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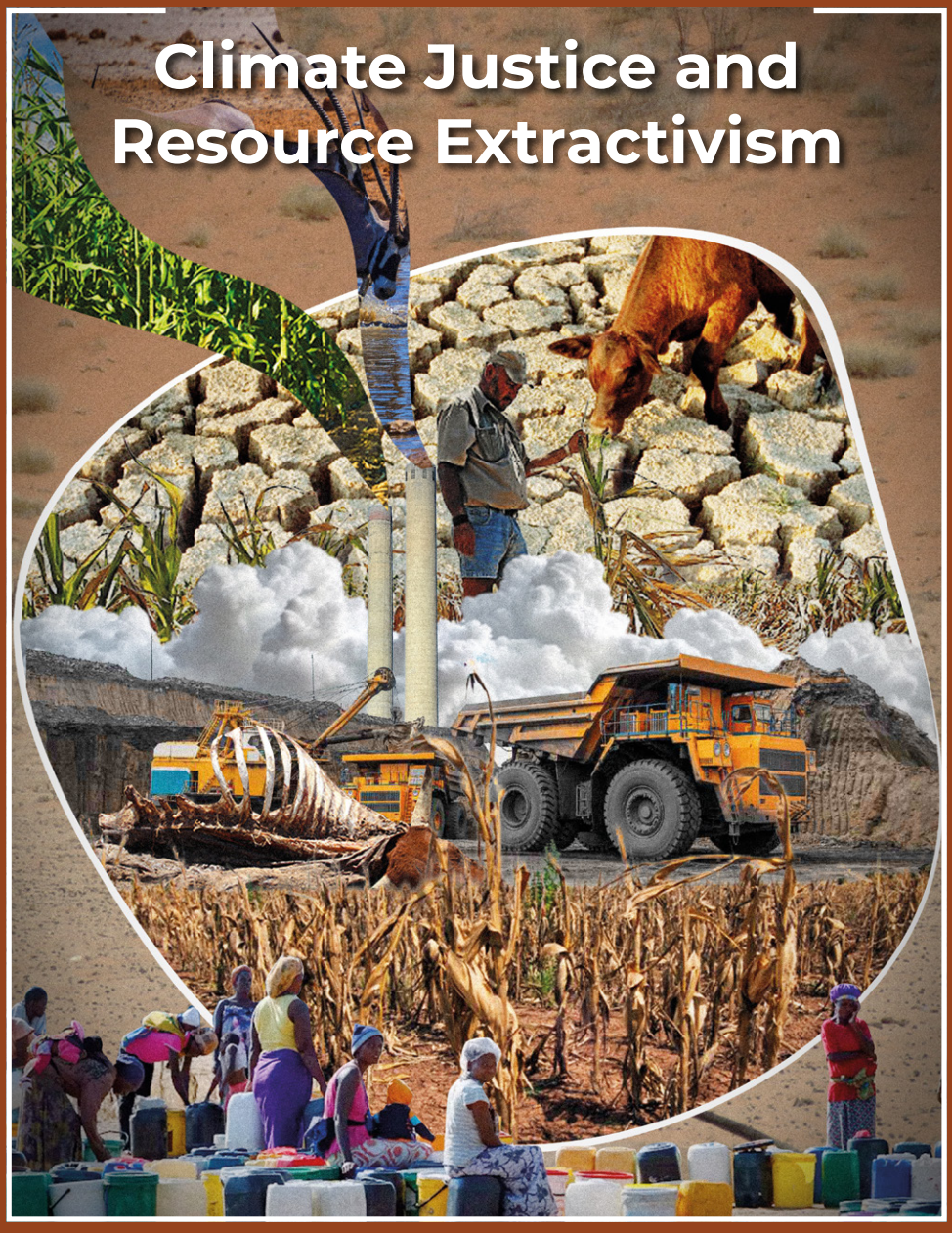

# Namibia's Sacrificial Zone: A Case Study of Arsenic Poisoning in Tsumeb

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This article has been translated and adapted rom an article published in (in different versions) in Switzeralnd, Canada and a daily newspaper in Namibia. Due to the significance of this topic, we included it in this journal.

## Background

Tsumeb was founded in 1905 by the German colonial power, which ruled Namibia from 1884 to 1915 as the colony German South-West Africa. Germany wanted not only the land of the indigenous population, but also the mineral resources of Namibia. The area surrounding Tsumeb was particularly rich in metal ores. Street names such as Copper Street, Silver Street, Zinc Street and Germanium Street still bear testament to the metals mined there until the late 20th century. There is a mining museum, and the city hosts an annual Copper Festival. A hill separates the 40 000-plus inhabitants of the city from the area of the former mine, where today ore is no longer mined, but copper continues to be smelted. Five-hundred metres lie between the slightly elevated arsenic landfill and the nearest school, and about 700 metres separate the smelter from the central Minen Hotel, whose entrance wall proudly displays a hammer and a pick – the international symbols of mining.

Dundee Precious Metals (DPM) smelted highly arsenic-laden copper ore in Namibia for 14 years on behalf of the Geneva-based metal trading company IXM. In September 2024, the smelter was sold to the Chinese company Sinomine Resource Group; DPM left behind approximately 300 000 tonnes of highly toxic arsenic trioxide, deposited above a groundwater source that is of national importance.

