didn’t read the signs fast enough. ... [T]he social license to mine—we had not addressed as robustly as we should have.”)

⁵⁷⁵ Ibid. He added, “The relationships turned 180 degrees in last 10 months.” Mintails is not the only company that says it has increased its focus on community engagement. See, e.g., Skype interview with senior official of mining company in the region (name withheld), December 4, 2014 (commenting on the value of positive community relations); interview with James Wellsted, Senior Vice President of Investor Relations, and senior official of metal-lurgy and surface operations (name withheld), Sibanye Gold, Libanon, October 27, 2014 (statement of James Wellsted) (discussing plans for direct outreach).

⁵⁷⁶ Email from Sylvan Montshonyane, Stakeholder Relations Manager, Mintails Ltd., May 31, 2016.

faced by the community specific to the mining operations” and to address socioeconomic concerns.⁵⁷⁷ Mintails has also created an internal unit to manage community relations at Sinqobile and beyond and to ensure “the company is more responsive to the needs of the communities around the mining operations.”⁵⁷⁸ In May 2016, Montshonyane wrote to IHRC that Mintails had “established a very good working relationship and open communication with the key stakeholders” and “improved cordial relations and regular consultations” with the community.⁵⁷⁹

While the shift in attitude and the establishment of new engagement mechanisms have been positive signs, many people have remained unsatisfied with the situation in practice. Eight months after the riots, residents of Sinqobile expressed their dissatisfaction to IHRC. One community leader said that despite resident complaints, “nothing has been done as yet.” He explained that many residents “feel that the mine is not 100 percent honest.”⁵⁸⁰ Charlie Sowa, also from Sinqobile, told IHRC that he still believed that “protesting is the only thing we can do, but other people can be put in danger.”⁵⁸¹ In 2016, Liefferink criticized the forum with government and Mintails officials as “very politicized” and said that FSE had not been invited to participate.⁵⁸²

Tudor Shaft Litigation

The failure to consult with Tudor Shaft residents before the operation to remove tailings similarly exacerbated existing tensions and led to litigation, whose value has been debated. Nkosinathi Sithole of SERI, which has represented residents in one lawsuit, told IHRC in 2014 that engagement with the people of Tudor Shaft had not improved since the suit was filed. “The problem in most cases is that they [i.e., the government] do not want to consult with communities,” Sithole said.⁵⁸³ Six months later, DEA official Werner Eiselen expressed frustration that the litigation was blocking progress on reclamation and remediation. He told IHRC that the plaintiffs “are not playing ball in a constructive manner. That they ended up in court is perhaps the laborious way of going about this whole issue, because it doesn’t serve the big picture, it doesn’t help anyone at the end of the day.”⁵⁸⁴ In October 2014, a Tudor Shaft resident was critical of the government’s failure to consult, but he also seemed frustrated at the impasse that had developed. He told IHRC that litigation “so far can’t get anything for the community.”⁵⁸⁵ Regardless of whether removal of tailings, relocation of residents, or a third option would be the best approach to addressing the contamination in Tudor Shaft, the lack of meaningful engagement during the decision process contributed to litigation, thus making the situation more confrontational and producing a stalemate instead of a solution.

The inability of community members to participate in decision making has increased tensions, decreased trust, and in some cases slowed efforts to address mining contamination. While

mining companies are partly responsible, the government has the primary obligation to promote participation. It should work with communities to design constructive forums for regular contact as well as proper engagement mechanisms for specific projects. The government should ensure that community members can participate in decision making at all stages of the mining process, from proposals for new operations to remediation of contaminated sites. Greater community involvement could enhance efforts to minimize the environmental and health impacts of mining. Community members would bring first-hand knowledge of the situation on the ground, which could inform the design of more effective solutions.⁵⁸⁶ In addition, they would be more apt to “buy in” to a plan they participated in developing.⁵⁸⁷ By enabling local people to exercise their rights to both information and participation, the government would fulfill its legal duties and empower historically disempowered communities.

⁵⁷⁷ Ibid.

⁵⁷⁸ Ibid.

⁵⁷⁹ Ibid.

⁵⁸⁰ Interview with Sinqobile residents #1, #2, and #3 (names withheld), Sinqobile, October 29, 2014 (statement of resident #2).

⁵⁸¹ Interview with Charlie Sowa and Marcus Garvey, Sinqobile residents, Sinqobile, October 29, 2014 (statement of Charlie Sowa).