From 2008, the provenance and composition of the copper ore processed in Tsumeb changed. It no longer came from the local mine or another southern African country, but from Europe. In that year, DPM opened the Chelopech copper and gold

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mine in Bulgaria. The initial plan was that the copper in the ore mined there was to be extracted with cyanide, or that the ore was to be smelted on site. However, the Bulgarian government refused to issue the required permits, citing environmental and health risks. The Chelopech ore contains around 5.5% arsenic, far above the typical concentration of less than 1% . The smelting of such ores is prohibited in many countries. There are only four smelters worldwide that accept such "complex ores" (sometimes also referred to as "dirty ores") for smelting. Tsumeb is one of them.

DPM first sent copper ore from Bulgaria to Namibia in 2008 for testing. In 2010, the Canadian group bought the smelter. To ensure full capacity utilisation, additional ore from Peru – also high in arsenic – was introduced. From that point on, DPM transported the pulverised, anthracite-coloured ore from its mine in Chelopech about 13 000 kilometres by truck, ship and railway to Tsumeb to smelt it there at over 1 200 degrees Celsius and separate it from the arsenic and other toxins. When the Ministry of Environment and Tourism intervened in 2012 and forced DPM to reduce the production capacity of the smelter, a large-scale investigation co-funded by the UN Environment Program was undertaken, but the relevantreport was never published. However, it was obtained from a former DPM employee who had scanned it. The report concluded as early as 2012 that the smelter was ill-equipped to process such arsenic-


*This is the smelter in which highly arsenic copper was processed by DPM until 2024.*

*Source Author*

rich ore from Chelopech. As a result, gaseous arsenic evaporated through the production process passed into the environment, seriously endangering the employees there.

Even though the management knew early on about the workers' exposure, they insisted that the plant remain operational. The report's authors also pointed out that "the government has insufficiently trained and experienced inspectors to monitor the industry." At that time, they already recommended a broad-based clinical examination of the "high risk communities", including long-term monitoring of cancer cases, including death certificates. This was later also demanded by a doctor who wishes to remain anonymous. He claims that he advised DPM on health issues for a long time, and criticises the company for its unprofessional monitoring of arsenic exposure among workers.

## Setting: Scenes from a post-apocalyptic movie

Travel enthusiasts primarily associate Namibia with vast, unpopulated swathes of savannah, animals in the wild, and luxurious lodges in national parks and protected areas. In Tsumeb, a small town in northern Namibia just 100 kilometres from the world-famous Etosha National Park, none of this can be found. Here, the landscape is characterised by fields of jet-black slag, high in toxic waste, and bright green sewage basins. They are the legacy of decades of mining and a huge copper smelter built in the 1960s that is still in operation today, mainly processing copper ore from Europe and South America. At the beginning of August 2024, through the mediation of a former employee, I gained access to an area of about nine square kilometres which is fenced off with barbed wire. This was surprising, as visit requests from journalists, scientists and NGOs are normally rejected by DPM.

We drove slowly in a DPM minibus, first towards the smelter and then to the waste dumps. In opaque, grey-filtered light, we passed post-apocalyptic scenes – rusty steel ribs, industrial buildings, pipelines, smoking chimneys and gigantic excavators. Everything was covered with dust. The few workers we saw, wearing protective suits, gloves, helmets and gas masks, were hosing down unpaved pathways. Working here requires protection against the hazards of toxic dust and vapours. We drove past tonnes of rusty steel pipes, discarded machines, and caldrons that had been abandoned for years, awaiting decontamination that would allow for their removal and disposal.

The bus continued past fields in a southerly direction towards the Hazardous Waste Disposal Facility, which is in fact a landfill with two

huge piles of white powder – arsenic trioxide, a stable form of the element arsenic. It is so toxic that a mere tenth of a gram, if swallowed, can be fatal. This deadly material is packed in sugar bags and transported in mine vehicles from the smelter to the landfill, where it is dumped in piles that are levelled by a bulldozer. A former senior employee of the smelter estimated that about 300 000 tonnes of this known carcinogen are stored in the landfill – enough to kill the world's entire human population multiple times over.

## Research Results

Data were collected through observation during site visits and face-to-face interviews conducted with numerous Tsumeb residents between July and August 2024. In addition, 25 interviews were conducted with current and former employees of the smelter; further interviews were conducted with activists, researchers and two former directors of the smelter; and 30 samples of water, soil, plants and hair were collected on site and analysed by the Soil Science Group at the University of Bern in Switzerland. The data generated were supplemented by secondary data from research reports.

*An estimated 300,000 tonnes of toxic waster are stored in Tsumeb.*
*Source Author*

The laboratory tests confirmed the findings of previous studies, namely that the soil near the smelter is massively contaminated with arsenic and other heavy metals. According to Adrien Mestrot, Associate Professor for Soil Science at the University of Bern, "These values are extremely high, with up to two percent arsenic in the soil, which is comparable to other soils contaminated by smelting". The leaves and grasses that were analysed also had very high arsenic values: "We didn't test the fruits of these plants, but these levels suggest that edible parts could also be significantly contaminated," said Mestrot.