⁵⁸² Phone interview with Mariette Liefferink, CEO, Federation for a Sustainable Environment, May 10, 2016.

⁵⁸³ Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nkosinathi Sithole).

⁵⁸⁴ Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁵⁸⁵ Interview with Tudor Shaft resident #1 (name withheld), Tudor Shaft, November 1, 2014.

⁵⁸⁶ South Africa should heed the relevant provision of the Rio Declaration, which states that “[e]nvironmental issues are best handled with the participation of all concerned citizens.” Rio Declaration on Environment and Development, principle 10.

⁵⁸⁷ Mark Brune of Mintails said that community members “must see the process going forward [so we can] start to get buy-in.” He highlighted the need to “really establish those channels so that communities ... can participate in the process.” Skype interview with Mark Brune, Chairman, Mintails Ltd., November 6, 2014.

6. A Coordinated and Comprehensive Program

The persistence of the environmental and health problems discussed in this report has largely been attributable to the want of a coordinated and comprehensive government program to mitigate them. Such a program is essential to minimizing the negative impacts of mining effectively and efficiently because the problem is multi-dimensional and dealing with it requires many agencies with different areas of expertise. South African and international law require the adoption of a program to realize the rights discussed in this report, which have been threatened by the presence of acid mine drainage and contaminated tailings in the region.

In its *Grootboom* decision from 2000, South Africa's Constitutional Court identified the elements of a so-called "reasonable programme" for progressive realization. The government has failed to meet most of the Court's criteria when dealing with mining in the West and Central Rand. A complex regulatory regime and frequent restructuring have led to an insufficiently coordinated response. A narrow scope of action, failure to address the needs of those most at risk, and limited attention to environmental concerns have contributed to the incompleteness of government action to date.

Given the severe and ongoing nature of the situation, the government should take immediate steps to rectify the inadequacies of its efforts. In particular, it should develop and implement a national-level program dedicated specifically to reducing the adverse effects of mining in the West and Central Rand. If coordinated and comprehensive, this program would help South Africa protect its communities and their environment, meet the country's legal obligations, and promote realization of human rights.

A Coordinated Program

The first requirement of a reasonable program is that it be coordinated. According to *Grootboom*, the program should "clearly allocate" responsibility and involve the executive and legislative branches of government "in consultation with each other."⁵⁸⁸ The plethora of executive agencies with overlapping areas of responsibility and the legislature's frequent amendments to mining laws, however, have interfered with the development of a coordinated program to address mining's effects in the West and Central Rand.

Concurrent Competency

The web of government entities governing mining in the region, combined with their failure to communicate and cooperate, has complicated efforts to protect the environment and human health from AMD and tailings. "Environment in South Africa is a concurrent competency," explained Grant Walters, director of environmental impact and pollution at the Department of Environmental Affairs.⁵⁸⁹ He estimated in 2014 that about nine national and provincial bodies played a role in the regulation of mining, and said that "there is no hierarchy among them."⁵⁹⁰ A draft of an internal Department of Water and Sanitation policy paper on water management,

⁵⁸⁸ *Grootboom*, paras. 39-40. While *Grootboom* referred specifically to housing programs when discussing consultation, the requirement to consult is equally applicable to reasonable programs designed to progressively realize other human rights.

⁵⁸⁹ Interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Grant Walters).

⁵⁹⁰ *Ibid.*

which was leaked to the press, stated, “Institutional roles and responsibilities are fragmented, overlapping or vaguely defined.”⁵⁹¹

At the national level, the bulk of the responsibility has rested with three departments whose missions have sometimes been at odds. The Department of Mineral Resources has approved mining permits and enforced licensing terms.⁵⁹² The Department of Environmental Affairs has ruled on appeals filed by affected parties regarding those mining licenses and their terms and has been empowered to respond to any situation that has threatened to cause “serious damage to the environment.”⁵⁹³ The Department of Water and Sanitation has granted water use licenses.⁵⁹⁴ While the agencies’ roles in mining regulation have been intertwined, their goals have diverged. Focusing on economic growth, DMR has sought “to enable a globally competitive, sustainable and meaningfully transformed minerals and mining sector to ensure that all South Africans derive sustainable benefit from the country’s mineral wealth.”⁵⁹⁵ DEA, by contrast, has defined its mandate as “giv[ing] effect to the right of citizens to an environment that is not harmful to their health or wellbeing, and to have the environment protected for the benefit of present and future generations.”⁵⁹⁶ DWS, which has also been concerned with human health, has described itself as the “custodian of South Africa’s water resources,” and as “striving to ensure that all South Africans gain access to clean water.”⁵⁹⁷ These distinct mandates have led to conflicting priorities and different approaches to addressing the problems associated with mining.