Arsenic accumulates in hair. Analysing hair is therefore a reliable means of measuring long-term exposure. In our samples, employees of the smelter and residents who live to the west of the smelter showed the highest arsenic concentration values. The latter area is particularly affected by emissions and dust from the smelter due to prevailing winds.

The highest measured values were found in people who suffer from symptoms associated with arsenic exposure. According to previous studies, arsenic concentrations in hair of more than 1 mg/kg indicate excessive exposure. All samples from Tsumeb exceeded this value, and in eight out of 12 samples, did so by at least three times. One smelter employee exceeded this value by a factor of 20. The arsenic content in the samples from Tsumeb was up to 100 times higher than samples collected in the Namibian capital, Windhoek, and in Switzerland. "The values are frightening, and show that the population of Tsumeb is massively exposed to arsenic," said Mestrot. "It is essential that further tests be conducted to understand the true extent of the health effects of the smelter."

The research revealed that the Geneva-based metal trading group IXM had copper ore with extremely high arsenic content processed in Namibia for years, and that its business partner DPM has taken advantage of Namibia's weak regulatory environment to dispose of highly toxic and carcinogenic arsenic trioxide in Africa. Risks to which the population of Tsumeb, particularly employees of the smelter, were knowingly exposed were accepted in the interests of the copper trade's profit. The management of DPM in Canada were informed early on that employees were sometimes exposed to very high arsenic concentrations. Despite being warned, and with full knowledge of the cancer risks involved, the management took no action.

## Impacts on the environment and human health

Copper smelting produces two particularly toxic waste products:

arsenic trioxide, and sulphur dioxide. The latter, a gas, was eleased into the environment in large quantities by the smelter until the end of 2016. The air often smelt of rotten eggs and garlic, and Tsumeb residents recall that it irritated their mucous membranes. On certain evenings when low clouds trapped the gas as if under a lid, the plants in the gardens and the corn in the fields were burned the next morning. Former employees confirmed that farmers were compensated several times after such losses; some say they were "bought".

The other waste product, arsenic trioxide, may lack the pungent odour of sulphur dioxide, but is far more dangerous. According to the World Health Organization (WHO), it is incontrovertibly carcinogenic. When ingested, it disrupts biochemical processes in the body, such as the repair of the DNA, energy metabolism in cells, and transport processes between receptors. Studies have shown a link between long-term arsenic exposure and increased infant mortality, impaired cognitive development, renal failure, and various types of cancer in adolescents. The symptoms of such exposure are diverse and difficult to trace back to the original source. The first signs are often skin problems, especially skin discolouration and hardening, or respiratory problems, usually in the form of bronchitis.

In 2011, a year after DPM took over the smelter, the complaints of workers began to pile up. Newspaper reports from this time show DPM workers with rashes all over their bodies, burst and bloody blisters, and blinded eyes. The management at the time denied any connection between these conditions and the smelter, claiming they were symptoms of HIV/AIDS. The situation escalated to such an extent that Namibia's Ministry of Environment and Tourism intervened in 2012, forcing DPM to temporarily halve the smelter's capacity, thereby reducing the volume of arsenic trioxide produced.

## Workers' testimonies

I meet Walter Haihambo on the terrace of a Tsumeb hotel, where tourists, mining industry consultants and NGO employees mingle. He speaks Oshiwambo, and a colleague translates for us. In 2011, Haihambo worked for half a year in the DPM smelting plant, at the hose filters where the arsenic vapours from the smelting furnace are cooled and crystallised into powder. He and his colleagues packed the arsenic trioxide into bags for transport to the landfill. Soon after starting at the smelter, Haihambo developed rashes all over his body, including his face. The company's doctor examined him and took a urine sample, but Haihambo never saw the results. Initially, he was transferred for a month. When he returned to his original workplace, the

rashes began again. After half a year he was fired, because, Haimbo said, "it was said that I was not fit enough to continue working in the smelter."

He rolls up his jeans and shows us his legs. They are scarred from the ankles to the thighs. The rash made blisters and burned so badly that he scratched permanent scars on his legs. "Sometimes it still burns today," he says. Haihambo has joined forces with other injured ex-DPM workers and is demanding financial compensation from the Canadian group for damage to his health and the lifelong medical care he will require. To date, DPM has not responded to the demand.

Arsenic trioxide irritates the skin due to its toxicity and low pH, which can lead to a violent rash. This "arsenic rash", as Walter Haihambo describes it, occurs particularly frequently in Tsumeb, as reports by occupational physicians from South Africa indicate. If you talk to former and current DPM employees, practically everyone knows someone who has already been afflicted with pustules.

In Tsumeb's Nomtsoub suburb, many streets are unpaved and riddled with potholes. In the evenings, the residents sit outside their simple brick houses with corrugated iron roofs or gather around braais frying meat on skewers. Teenagers drink in shebeens (informal pubs), while amapiano (a southern African house music genre) booms from loudspeakers. It's here in Nomtsoub that we meet Nikasius Hangula. He also belongs to the group of men who are demanding compensation from DPM. Under a glaring light bulb in a modest living room, he tells the story of how the smelter has affected him.

Hangula was hired by the mine in 1973 as a 19-year-old, repairing the railway tracks that transported ores and metals to the coast. After the mine was closed, he moved to the smelter till his retirement in 2014. His stories of the early years sound nostalgic, but the closer they come to the present, the more sinister they become. "It was only with DPM and the copper ore from Bulgaria that the problems in the smelter began," he says. Long-time colleagues suddenly complained about unbearable itching and skin rashes that turned into blisters that left open wounds. "We didn't know such things before."

Nikasius Hangula's arm trembles uncontrollably during the conversation – a problem with his nerves, possibly Parkinson's, he doesn't know exactly. He appears weak and frail, and tells of regular abdominal pain and a damaged kidney. Most of the colleagues with whom he worked in the smelter are sick today. "When we confronted

our superiors at DPM with the skin rashes, they simply claimed we were not wearing our protective clothing properly." Since then, Hangula has become something of an unofficial chronicler of the resistance against DPM. Employees have repeatedly denounced the working conditions in the smelter. They could not count on the union because they aligned with the government and DPM management. Their only support came from local and, occasionally, international NGOs. Many workers were fired because of their resistance. There were also some who resigned of their own accord, who suddenly became silent and moved away. "DPM put employees under pressure and silenced them," says Hangula.

## Headquarters in Canada knew

An internal company report from 2013 revealed that in particular employees in the "arsenic plant" were exposed to high arsenic concentrations. In this separate manufacturing building, which was only closed in 2017, DPM processed the arsenic trioxide produced in the smelting process so that it could be resold to manufacturers of pesticides and wood preservatives, mainly in Malaysia. According to the report, arsenic concentrations in the air at the facility were up to 15 times above Namibia's legal limit. Urine samples from workers showed levels up to eight times the Namibian legal limit. If DPM were to have been assessed against international standards, the results would have been even more damning.

These levels remained consistently high in subsequent years, with some measurements surpassing earlier records, according to a former DPM employee with access to health data, who does not want to be named. According to him, "The management in Canada was informed early on about the severe exposure levels of the workers. Yet, the directive was clear: keep the plant running." He says that David Rae, the Chief Operating Officer at the time and current CEO of DPM in Toronto, was informed, as was Nikolay Hristov, the current Vice President of sustainability. The numerous warnings from Tsumeb were deliberately ignored in Canada: "DPM has benefitted from the weak regulation and the lack of control by Namibian authorities," says the former employee. "The health of the workers was not a consideration." We have confronted the DPM headquarters in Canada with these allegations, but despite repeated follow-ups, we have never received a response. No one knows how the 30 employees who worked in arsenic production are doing today, and whether they are still alive. Although a list of their names exists, no effort has been made to locate them. "The perfidious thing is that arsenic-related cancer often only

surfaces many years after exposure," says the former employee. "And DPM knows that."

## IXM – a heavyweight in the global metal trade

From the outset, DPM's central partner was the multinational group Louis Dreyfus Company (LDC), whose operational headquarters are in Geneva. In 2017, LDC sold its metal division for US$466 million to the Chinese company Natural Resources Investment Fund. The company was renamed IXM in 2018.

IXM is a world-leading metals trading group that emerged in 2017 from the sale of the metals division of LDC. It has over 450 employees worldwide with its headquarters located in Geneva. Today, IXM is the third largest group in the industry, right behind Glencore and Trafigura. Nevertheless, very few people have ever heard of the company. In 2023, IXM sourced copper, zinc, lead, nickel, aluminium, cobalt and niobium from over 40 countries across six continents. In 2022, the group generated a turnover of around 21.5 billion Swiss francs. The Chief Executive Officer of IXM, Kenny Ives, previously worked at Glencore for over 25 years, where he last headed the nickel division.

Since DPM took over the smelter in Tsumeb in 2010, LDC (and later IXM) have had exclusive purchase rights for the copper processed there. In 2010, LDC opened its own warehouse for the copper ore imported from Bulgaria in the port of Walvis Bay on the Namibian coast. From there, the high-arsenic ore was transported by rail inland to Tsumeb. IXM had exclusive rights, valid until 2026, to buy copper concentrate from the Bulgarian Chelopech mine, to have it processed in the Tsumeb smelter in Namibia, and to buy all refined blister copper from the smelter. This exclusive agreement benefited IXM, as they were able to have the problematic copper ore with its high arsenic content processed in Tsumeb by DPM, while at the same time DPM also benefitted by having a predictable throughput for the smelter. Because the ore from the Bulgarian Chelopech gold and copper mines and from copper mines in South America was so toxic – or "complex", as it is termed in DPM's annual report – DPM was able to charge a high price for processing. On 30th August 2024, DPM sold the smelter for US$20 million to the Chinese Sinomine Resource Group Co. Ltd. This also ended all purchase contracts with IXM.