Further complicating the governance system, the mandates of several other actors have touched on mining and its effects. High levels of radioactivity from mine waste have triggered the involvement of the National Nuclear Regulator because under the 1999 National Nuclear Regulator Act, tailings storage facilities can be classified as “nuclear installations.”⁵⁹⁸ NNR has described itself as a “public entity” with the duty to “provide for the protection of persons,

⁵⁹¹ Sheree Bega, “Laying Down the Law on Mine Water,” *Saturday Star*, September 5, 2015 (quoting draft internal DWS report).

⁵⁹² Mineral and Petroleum Resources Development Act, No. 28 of 2002, as amended through December 7, 2014 (MPRDA), http://www.saflii.org/za/legis/consol_act/20160418/maprda2002452.pdf (accessed April 29, 2016), § 3(2); National Environmental Management Act, No. 107 of 1998, as amended through December 14, 2014 (NEMA), http://www.saflii.org/za/legis/consol_act/nema1998331.pdf (accessed April 29, 2016), § 24C(2A) (making DMR the “competent authority” for granting environmental authorizations for mining activities). Recent amendments to NEMA also allowed for the designation of environmental mineral resource inspectors (EMRIs) with compliance monitoring and enforcement powers under DMR’s auspices. National Environmental Management Laws Amendment Act, *Government Gazette*, No. 25 of 2014, https://www.environment.gov.za/sites/default/files/legislations/nemla_actno25of2014.pdf (accessed April 17, 2016), §§ 11-12; Department of Environmental Affairs, “Government’s One Environmental System Commences,” media release, December 9, 2014, <https://www.environment.gov.za/mediarelease/oneenvironmentalsystem> (accessed April 17, 2016) (describing changes made by the Amendment Act). A bill to amend the MPRDA that might change the allocation of responsibilities among agencies was in the South African Parliament as of June 2016. See Mineral and Petroleum Resources Development Amendment Bill, No. B15–2013; phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

⁵⁹³ NEMA, No. 107 of 1998, as amended through December 14, 2014, § 43(1A) (“Any person may appeal to the Minister [of Environmental Affairs] against a decision made in terms of this act . . . by the Minister responsible for mineral resources or any person acting under his or her delegated authority.”); interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Grant Walters) (referring to NEMA, § 28).

⁵⁹⁴ National Water Act, No. 36 of 1998, as amended through September 2, 2014, ch. 4, pt. 2.

⁵⁹⁵ Department of Mineral Resources, “About Us,” <http://www.dmr.gov.za/about-us.html> (accessed April 17, 2016).

⁵⁹⁶ Department of Environmental Affairs, “Overview of the Department,”

<https://www.environment.gov.za/aboutus/department#mandate> (accessed April 17, 2016).

⁵⁹⁷ Department of Water and Sanitation, “About Us,” <https://www.dwa.gov.za/about.aspx> (accessed April 17, 2016).

⁵⁹⁸ National Nuclear Regulator Act of 1999, http://www.energy.gov.za/files/policies/act_nuclear_47_1999.pdf (accessed July 6, 2016), § 1(xviii)(a)(viii) (including in the definition of nuclear installations “a facility specifically designed to handle, treat, condition, temporarily store or permanently dispose of any radioactive material which is intended to be disposed of as waste material”). See also Fourth Respondent’s Answering Affidavit from Sonny-boy Bapela, Chief Director of Compliance, Department of Environmental Affairs, *Federation for a Sustainable Environment v. National Nuclear Regulator and Others*, South Gauteng High Court, Case No. 24611/2012 (interpreting that provision).

property and the environment against nuclear damage through the establishment of safety standards and regulatory practices.”⁵⁹⁹ Dust from the tailings dams can violate air quality standards and has fallen primarily under the authority of district municipalities and provincial departments.⁶⁰⁰ Relocation of communities vulnerable to nearby contamination has had the potential to implicate both municipal bodies and the Department of Human Settlements (DHS), whose mission is “to facilitate the creation of sustainable Human Settlements and improved quality of household life.”⁶⁰¹