The headquarters of IXM, which is part of the Chinese CMOC Group, are located in Geneva, with a branch in Zug and offices on several continents. DPM acted as a sort of service provider for IXM. The Swiss-based group buys copper ore from Chelopech and other

mines, organises and finances the transport to Tsumeb, and then has the exclusive rights to accept the processed blister copper with a purity of around 98 percent. Copper is a lucrative core business for IXM. The metal is in demand because it is one of the most important for key technologies such as photovoltaics and energy production from wind. In recent years, prices for copper have mostly pointed in one direction: upwards. According to information supplied by IXM, its revenue is more than US$20 billion per year through the sale of metals. The Group's website lists a number of sustainability awards it has received, including "The Copper Mark", which is intended to guarantee the responsible production of copper, nickel, zinc and molybdenum and "contribute to a positive legacy and a sustainable society".

Relations between LDC (later IXM) and DPM have been close since the takeover of the smelter. Swiss-based employees regularly visited the smelter, as confirmed by several former DPM employees. In addition, IXM commissioned consultants from Bureau Veritas, stationed in Tsumeb, to ensure that DPM produced the agreed quantities of copper. According to a former DPM employee with insight into the coordination between DPM and IXM, the headquarters in Geneva was informed practically daily about the operations of the smelter. Despite this, IXM did not intervene to protect workers and the population of Tsumeb from the toxic emissions of the smelter. We also confronted IXM with the statements of former DPM employees and asked several times why the management had not intervened when it saw reports detailing the high arsenic levels. These queries were unsuccessful; IXM merely referred us to DPM.

## Chemical exposure

Most of Tsumeb's shops line up along the central President Street, with bulky pick-ups parked in front of fast food restaurants. Women sell nuts and vegetables from the surrounding area on cloths spread out along the pavement. Groups of young men stand around, chatting and drinking beer.

In one of the shops, we meet a young shop owner (who wants to remain anonymous). Her arms, neck and face are covered with red pustules, resembling a rash of measles. She has been living in Tsumeb since 1991, and says her skin problems started in 2009. Since then, she has frequently suffered from stomach cramps and nausea at night and in the morning, enduring severe headaches that are often so intense that they make her vomit during the day. She digs out two boxes of different brands of painkiller. "I wouldn't manage without them," she says.

Her neighbour is also sick. As soon as she spends some days at the coast, she feels better again. "But Tsumeb is my home, I don't want to leave." Her small shop is located at the northern end of the city and only a few hundred metres from the arsenic landfill.

A young man dressed in smart attire and sporting a freshly shaved haircut overhears our conversation and says, "Look at my cheeks." They are rough and a little red. He is very worried about his appearance. "I think these chemicals are responsible," he says, and points in the direction of the smelter.

In the centre of Tsumeb there is a surprisingly high number of pharmacies. As we learned, they don't lack customers, and provide insights into the health problems of the community. The pharmacist at Tsumeb Pharmacy, Buys Steenkamp, reports no out-of-the-ordinary symptoms among his clients. "Nothing unusual – dry skin, as is common here during the winter months," he says. However, the pharmacist at Etosha Pharmacy, Annemarie Erasmus, says it is striking how many medications for respiratory diseases she sells, especially nasal sprays and cortisol. The supplier confirmed to her that nowhere else in the country are such large quantities of these medications sold. A third pharmacist wanted to remain anonymous because she doesn't want to get into trouble. "We are all suffering from the smelter here," she says. She describes how often she wakes at night because of the smoke and the gases from the smelter, struggling to breathe. When she came to Tsumeb six years ago, she was shocked at how many people sought help from the pharmacy for allergies and skin problems. She tells of frequent skin fungus infections in children. But very few residents are willing to complain or oppose DPM. "Most people are grateful when we give them an ointment. They don't want to cause trouble – above all, they want jobs."

DPM is by far Tsumeb's most important employer, until August 2024 providing jobs for 650 workers at the smelter, alongside hundreds of "contractors", who handle cleaning, maintenance and transport. DPM pays by far the best wages in the region, making the jobs highly sought after. A woman who had worked as a receptionist in the smelter since 2016 says she earned N$12 000 per month , double the average pay in other Namibian companies. DPM consciously cultivates its image and does not tire of emphasising how important the smelter is for the local economy. On huge billboards at the entrance to the city, the company boasts of "respect" and "inclusion", as well as of their being "stewards of the environment". DPM sponsored the shade roof in front of the post office

building, DPM organises the annual golf tournament, DPM is the main sponsor of the annual copper festival in Tsumeb, DPM donates laptops for schools and renovates football fields, and together with the community is building an open-air gym with the slogan "Healthy body, healthy mind, healthy life", as proclaimed on an information board.

## Political connections

Relations between the company and the government are close, with politicians frequently visiting the smelter. Zebra Kasete, CEO of the smelter until the end of August 2024, grew up in Namibia, studied metallurgy, worked for Rio Tinto, and managed a diamond mine in Zimbabwe. He is also vice-president of the Chamber of Mines in Namibia and maintains excellent relations with the ruling SWAPO Party. President Hage Geingob, who passed away in February 2024, personally visited the smelter in 2016 to open the new sulphur dioxide plant. DPM is largely tax-exempt, as the smelter is a designated export processing zone. All the copper produced in Tsumeb, so-called blister copper with a copper content of 98.5 percent, is immediately exported. Virtually nothing remains in Namibia, except the toxic waste.

For many, it came as a surprise when, in March 2024, DPM announced that it wanted to sell the smelter to the Chinese group Sinomine Resource Group for US$49 million, mainly because the company had invested more than US$515 million in the smelter since 2010. By the end of August, the deal had been sealed, but Sinomine paid only US$20 million. Many found it strange that the Canadian company should be in such a hurry to get rid of the smelter and disappear from Namibia.

## Trust lost

In August 2023, significant public resistance against DPM emerged for the first time. According to the organisers of a demonstration, over 700 people took to the streets, mainly from Nomtsoub. The straw that broke the camel's back was widespread unemployment and an incident involving a truck from the smelter, which was illegally cleaned in a public garage in the town. Fears arose that the truck had carried arsenic-loaded material and that arsenic could have entered the community's wastewater system. Concerns about water quality have been a persistent issue in Tsumeb. In a petition handed over to DPM during the demonstration, the organisers demanded an investigation into the incident and requested free medical examinations for all Tsumeb residents "to assess our health status, as we are daily exposed to arsenic and other toxic substances." The petition also declared: "The Tsumeb community has lost faith and trust in the corrupt

management of Dundee Precious Metals, which has no compassion for the residents." On 11 August 2023, the demonstrators marched towards the main entrance of the smelter and demanded the immediate resignation of CEO Zebra Kasete and other senior managers.

The demonstration was organised by the Tsumeb Community Concern Representatives. I meet the founder, Lisken Claasen, and several comrades one evening in the dimly lit room of a kindergarten on the outskirts of Nomtsoub. A thick folder with material collected on DPM and the smelter lies on the table. Claasen coughs and clears her throat constantly. "We are seriously worried about our health here," she says, "our men become impotent, many suffer from diabetes or high blood pressure, we see miscarriages and children with disabilities. DPM always says 'safety first', but we don't see them being genuinely concerned about the health of workers or the residents of Tsumeb."

Mujiwa Diamantina, a co-founder of Tsumeb Community Concern Representatives, says: "We have been there, we have seen the arsenic landfill for ourselves. When there is a strong wind, you can see the powder spreading into the surroundings." She continues that the soils in Tsumeb are obviously contaminated with arsenic trioxide. She is worried because many grow vegetables and fruits in Tsumeb and the arsenic and other heavy metals from the slag dumps may have entered the food chain. "We feel powerless," says Diamantina. "We don't trust the information from DPM, but we don't have the money to commission experts from abroad with independent tests." The government was aware of the situation for a long time, but would not do anything, she says, and the same applies to the municipal administration.

## Permission for research into health risks refused

DPM and the Namibian government have long been aware of the risks to which the people of Tsumeb are exposed. In 2011, in cooperation with the German Federal Institute for Geosciences and Raw Materials, researchers at the University of Namibia in Windhoek tested 148 people from Tsumeb for arsenic and other heavy metals in their blood and urine. One in six persons had arsenic values above the WHO safe limit; in one case, the safe limit was exceeded by a factor of nine. Similarly, lead levels were above WHO limits in one-fifth of the participants. Residents of the industrial area adjacent to the smelter directly to the south, and in the suburb of Nomtsoub, were particularly affected. The scientists attributed the high values to the inhalation of contaminated dust, contact with contaminated soil, and the

consumption of products from their own gardens. However, the results were never published in a scientific journal. "We didn't have permission for it," says a researcher involved, who wants to remain anonymous. The research had been funded by the government, which had the final say. "They argued that the results could deter foreign investors in the mining sector."

In 2014, the same research group analysed 43 samples of tomatoes, carrots, corn and pumpkins from Tsumeb for heavy metals and arsenic. All samples showed significant accumulations of lead, cadmium and arsenic. "These elements can seriously affect human health if contaminated fruit and vegetables are consumed regularly or in large quantities," the study says, recommending that the vegetables should not be eaten. The researchers proposed creating zones around the smelter where agricultural activity would be restricted or banned entirely. In particular, growing leafy and root vegetables, which are prone to accumulating heavy metals, should be prohibited throughout the city and on agricultural land up to 10 kilometres west of the smelter. The researchers also recommended measures for the remediation of polluted soils, including the removal of the contaminated upper soil layers. None of these measures have been implemented by DPM or the government.

According to a researcher involved in the study, "At that time, we would also have liked to analyse hair and fingernail samples to better understand how many people in Tsumeb have high arsenic and lead values." Unlike in urine samples, in hair cumulative arsenic ingestion can still be detected long after exposure. But the Ministry of Health and Social Services would not approve these tests, or even studies on the impact of arsenic and lead exposure on children. "Tsumeb has essentially become off-limits for Namibian researchers," the researcher says. "It is simply too sensitive for the government." We have confronted the Ministry with these statements, as well as with the results of our own analysis. Despite repeated follow-ups, we have never received an answer.