As a result of the concurrent competency, a single action or situation can lead to the involvement of multiple government agencies. In 2016, Bashan Govender of DWS explained that a “mine that irrigate[d] its facilities with mine waste water to prevent dust fallout” had to comply with DMR and DEA requirements. It also needed DWS authorization to use water for that purpose. Similarly, if a mine waste facility failed, he said, “DMR [would] respond to this in terms of mine health and safety issues, whilst from the DWS’ perspective, the risk of water pollution would become[] pertinent.”⁶⁰²

In some cases requiring multiple approvals, the agencies’ mandates have caused them to compete. According to a the *Saturday Star*, the leaked DWS policy paper found that DMR’s mandate to promote mining was “incompatible” with DWS’s obligation to protect water. Suggesting that the proponents of mining frequently won out, the policy paper said, “Mining authorisations often appear to be granted for mines that are to mine in water-sensitive areas. Mining authorisations appear to be granted on an ad hoc basis without the necessary consultations among the relevant government departments.” Consistent with DWS’s mandate, the policy paper called for greater attention to be paid to water pollution. It stated: “It is especially pertinent that the ultimate socio-economic benefit of mining be quantified against potential long-term water resource impacts and that [this] outcome guide the decision on whether to authorise mining activity in sensitive areas.”⁶⁰³

The government’s response to the contamination in Tudor Shaft exemplifies both the complexity of the system and the problems caused by its deficiencies in the West Rand.⁶⁰⁴ In 2011, NNR recommended relocating selected community members, and Mogale City municipality assumed responsibility for the process. A year later, excessive radioactivity led to the further involvement of NNR, while threats to the environment attracted DEA’s attention.⁶⁰⁵ Given the concerns about the living conditions of the remaining residents, representatives of civil society, academia, and government have argued DHS should have also played a role in finding a solution.⁶⁰⁶

⁵⁹⁹ National Nuclear Regulator, “Introduction to the NNR,” <http://www.nnr.co.za/about-us/introduction-to-the-nnr/> (accessed April 17, 2016).

⁶⁰⁰ National Environment Management: Air Quality Act, No. 39 of 2004, § 36(1).

⁶⁰¹ Department of Human Settlements, “Overview,” <http://www.dhs.gov.za/content/overview> (accessed April 17, 2016).

⁶⁰² Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016. ⁶⁰³ Bega, “Laying Down the Law on Mine Water,” *Saturday Star*.

⁶⁰⁴ For an overview of the events in Tudor Shaft, see generally Humby, “Environmental Justice and Human Rights on the Mining Wastelands of the Witwatersrand Gold Fields,” *Revue générale de droit*.

⁶⁰⁵ Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁶⁰⁶ See interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nomzamo Zondo). Professor Angela Mathee said she believed that DHS should have been more involved both in relocation and in setting policies regarding safe levels of radioactivity. Interview with Angela Mathee, Director, Environmental and Health Research Unit, South African Medical Research Council, Johannesburg, October 31, 2014. Grant Walters and Werner Eiselen of DEA agreed, adding that DEA’s mandate does not extend to social and economic issues. Interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Grant Walters) (“This issue of housing comes with a different set of political issues.”); *ibid.* (statement of Werner Eiselen) (“I don’t want you to leave with the idea that we are not alive to other social and economic issues. But we have to do our job—handle environmental issues. Everyone else needs to take care of their jobs.”).

Each agency brought different expertise to the situation, but poor coordination impeded development of an effective and efficient resolution to the problem. In 2014, DEA's Eiselen told IHRC that Tudor Shaft was a case in which “cooperative governance failed miserably.”⁶⁰⁷ He contended that the different agencies had made decisions without communicating with each other.⁶⁰⁸ NGOs alleged that national and local government actors dodged responsibility by deferring to each other's expertise. A lawyer from the Legal Resources Centre explained that the departments all “blame each other and there is no cohesive plan. No one wants to set the precedent that they are responsible.”⁶⁰⁹ Nomzamo Zondo of the Socio-Economic Rights Institute said that government bodies frequently dismissed the NGO's inquiries regarding plans for Tudor Shaft. According to Zondo, “NNR says, ‘We are not concerned with the people. We are concerned with the tailings dump’”; DEA says it will not get involved with nuclear material, which it considers outside of its jurisdiction; and Mogale City says it is the owner of the land and will move the people, but it will not get involved in the tailings problems. Zondo continued, “We need them [the government departments] to work together ... in resolving this whole thing.”⁶¹⁰ The reports of the failure to communicate and cooperate in the specific case of Tudor Shaft illustrate the problems of inadequate coordination within the executive branch.