## Lack of transparency

DPM rebutted the research findings with its own measurements. According to the company, air quality in Tsumeb is continuously monitored using six measuring stations, while water quality is regularly checked at 31 groundwater boreholes in and around the smelter area. However, the environmental data are neither publicly available nor independently reviewed. DPM argues that all pollution, as well as the high arsenic and heavy metal levels in the soils, predates its acquisition of the smelter in 2010. It is not disputed that decades of mining and copper

smelting had already contaminated the soils with heavy metals before DPM's arrival. However, a 2020 study by Australian researchers measuring lead isotopes in dust samples found that residents continued to be exposed to dust from the slag fields and tailings heaps, and that the current operation of the smelter contributes to the exposure. Their modelling also shows that the absorption of dust through the mouth and food is the most important route for the absorption of arsenic, followed by inhalation. Especially the volatile dust which reaches the vicinity of Tsumeb from the landfills and the arsenic landfill is of concern, as it is very fine and has a high content of toxic elements. The researchers concluded that this dust exposure significantly increases the risk of cancer for the town's residents.

"The smelter in Tsumeb is dirty and dusty compared to similar operations," says Mark Patrick Taylor, a global expert with over 40 years of experience in mining-related environmental impacts and the lead author of the Australian study. When he took samples on site in 2018, he observed the lack of effective measures to contain the dust development – the main source of exposure for the population. "There is no doubt that the smelter is a source of environmental pollution and the harmful exposure of the people in Tsumeb." This is especially true for young children: "Studies in Australia have shown that the unintentional intake of lead in children is often much higher than in mothers, because they put everything in their mouths and are particularly exposed to toxic substances through the mother's clothes and breasts. There is no reason to believe that this would be different with arsenic."

According to Taylor, DPM's hasty exit from Tsumeb would be difficult to achieve in Europe, the USA or Canada, as stricter environmental regulations would require site remediation before the sale, or require that millions of dollars be deposited in a public fund for a future cleanup. None of this is planned in the case of Tsumeb, even if the smelter violates the right of future generations to an intact environment. The hasty departure is thought to be a ploy to evade responsibility and liability for the environmental damage and negative health impacts the company has caused in Tsumeb.

Ninety-two percent of deaths due to pollution are recorded in low- or middle-income countries, many of them in Africa. The Namibian Constitution states that the government "should take measures against the deposition or recycling of foreign nuclear and toxic waste on Namibian territory". Furthermore, the Constitution stipulates those conventions, such as the Basel Convention on the Control

of the Transboundary Shipments and Disposal of Hazardous Wastes, which has been ratified by 191 countries, including Namibia, Canada and Switzerland, is applied as part of Namibian legislation. This convention aims to prevent wealthy countries from disposing of toxic waste in poorer countries. Arsenic is explicitly mentioned in the Convention.

Attempts to take legal action against DPM have so far failed. The Namibian Legal Assistance Centre, which represents injured parties on a pro-bono basis, began investigations, but discontinued the case due to insufficient data. In 2019, the English law firm Leigh Day interviewed a dozen workers and wanted to sue DPM for damages. Because the company is registered in Canada, but Leigh Day is based in England, however, the firm wanted to sue the European Bank for Reconstruction and Development, which is based in London, as being liable for the health damage in Tsumeb, as the bank had co-financed the expansion of DPM's mine in Bulgaria from January 2017 to July 2024 with US$40 million. The plaintiffs argued that the bank knew or should have known about the risk of arsenic poisoning of the workers in Tsumeb. However, it soon became clear that the bank enjoys far-reaching immunity and cannot easily be prosecuted before a national or international court.

At the end of August 2024, Namibia's National Competition Commission gave the green light for the sale of the smelter after five months of deliberation – without any requirements regarding the safe storage of the arsenic waste, even though this is exactly what had been demanded by NGOs, researchers and the population in Tsumeb. "Why did DPM choose Namibia of all places to deposit this waste?" asks Richard Naobeb, a member of Tsumeb Community Concern Representatives, the citizens' movement that organised the demonstration against DPM. "And now they simply sell the smelter to a Chinese company and run away – without having to take any responsibility!" He wonders if there is a plan for the closure of the arsenic landfill and whether a fund has been set up for the remediation of the land. He doesn't know, because he never received an answer from DPM. "You have to remove this arsenic landfill!" says Naobeb. "This is not just about us, but also about the future of our children."

## Arsenic waste threatens groundwater

Some in Tsumeb say the Hazardous Waste Disposal Facility is a ticking time bomb. It was built in 2012 on an aquifer of national importance, the Tsumeb Karst Aquifer, which is connected to other aquifers in the region. The landfill is located in a

porous dolomite zone, known for its geological faults and for the formation of sinkholes. According to experts, the landfill should never have been built at this location. Arsenic trioxide is water-soluble, meaning that heavy rains could leach it into the ground. If the landfill's liner fails, there is the possibility that arsenic will diffuse into the soil over a large area and get into the groundwater – a catastrophic scenario. Tsumeb relies entirely on groundwater for its drinking water supply. Additionally, more than 80 farms to the north depend on groundwater for growing vegetables, maize, wheat, cotton, and lemons.