Frequent Legislative Changes

While legislative changes to the regulatory regime are not inherently problematic, in this case their frequency has further interfered with efforts to develop a coordinated program. Since 2003, Parliament's restructuring of mining and environmental management has shifted the responsibilities of governmental agencies multiple times.⁶¹¹ The adjustments have in turn required that regulations be revised. DMR's Mosa Mabuza said that amendments have been necessary “to streamline mining license requirements.”⁶¹² Grant Walters of DEA, however, criticized the frequent changes for interfering with implementation of an effective program of environmental remediation and enforcement.⁶¹³ For example, DEA has had to issue three versions of its Environmental Impact Assessment Regulations since 2006, “and these are not minor changes. They are substantial changes.”⁶¹⁴ He added that law reform can require increased funding and new training for every department.⁶¹⁵

⁶⁰⁷ Interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Werner Eiselen).

⁶⁰⁸ Ibid.; phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁶⁰⁹ Interview with lawyer (name withheld), Legal Resources Centre, Johannesburg, October 31, 2014.

⁶¹⁰ Interview with Nomzamo Zondo, Director of Litigation, and Nkosinathi Sithole, Be Just Fellow, Socio-Economic Rights Institute of South Africa, Johannesburg, October 31, 2014 (statement of Nomzamo Zondo).

⁶¹¹ The year 2008 saw both the amendment of the MPRDA and the expansion of NEMA's scope to cover mining activities. These changes were slated to come into effect over a period of time: some in 2013 and some in 2014. The MPRDA was also amended in 2005, and NEMA has been amended almost a dozen times since it was promulgated in 1998. See MPRDA, No. 28 of 2002, as amended through December 7, 2014, p. 1, introductory paras.; NEMA, No. 107 of 1998, as amended through December 14, 2014, p. 1, introductory paras. Further proposed amendments to the MPRDA were in Parliament as of June 2016. See phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

⁶¹² Phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

⁶¹³ Interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Grant Walters).

⁶¹⁴ Ibid. See also Environmental Impact Assessment Regulations, Listing Notice 1 of 2014, http://www.saflii.org/za/legis/consol_reg/nema107o1998rangnr983774.pdf (accessed April 29, 2016) (presenting 2014 regulations and repealing Listing Notice 1 of 2010); Department of Environmental Affairs and Development Planning, *NEMA Environmental Impact Regulations Guideline and Information Document Series: Guideline on Transitional Arrangements* (draft) (May 2009), https://www.westerncape.gov.za/other/2009/9/transitional_arrangements.pdf (accessed April 29, 2016), p. 4 (referencing environmental impact assessment regulations from 2006).

The regulatory instability has also adversely affected local communities. It has exacerbated the challenges of assisting residents of the region. DEA official Werner Eiselen contended that “[a]ny form of helping people in the West and Central Rand is completely hampered by this administrative mess.”⁶¹⁶ In addition, the amendments to existing laws have created uncertainty among civil society advocates. For example, an LRC lawyer told IHRC in 2014 that she was “completely confused” about the revisions. She said, “The [Mineral and Petroleum Resources Development Act] was amended in 2002 and 2008. In 2008 it was amended with [the National Environmental Management Act (NEMA)]. ... [NEMA] was amended again this year so no one knows where we are. They left different departments in charge.”⁶¹⁷ According to this lawyer, NGOs have not been the only ones affected by the lack of clarity. She said, “Everybody is in a state of confusion, including the industry.”⁶¹⁸

While the amendments may have been well-intended reforms, the frequent changes have compounded the administrative problems within the executive branch.⁶¹⁹ They have also suggested the need for better coordination across branches of government. Coordination between the executive and legislative branches, required by *Grootboom*, could help the government settle on a structure for dealing with mining that minimizes the need for further regulatory changes and provides administrative stability.

A Comprehensive Program

Under South African law, a reasonable program to realize the human rights endangered by mining in the West and Central Rand must be comprehensive as well as coordinated. According to *Grootboom*, to fit that criterion, the program should encompass short- and long-term actions, help those with the most urgent needs, and be “balanced.”⁶²⁰ South Africa's efforts to decrease the harm in the region have fallen short on all three counts.

Limited Scope of Action

The response to the situation in the West and Central Rand has not been comprehensive in scope. *Grootboom* requires the government to provide for short-, medium-, and long-term needs.⁶²¹ Despite a slow start, the government has recently made progress in dealing with some pressing needs, most notably in the form of water treatment plants to neutralize and stop the decant of AMD and the relocation of some Tudor Shaft residents. It has neglected, however, to ensure systematic implementation of other interim measures, such as controlling dust through irrigation or vegetation.

As described earlier in this report, long-term planning has been even more limited. As of mid-2016, the government had just begun to take concrete steps toward desalination of contaminated water, which is necessary to protect South Africa's environment and water

⁶¹⁵ Interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, and Grant Walters, Director of Environmental Impact and Pollution, Department of Environmental Affairs, Pretoria, October 30, 2014 (statement of Grant Walters).

⁶¹⁶ Ibid. (statement of Werner Eiselen).

⁶¹⁷ Interview with lawyer (name withheld), Legal Resources Centre, Johannesburg, October 31, 2014. For an overview of some of the changes and the shifting dates on which they were to take effect, see Centre for Environmental Rights, “Mineral and Petroleum Resources Development Act No. 28 of 2002,” <http://cer.org.za/virtual-library/legislation/national/mining/mineral-and-petroleum-resources-development-act-2002> (accessed April 29, 2016).

⁶¹⁸ Interview with lawyer (name withheld), Legal Resources Centre, Johannesburg, October 31, 2014.

⁶¹⁹ Legislation has failed to clarify the division of responsibilities among government agencies. The internal DWS report was quoted as saying, “There is a need to rationalize and align national legislation, even our own National Water Act, to remove ambiguity and address mine water directly.” Bega, “Laying Down the Law on Mine Water,” *Saturday Star*.

⁶²⁰ *Grootboom*, para. 43.

⁶²¹ Ibid.

supply.⁶²² It had also played a minimal role in the development of plans to address the underlying cause of dust, i.e., the omnipresent tailings dams. Industry has driven discussions of moving the polluted soil to isolated mega dumps.⁶²³

Inadequate Attention to At-Risk Communities

The government's response to the adverse effects of mining in the West and Central Rand has also fallen short because it has not adequately addressed the needs of those who face the greatest threats. *Grootboom* states that a reasonable program must be sure to address "those whose needs are the most urgent and whose ability to enjoy all rights therefore is most in peril."⁶²⁴ The people most affected by mining contamination in the region have belonged to disadvantaged communities. As discussed in Chapters 3 and 4, residents of informal settlements, such as Bekkersdal and Tudor Shaft, have faced especially high health risks from AMD and polluted tailings, respectively. Those living in relatively poor formal settlements, including Sinqobile and Riverlea, have experienced breathing problems from dust stirred up by mining and remining activities. The impacts of mining have not been limited to such communities. Mindalore, for example, a middle-class Afrikaner town, has also been exposed to contaminated dust. Members of poor and disempowered communities have borne the brunt of the burden, however, and their already difficult living conditions have exacerbated the impact of the pollution. In most cases, these residents have had few options to relocate; had limited capacity to protect themselves from contamination, such as by using alternative water sources; lived in poorly constructed homes that allow AMD and dust to enter; and been less likely to have access to good medical care. With the exception of moving a small number of residents from Tudor Shaft, the government has not adequately addressed the preventive and remedial needs of these people.

Imbalanced Approach to Mining Regulation

The structure created by the 2014 amendments to NEMA seems to be biased toward the mining industry. As the amendments are implemented, this imbalance could create obstacles to environmental protection and in turn interfere with realization of the human rights to health, water, and a healthy environment. Despite the widespread impacts of mining waste, including in the West and Central Rand, the 2014 rules reduced the regulatory role of environmental experts and granted greater authority to DMR.⁶²⁵ According to DEA's Werner Eiselen, "DEA has been moved out of the picture in respect to mining." He explained that while DEA can express opposition to a project and DMR should consider its views, DMR is not bound to heed DEA's advice.⁶²⁶ Eiselen told IHRC he has been troubled by the development: "There

are some concerns about [this arrangement] because the objective for DMR, its reason for existence, is to ensure economic growth and exploit natural resources. Protection of the environment and pollution control are not on their radar screen. I don't know how ... [environmental protection] will happen. ... I'm not optimistic."⁶²⁷ Without adequate input from environmental experts, the adverse effects of mining in the West and Central Rand could linger or even increase.