## No remediation plans

In 2016, DPM commissioned an environmental impact study from the international firm SLR Consulting, for a planned expansion of the smelter, which would increase its capacity from 240 000 to 370 000 tonnes of copper ore annually. The experts from SLR came to the conclusion that negative effects of the smelter on groundwater quality are already measurable and likely to intensify. Borehole samples from the site revealed levels of arsenic, molybdenum, and sulfate exceeding Namibia's drinking water standards. So far, the contamination has not yet penetrated into the areas in which the drinking water for the population is received, as also shown by analyses by the University of Bern of drinking water samples from Tsumeb. The SLR simulations indicate that the groundwater's heavy metal contamination will slowly spread northwards into agricultural areas. At the time, the experts recommended a large-scale remediation operation of the existing landfills. To this day, no such plans for Tsumeb have been announced.

The scale of environmental remediation required in Tsumeb to be in accordance with international standards can be compared to current efforts in Yellowknife, the capital of Canada's Northwest Territories. There, US$4.4 billion will be invested to safely store arsenic waste from the Giant Mine. For years, 237 000 tonnes of arsenic oxide were stored in 15 sealed chambers 76 metres below the earth's surface. To prevent leaching and contamination of the groundwater and to secure the landfill in the long term, the chambers are now being permanently frozen – an exceptionally complex undertaking expected to last until 2038. Canadian taxpayers are footing the bill after the responsible company, Royal Oak Mines Inc., declared bankruptcy in 1999.

For Tsumeb, however, there are no such plans. Although Dundee Sustainable Technologies, a subsidiary of DPM, on its website heaps praise on a "cost-effective" and "environmentally friendly" technology for the storage of

arsenic trioxide through vitrification, this option has not been implemented. Vitrification involves turning arsenic trioxide into a glass-like substance to prevent leaching. DPM claims to have conducted a pilot project in Tsumeb. During a visit to the smelter in early August, CEO Zebra Kasete showed a small piece of glass that is supposed to contain arsenic trioxide. However, he could not provide cost estimates for vitrifying the 300 000 tonnes of arsenic trioxide stored on-site, nor did there seem to be any concrete plans for its implementation. DPM does not have to worry about that anymore. The Chinese buyer Sinomine Resource Group took over the smelter in September with all responsibilities and liabilities. Was that the reason for the low selling price of $20 million?

Even during our tour of the smelter area at the beginning of August, there was no indication that the hazardous waste disposal site in Tsumeb would soon be closed. A landfill section that had already reached its maximum capacity had been covered with plastic sheeting; another was open and continues to be filled, with a group of men, dressed in white full-body suits and gas masks on their faces, shovelling white-grey powder onto a pile; a third site is already being prepared. This powder is probably arsenic trioxide residues from the basin, which was formerly used to collect contaminated water. Kasete confirms plans to enlarge the landfill, and says: "We assume that we still have capacity for another two to three years."

At the end of the tour through the dusty smelter area full of industrial waste, Kasete shows a small recycling station where plastic, paper and glass from the smelter offices are separated. Two employees, their faces also hidden behind gas masks, sort boxes with little enthusiasm. "This is our small contribution to saving the world. Everyone has to make a contribution," says the CEO. He proudly says that an employee of the Ministry of the Environment and Tourism inaugurated the station and praised the project as a model for the whole of Namibia. With regard to the renaturation of the area widely communicated by DPM, Kasete refers to a phyto-remediation project. DPM claims to have planted 15 000 tamarisk trees around the smelter, a resilient species that can also cope with dry and saline soils. They are known for extracting heavy metals from the ground and storing them in the wood. Once they are large enough, they should be burned in the smelter's furnace. "We want to leave a positive legacy and leave the place cleaner than we found it," says Kasete. Dioni Davindschima, who is responsible for the project at DPM, shows us the tamarisks. They are only chest-high, and grow in a pitch-black, sandy soil that should actually

be reddish. They look stunted and weak. We ask Davindschima if all the originally planted trees had survived. "No, about 40 percent have died," she says. "Probably because of the soil."

## Assessment of the Coalition for Corporate Responsibility

If DPM were based in a European Union country, it could not simply leave Namibia without taking responsibility for the affected workers and residents, and the waste they have left behind. The new Corporate Sustainability Due Diligence Directive, adopted by the European Union in mid-2024, obliges corporations to comply with human rights and environmental regulations in their business operations. If a group violates these rules, it will be held liable for the damage caused. Switzerland, however, is not a member of the European Union, and still has no corporate responsibility law, and IXM, based in Geneva, therefore does not have to fear any consequences for the environmental pollution in Tsumeb, although the group profited from it for years. Also in Canada, there is still no comprehensive corporate responsibility law, but a legislative proposal that would address the issue is pending in parliament. Due to a different legal system in Canada, there have also been several legal proceedings against corporations in the past which were terminated by settlements being agreed upon.

Whether IXM will ever have to care about human rights and environmental requirements remains uncertain. Switzerland will soon be the only country in Europe without legally enforceable corporate responsibility. The Tsumeb case thus shows once again why a comprehensive corporate responsibility law is also needed in Switzerland to oblige corporations like IXM to comply with human rights and environmental standards, and to make it possible to hold them responsible for the damage caused in the event of violations.