Part of the rationale behind the 2014 amendments, known as the "One Environmental System," was to simplify and expedite the licensing process by placing most of the steps under the authority of one agency.⁶²⁸ Mosa Mabuza of DMR praised the system for setting a 300-day limit on the government's consideration of mining license applications.⁶²⁹ His colleague Andreas Moatshe said that while the approval process used to take a long time, there was an "advantage to hav[ing] government departments collaborate. It is going very well, and we expect ... henceforth to improve service to the community."⁶³⁰ Improving coordination related to mining regulations could arguably have additional benefits. Sibongile Malie, DMR's director of mineral policy development told IHRC, "Protection of the environment and human health needs collaboration between all stakeholders."⁶³¹

Werner Eiselen of DEA had a different opinion of the efforts to simplify licensing. He acknowledged that the old system could be slow because "you ha[d] two different agencies fighting over a matter," but he noted that there were important benefits to having advocates for both the environment and economic development. He said, "I don't see how it actually can work if you have everything in one place. It's great for someone who wants to start mining quickly, but very bad for environmental protection."⁶³² Even though the changes streamlined the licensing process, a representative of at least one mining company had reservations about DMR's increased role. He told IHRC, "I think everything should fall under the [DEA]."⁶³³ Regardless of how the legislation allocates responsibilities, it should ensure that the environmental perspective is adequately taken into account in any comprehensive program to deal with mining's impacts.

Elements of a Reasonable Program

A reasonable program, modeled on that described in *Grootboom*, would represent the most efficient and effective solution to dealing with the impacts of mining in the West and Central Rand. While South Africa has taken some steps toward addressing the harm from the industry, it should strive for a program that is more coordinated and comprehensive.

To enhance coordination, such a program should establish an administrative focal point for design and implementation. Whether a committee or an individual, this focal point should bring a balanced view and organize the actions of all relevant players, including government

⁶²² Email from Bashan Govender, Assistant Director, Department of Water and Sanitation, to IHRC, June 2, 2016.

⁶²³ For further discussion, see Chapter 4 on Tailings.

⁶²⁴ *Grootboom*, para. 44. The Constitutional Court quotes and reaffirms this part of the *Grootboom* holding in its judgment in the *Treatment Action Campaign* case. It finds that a government policy denying HIV-positive mothers access to an antiretroviral drug that could prevent transmission of the disease to their babies was unreasonable. The Court explains, "[I]t must be kept in mind that this case concerns particularly those who cannot afford to pay for medical services. ... There is a difference in the positions of those who can afford to pay for services and those who cannot. State policy must take account of these differences." *Minister of Health vs. Treatment Action Campaign* [2002] ZACC 15, 2002 (5) SA 721, 2002 (10) BCLR 1033 (CC), paras. 68-70.

⁶²⁵ See National Environmental Management Laws Amendment Act, No. 25 of 2014, p. 2, introductory paras. (declaring that the amendments intend, *inter alia*, to make DMR "the competent authority for environmental matters in so far as they relate to prospecting, exploration, mining or production of mineral and petroleum resources" as well as the licensing authority for purposes of the National Environmental Management: Waste Act); *ibid.*, § 17 (granting DMR the power to implement NEMA and grant environmental authorizations for "prospecting, exploration, mining or operations," and prohibiting further legislative amendments unless they are approved by DEA, DMR, and DWA). See also Department of Environmental Affairs, "Government's One Environmental System Commences" (discussing changed responsibilities).

⁶²⁶ Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁶²⁷ *Ibid.*

⁶²⁸ Department of Environmental Affairs, "Government's One Environmental System Commences." See also phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015 (Under the old system, "it [was] difficult for the [license] applicants and from a business development perspective because the timeline [was] so long to get authorization.")

⁶²⁹ Phone interview with Mosa Mabuza, Deputy Director-General of Mineral Policy and Promotion; Andreas Moatshe, Chief Director of Mine Environmental Management; and Sibongile Malie, Director of Mineral Policy Development, Department of Mineral Resources, June 9, 2016 (statement of Mosa Mabuza).

⁶³⁰ *Ibid.* (statement of Andreas Moatshe).

⁶³¹ *Ibid.* (statement of Sibongile Malie).

⁶³² Phone interview with Werner Eiselen, Deputy Director of Reactive Administrative Enforcement, Department of Environmental Affairs, April 21, 2015.

⁶³³ Skype interview with senior official of mining company in the region (name withheld), December 4, 2014.

entities, communities, industry, and civil society. Legislative support would be necessary at every stage in order to provide structural stability and earmark necessary resources.

To be comprehensive, the program should ensure that the government not only pursues immediate preventive and remedial actions, but also articulates strategies for eliminating problems in the long run. It should devote special attention to meeting the needs of the most vulnerable communities. The program should emphasize mitigation of environmental and health concerns without neglecting the need for economic growth.

Efforts to improve the situation in the West and Central Rand would benefit further from a holistic perspective that informs the coordinated and comprehensive program just described. Such a perspective would illuminate how the various issues raised in this report intersect. It would take into account the connection between AMD and tailings and how proper storage of tailings can reduce the flow of AMD. It would recognize the importance of linking efforts to protect the environment and human health with those to engage communities; such integration would increase community support for any actions, improve relations among the relevant players, and potentially lead to the design of more successful plans. By giving the government an overarching understanding of the problem, a holistic view would also help it better prioritize tasks and marshal its financial and human resources. Ultimately, adoption of a national program that meets these standards would enable South Africa to minimize the adverse effects of mining on communities in the West and Central Rand and advance the realization of residents' human rights.

Acknowledgments

Bonnie Docherty, senior clinical instructor and lecturer on law at the Harvard Law School International Human Rights Clinic (IHRC), was the lead researcher and writer of this report. Harvard Law students from IHRC contributed significantly to the research and writing of this report and joined Docherty on each of the field investigations. The 2014 team consisted of Daniel Carpenter-Gold, Jennifer Garnett, and Kurt Krieger. The 2012 team consisted of Maia Levenson, Ruchi Parekh, and Misty Wright. The 2010 team consisted of Kyle Dandelet and Giovanni Mejia.

Other members of IHRC also made important contributions to the project. Meera Shah, then clinical advocacy fellow, co-supervised the 2012 project and field research trip. Cara Solomon, communications manager, conducted interviews on the 2012 trip. Clinical Professor Tyler Giannini, co-director of IHRC and the Human Rights Program, edited and reviewed the report. Additional assistance was provided by Katherine Talbot, IHRC program coordinator, and clinical students Mana Azarmi, Ben Collins, Michelle Ha, and Shannon Smyth.

IHRC is grateful to Mariette Liefferink, CEO of the Federation for a Sustainable Environment (FSE), for her informative tours of the region, endless patience with our questions, and helpful comments on the report. IHRC greatly appreciates the interpretation and logistical assistance provided by Tsholofelo Barnard, also of FSE. IHRC further wishes to thank Frank Winde, chairperson of Geography and Environmental Studies at the School of Basic Sciences, North-West University, for reviewing the scientific segments of the report.

Finally, IHRC expresses its gratitude to the many individuals who shared their experiences and expertise during interviews for this report.

The Cost of Gold: Environmental, Health, and Human Rights Consequences of Gold Mining in South Africa's West and Central Rand

Gold mining has brought risks as well as riches to South Africa's West and Central Rand. This region, encompassing Johannesburg and its environs, contains one of the largest gold deposits on earth. The extraction of this resource has left a dangerous legacy.

Based on more than 200 interviews and in-depth desk research, *The Cost of Gold* illuminates the environmental and health consequences of gold mining. In particular, it shows how the industry's adverse effects have compromised South Africans' human rights.

Gold mining has contaminated water, soil, and air with elevated levels of heavy metals, including uranium. Local people have been exposed to acid mine drainage when using local waterways for agriculture, laundry, or recreation. Residents have also inhaled dust from toxic and radioactive mine waste dumps, known as tailings dams.

While the government has taken some noteworthy steps to address the situation, its response has generally been slow and insufficient. It has not fully met its obligations to ensure that South Africans in the West and Central Rand can exercise their rights to health, a healthy environment, water, and housing.

The government has also failed to engage adequately with affected residents, thereby infringing on their rights to information and participation. Community members have received limited warning of the threats they face and been denied a voice in decisions regarding new mining operations and efforts to address the impacts of old ones.

The Cost of Gold calls on the South African government to adopt a coordinated and comprehensive program to deal with the crisis in the West and Central Rand. Such a plan should both mitigate the environmental and health effects of mining and help the country meet its responsibilities under national and international human rights law.